



Environment and
Climate Change Canada

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Hearing Order OH-001-2014

Trans Mountain Pipeline ULC

Application for the Trans Mountain Expansion Project

Written Argument-in-Chief of

ENVIRONMENT AND CLIMATE CHANGE CANADA

to the National Energy Board

January 2016

**Hearing Order OH-001-2014
Trans Mountain Pipeline ULC
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Intervenor: Environment and Climate Change Canada

Environment and Climate Change Canada (ECCC) has limited this written argument-in-chief to comments on the draft conditions released by the National Energy Board in Procedural Direction No. 17 (Exhibit A199) on August 12, 2015 and in its letter (Exhibit A237) filed on December 11, 2015. The comments have been organized in sequential order. New suggested conditions are included at the end. Each comment is structured with the original draft condition text first (if applicable) followed by the recommended changes and/or new text in red font, then the associated rationale, and lastly the relevant referenced evidence.

It should be noted that Environment Canada was officially renamed Environment and Climate Change Canada on November 4, 2015. As such, any reference to either name refers to the same department.

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DRAFT CONDITION # 19

Air Emissions Management Plan for the Westridge Marine Terminal

Trans Mountain must file with the NEB for approval, at least 6 months prior to commencing construction, an Air Emissions Management Plan for the Westridge Marine Terminal that includes:

- a) a description of the baseline, pre-construction conditions informed by relevant modelling results and recent existing monitoring data;*
- b) locations of air monitoring sites (on a map or diagram), including the rationale for the locations selected;*
- c) the timing for installing air monitoring stations;*
- d) the methods and schedule for ambient monitoring of contaminants of potential concern in air (e.g., particulate matter [including diesel particulate matter and speciation of PM 2.5], carbon monoxide, nitrogen oxide, sulphur dioxide, hydrogen sulphide, and volatile organic compounds);*
- e) procedures for monitoring station data recording, assessment, and reporting details;*
- f) a particulate matter management plan;*
- g) a description of the public and Aboriginal communication and complaint response processes;*
- h) the criteria or thresholds that, if triggered or exceeded, would require implementing additional mitigation measures;*
- i) a description of additional mitigation measures that could be implemented as a result of the monitoring data or ongoing concerns; and*
- j) a summary of consultation with appropriate government authorities and any potentially affected landowners and Aboriginal groups, including any issues or concerns raised with respect to the Air Emissions Management Plan and how Trans Mountain has addressed or responded to them.*

Recommendations:

Recommendation 1:

Environment and Climate Change Canada (ECCC) recommends that condition 19 (b) be amended as follows:

- (b) locations of air monitoring sites (on a map or diagram), including the rationale for the locations selected; **the locations would include a monitoring site at, or adjacent to, the Tsleil-Waututh Nation reserve;**

Recommendation 2:

ECCC recommends that condition 19 (c) be amended as follows:

- (c) the timing for installing **fixed** air monitoring **stations commencing at least one year before operations to establish a statistically robust local baseline;**

Recommendation 3:

ECCC recommends that condition 19 (d) be amended as follows:

- d) the methods and schedule for ambient monitoring of contaminants of potential concern in air (e.g., particulate matter [including diesel particulate matter and speciation of PM 2.5], carbon monoxide, nitrogen oxides **(including NO₂)**, sulphur dioxide, hydrogen sulphide, and volatile organic compounds) **following a recognized protocol (e.g. National Air Pollution Surveillance program or U.S. Environmental Protection Agency) for continuous air pollutant monitoring;**

Recommendation 4:

ECCC recommends that condition 19 (i) be amended as follows:

- i) a description of additional mitigation measures that ~~could~~ **would** be implemented as a result of the monitoring data or ongoing concerns

Rationale:

For Recommendation 1:

ECCC notes that Condition 19 (b) does not provide any guidance concerning the proposed locations for ambient monitoring stations. Section 5(1)(c) of the *Canadian Environmental Assessment Act (2012)* requires that the environmental effects on aboriginal peoples be taken into account.

Section 5(1)(c) of the *Canadian Environmental Assessment Act (2012)* states:

5. (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are

(c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on

- (i) health and socio-economic conditions,
- (ii) physical and cultural heritage,
- (iii) the current use of lands and resources for traditional purposes, or (iv) any structure, site or thing that is of historical, archaeological, paleontological

ECCC expects project air emissions to increase concentrations of nitrogen dioxide (NO₂) and PM_{2.5} in the vicinity of the Tsleil-Waututh Nation, which is located across Burrard Inlet 2 km northwest of the Westridge Marine Terminal.

There is uncertainty related to the current NO₂ concentrations at the First Nation reserves near Burrard Inlet due to the spatial variability of pollutant concentrations which result from the variety of emission sources in the area and the substantial variations in terrain and local meteorology. ECCC expects project air emissions to increase concentrations of nitrogen dioxide (NO₂) and PM_{2.5} in the vicinity of the Tsleil-Waututh Nation reserve. The Proponent has predicted that peak NO₂ and PM_{2.5} concentrations will remain within applicable air quality standards. However, project marine NO_x emissions may be substantially underestimated due to an underestimate for tanker time-at-anchor as well as difficulties with the NO_x emission calculation methodology. The Proponent's decision to exclude boiler emissions is also expected to result in an underestimate of project marine-source PM_{2.5} emissions.

The multiple uncertainties in project emissions estimates and the strong local variations in terrain and meteorological conditions result in uncertainty about the modelled magnitude of air pollutant concentrations. This in turn reduces confidence that peak air pollutant concentrations will remain within applicable standards in the vicinity of the Tsleil-Waututh Nation reserve. ECCC recommends that the sub condition 19(b) explicitly include an air monitoring site at, or adjacent to, the Tsleil-Waututh Nation reserve.

For Recommendation 2:

ECCC notes that sub-component (c) does not specify a timeframe to commence monitoring of the air contaminants of potential concern. It is important to establish the local, pre-operation baseline for new monitoring sites in order to quantify the magnitude of the impacts attributable to the project. Air quality objectives for NO₂ and PM_{2.5} have timescales ranging from one hour to one year.

ECCC recommends that any air quality monitoring program for NO₂ and PM_{2.5} would gather site-specific baseline data for one year prior to the commencement of project operations.

For Recommendation 3:

ECCC notes that sub-component (d) does not explicitly mention nitrogen dioxide in the list of air contaminants of potential concern. The Canadian National Air Quality Objectives and Metro Vancouver air quality objectives include specific targets for nitrogen dioxide concentrations. The project is expected to produce substantial emissions of nitrogen oxides and these emissions are expected to increase concentrations of NO₂ in the vicinity of the project. ECCC also identified concerns with project PM_{2.5} emissions and the potential underestimate of marine-source PM_{2.5} emissions. ECCC recommends the ambient air monitoring of contaminants of potential concern include nitrogen dioxide and PM_{2.5}.

ECCC also recommends that the ambient monitoring of air contaminants of potential concern follow a recognized protocol (e.g. National Air Pollution Surveillance program or U.S. Environmental Protection Agency's Ambient Monitoring Technology Information Center guidance) for continuous monitoring in order to gather accurate, reliable air contaminant concentration data. This would support an accurate evaluation of the magnitude of air contaminant impacts attributable to the project. Following a recognized protocol would also facilitate comparison of program air quality observations to air quality data from existing stations in the Lower Fraser Valley.

For Recommendation 4:

ECCC recommends that the Proponent be committed to implementing specific additional mitigation measures in the event of degraded air quality as opposed to just identifying potential mitigation measures. This is of particular concern as ECCC's analysis indicates that the marine emissions have been underestimated which leads to uncertainties with respect to the Proponent's approach and findings in regard to the impacts of Project-related marine source pollutants on air quality.

Evidence relied upon:

For Recommendation 1:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 102):

“Section 5(1)(c) of CEEA 2012 specifies that the environmental effects of a project are to be considered with respect to Aboriginal peoples, including their health and socio-economic conditions....”

Written evidence of ECCC (Exhibit C121-3-1, PDF page 104):

“The geographical focus of EC’s review is the WMT and the first several kilometres of the marine shipping route in Burrard Inlet. Figure 3-4 shows the location of First Nations reserves in the vicinity of the WMT and Burrard Inlet, as extracted from Aboriginal Affairs and Northern Development Canada’s First Nation Profiles Interactive Map. There are four reserves that have the potential to be substantially impacted by project related emissions: the Burrard Inlet No. 3 reserve of the Tsleil-Waututh Nation - the closest reserve to the WMT and located 2 km to the northwest of WMT; the residential portion of the Seymour Creek No. 2 reserve located immediately west of Highway 1 and south of Fern St. adjacent to the District of North Vancouver; the Mission No. 1 reserve located primarily west of Forbes Ave. and south of West 3rd St. adjacent to the City of North Vancouver; and the Capilano No. 5 reserve located primarily south of Marine Drive along both sides of the Lions Gate Bridge’s north viaduct adjacent to the Districts of North Vancouver and West Vancouver....”

Written evidence of ECCC (Exhibit C121-3-1, PDF page 106):

“There is considerable spatial variability in the concentration of contaminants due in part to the discrete nature of various emission sources. Emissions may exhibit strong temporal variability as well, e.g. number and speed of mobile sources between peak and non-peak traffic periods. Variations in meteorological parameters (wind speed and direction, temperature, vertical stability) and terrain features (relief and roughness) are also important factors. As a result, in the absence of monitoring data, it is difficult to assess actual ambient concentrations at the First Nations reserves, and these concentrations may be higher or lower than those measured at North Vancouver-Second Narrows or any of the other stations of the monitoring network.”

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 111-112):

“The Proponent has predicted the peak hourly NO₂ concentration (Westridge Marine Terminal emissions + related marine emissions + ambient background) to be 92 µg/m³ at the Tsleil- Waututh Nation reserve, which is well within the National Ambient Air Quality Objective of 400 µg/m³ and the Metro Vancouver hourly objective of 200 µg/m³. The Proponent also predicts a maximum 24-hour average PM_{2.5} concentration of 14.8 µg/m³ at the Tsleil-Waututh Nation reserve as compared to the current Canadian

Ambient Air Quality 1 Standard of 28 µg/m³. However, EC has concerns about aspects of this analysis. The region along the north shore of Burrard Inlet, which includes the Tsleil-Waututh Nation reserve, already experiences some of the higher hourly NO₂ concentrations in Greater Vancouver: the 98th percentile 1-hour NO₂ concentration is near 60 µg/m³ and the peak hourly NO₂ concentrations occasionally surpass 100 µg/m³ at the North Vancouver – Second Narrows monitoring station. The Canadian Ambient Air Quality Standard 24-hour PM_{2.5} calculated metric (see section 3.3.2.1 was 12 µg/m³ in 2012 (based on data from the North Vancouver – Second Narrows monitoring station).

The Proponent predicts that the project will impact concentrations of NO₂ and PM_{2.5} near the WMT: a maximum 50 µg/m³ increase in hourly NO₂ concentrations and a 2.3 µg/m³ increment to maximum 24-hour PM_{2.5} is expected at the Tsleil-Waututh Nation reserve.

In addition EC has the following concerns:

- *Project marine NO_x emissions could be underestimated by as much as 37% due to an underestimate in anchorage times (section 3.2.2.4) and difficulties with the NO_x calculation methodology (section 3.2.2.2);*
- *The Proponent’s decision to exclude boiler emissions is expected to result in a 20% underestimation of Project marine-source PM_{2.5} emissions;*
- *EC has also identified uncertainties related to the impact of excluding emissions from vessels anchored beyond the inner harbour and uncertainties about emissions from the Vapour Combustion Unit; and*
- *In addition to the emissions uncertainties noted above, there is a further degree of uncertainty that is inherent to the dispersion modelling process. The U.S. Environmental Protection Agency estimates that errors in the highest predicted concentration for a substance are typically on the order of ±10 to ±40%.”*

For Recommendation 2:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 107):

“The Canadian annual NAAQO is 100 µg/m³ for NO₂, and the MV annual air quality objective is 40 µg/m³....”

Written evidence of ECCC (Exhibit C121-3-1, PDF page 110):

“The Canadian Ambient Air Quality Standard (CAAQS) 24-hour average for PM_{2.5} is 28 µg/m³, dropping to 27 µg/m³ in 2020 (PM_{2.5} metric values are calculated based on the 3-

year average of the annual 98th percentile of the daily 24-hour average concentrations). For comparison, the MV air quality objective for a 24-hour average is 25 µg/m³....”

Written evidence of ECCC (Exhibit C121-3-1, PDF page 112):

“EC recommends that the Proponent establish a program to monitor air contaminants, including NO₂ and PM_{2.5}, at, or adjacent to, the Burrard Inlet No. 3 reserve of the Tsleil-Waututh Nation. The monitoring program would operate for one year before operations and for at least the first three years of full project operation. The monitoring would be used to verify predicted project impacts under the full range of expected meteorological conditions.”

For Recommendation 3:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 104):

“Modelled concentrations for the CACs, BTEX, H₂S, and mercaptans satisfied national and regional air quality objectives within and around the four First Nations reserves in the Burrard Inlet vicinity. However, NO₂ and PM_{2.5} became the focus of EC’s dispersion modelling review due to the substantial magnitude of project emissions and the uncertainty about the impact of these emissions.”

Written evidence of ECCC (Exhibit C121-3-1, PDF page 104):

“EC recommends that the Proponent establish a program to monitor air contaminants, including NO₂ and PM_{2.5}, at, or adjacent to, the Burrard Inlet No. 3 reserve of the Tsleil-Waututh Nation....”

For Recommendation 4:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 92):

“... EC’s analysis indicates the Proponent’s marine emissions have been underestimated for several reasons, which leads to multiple uncertainties in the Proponent’s approach and findings in regards to the impact of Project-related marine source pollutants on air quality.”

Written evidence of ECCC (Exhibit C121-3-1, PDF page 102):

“EC’s analysis indicates that the marine-source of emissions of NOx and fugitive VOCs could be substantially underestimated and therefore lacks confidence in the Proponent’s maximum modeled concentrations, some of which are close to the applicable Ambient Air Quality Objectives, such as for NO2. Unless additional modelling is done, it is uncertain whether exceedances of some of these pollutants would be reached if the additional marine emissions were included.

Recommendation 3-1

Given the uncertainties related to prediction of marine-source combustion emissions, EC recommends the Proponent develop an Air Quality Monitoring, Reporting, and Mitigation Plan in conjunction with the Lower Fraser Valley Air Quality Coordinating Committee. EC further recommends that the Plan include monitoring of emissions to provide data necessary to verify the Project emissions”

DRAFT CONDITION # 20

Pre-construction caribou habitat assessment

*Trans Mountain must file with the NEB for approval, **at least 6 months prior to commencing construction**, a detailed caribou habitat assessment for each caribou range. The framework of the habitat assessment must use the components of critical habitat outlined in the proposed Recovery Strategy for the Woodland Caribou, Southern Mountain Population in Canada (2014). The habitat assessment must include:*

- a) map(s) indicating the location of the habitat;*
- b) a description of the amount of habitat and the existing habitat alteration, in hectares;*
- c) a description of how Trans Mountain has incorporated available and applicable Aboriginal traditional ecological knowledge studies into the assessment; and*
- d) a description of the type of habitat characterized by the biophysical attributes of critical habitat, as defined in the applicable Recovery Strategy.*

Recommendation:

ECCC recommends that condition 20 be amended as follows:

Pre-construction ~~caribou~~ critical habitat assessment

Trans Mountain must file with the NEB for approval, **at least 6 months prior to commencing construction**, a detailed ~~caribou~~ critical habitat assessment for each ~~species with early draft, candidate, proposed, or final critical habitat potentially affected by the Project caribou range~~. The framework of the ~~critical~~ habitat assessment must use the components of critical habitat outlined in the ~~applicable final or proposed recovery strategy or as provided by Environment Canada proposed Recovery Strategy for the Woodland Caribou, Southern Mountain Population in Canada (2014)~~. The habitat assessment must include:

- a) map(s) indicating the **precise** location of the **critical habitat (based on surveys for the biophysical attributes of critical habitat, as appropriate)**;
- b) a description of the amount of **critical** habitat, in hectares;
- c) a description of how Trans Mountain has incorporated available and applicable Aboriginal traditional ecological knowledge studies into the assessment; and
- ~~d) a description of the type of habitat characterized by the biophysical attributes of critical habitat, as defined in the applicable Recovery Strategy.~~
- d) a summary of Trans Mountain's consultation concerning a) to c) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Rationale:

ECCC recommends that the draft condition be amended to require critical habitat assessments for all species, and not solely Southern Mountain Caribou. Critical habitat is identified by: (1) the geospatial areas containing critical habitat (e.g. polygons), and (2) a written description of biophysical attributes that completes the identification. In other words, within the geospatial area containing critical habitat, critical habitat is identified wherever those particular biophysical attributes are found. Surveys for biophysical attributes should be conducted for all species, as appropriate, as soon as possible and before Project decisions are made to determine the precise distribution of critical habitat (early draft, candidate, proposed or final critical habitat) impacted by the Project. These surveys may aid the Proponent in determining how the destruction of critical habitat could be avoided. Appendices C1-C16 from ECCC's written evidence provide species-specific information and recommendations regarding surveys for critical habitat for species with potentially impacted critical habitat (Exhibit C121-3-1, PDF pages 159-290).

ECCC recommends that a requirement for consultation with appropriate government authorities, species experts, and any potentially affected Aboriginal groups be included in this condition. ECCC highlights that consultation with ECCC is required to confirm that the Proponent has the most up-to-date critical habitat information for all species.

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 22):

“Critical habitat is the habitat that is necessary for the survival or recovery of a SARA listed species and that is identified in the recovery strategy or action plan for the species. The primary consideration in the identification of critical habitat is the amount, quality, and locations of habitat needed to achieve the population and distribution objectives for

a species. Critical habitat is identified by: (1) the geospatial areas containing critical habitat (e.g. polygons), and (2) a written description of biophysical attributes that completes the identification. In other words, within the geospatial area containing critical habitat, critical habitat is identified wherever those particular biophysical attributes are found. Both pieces of the critical habitat identification (geospatial area plus written description of biophysical attributes) are key to understanding what is, and what is not critical habitat for any given species.

The scale and nature of the critical habitat identification depends on the geographic range (distribution), the population size, and the habitat specificity of the species involved, in combination with other known characteristics (e.g. life history, mobility and/or other unique species' traits). For example, species that have only a few occurrences and are closely linked to particular ecological attributes will have the finest scale of detail in critical habitat identification. In some cases, the biophysical attributes may be mapped to such a fine scale that the area containing critical habitat represents the distribution of biophysical attributes exactly. In this case, the mapped area containing critical habitat will "represent" the critical habitat identification (excepting where particular features not known to support the species occur and are described as "excluded", e.g. anthropogenic features such as roads or buildings). Some examples of species where the area containing critical habitat "represents" critical habitat include Toothcup and Mexican Mosquito Fern.

Conversely, species that are wider-ranging and/or that are linked to a more diverse group of habitat features (in space or time) will have a broader-scale critical habitat identification. As the scale is broadened (i.e. from "site" level to "area" level, to "landscape" level), there is increased need to focus on the definition of biophysical attributes that comprise the identification for management and protection purposes. In some cases (e.g. Pacific Water Shrew, Oregon Forestsnail) the critical habitat unit is still mapped at a relatively fine scale and the critical habitat is identified such that most of the mapped area containing critical habitat is very likely to possess biophysical attributes of critical habitat. In other cases (e.g. Williamson's Sapsucker, American Badger) the area containing critical habitat is mapped at a relatively broad scale and the critical habitat is identified such that it is uncertain as to what portion of the mapped critical habitat unit is likely to possess biophysical attributes until surveys are conducted. In both of the aforementioned cases, surveys for biophysical attributes are required to determine their exact extent and distribution within the area containing critical habitat."

Written evidence of ECCC, Appendix C (Exhibit C121-3-1, PDF pages 159-290):

C-1: Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*)

- C-2: Pacific Water Shrew (*Sorex bendirii*)
- C-3: Toothcup (*Rotala ramosior*)
- C-4: Williamson's Sapsucker (*Sphyrapicus thyroideus*)
- C-5: Oregon Forestsnail (*Allogona townsendiana*)
- C-6: Townsend's Mole (*Scapanus townsendii*)
- C-7: American Badger – *jeffersonii* ssp. (*Taxidea taxus jeffersonii*)
- C-8: Coastal Giant Salamander (*Dicamptodon tenebrosus*)
- C-9: Great Basin Gophersnake (*Pituophis catenifer deserticola*)
- C-10: Great Basin Spadefoot (*Spea intermontana*)
- C-11: Lewis's Woodpecker (*Melanerpes lewis*)
- C-12: Mexican Mosquito-fern (*Azolla mexicana*)
- C-13: Oregon Spotted Frog (*Rana pretiosa*)
- C-14: Western Rattlesnake (*Crotalus oreganus*)
- C-15: Western Screech Owl *macfarlanei* spp. (*Megascops kennicottii subspecies macfarlanei*)
- C-16: Whitebark Pine (*Pinus albicaulis*)

DRAFT CONDITION # 21

Caribou Habitat Restoration Plan (CHRP)

Trans Mountain must file with the NEB for approval, in accordance with the timelines below, preliminary and final versions of a CHRP for each caribou range potentially affected by the Project.

- a) *Preliminary CHRP – to be filed at least 6 months prior to commencing construction of any project component potentially affecting each caribou range. This version of the CHRP must include the following:*
 - i) *The CHRP's goals and measureable objectives for each caribou range.*
 - ii) *A list of criteria used to identify potential caribou habitat restoration sites.*
 - iii) *Conceptual decision-making tree(s) or decision framework(s) that will be used to identify and prioritize restoration sites, and mitigative actions to be used at different types of sites, including consideration of typical site factors that may constrain implementation.*
 - iv) *A literature review upon which the decision-making tree(s) or decision framework(s) are based, including:*
 - 1) *an identification of applicable temporal and spatial caribou habitat restoration methodologies;*
 - 2) *an assessment of the relative effectiveness of the identified methodologies; and*
 - 3) *a detailed methodology of how the literature review was conducted.*

- v) *The quantifiable targets and performance measures that will be used to evaluate the extent of predicted residual effects, CHRP effectiveness, the extent to which the goals and objectives have been met, and the need for further measures to offset unavoidable and residual effects on habitat.*
 - vi) *A schedule indicating when mitigation measures will be initiated and their estimated completion dates*
 - vii) *A description of how Trans Mountain has taken available and applicable Aboriginal traditional ecological knowledge studies into consideration in identifying potential caribou habitat restoration sites.*
 - viii) *A summary of Trans Mountain's consultation with appropriate government authorities and any potentially affected Aboriginal groups regarding the preliminary CHRP. This summary must include any issues or concerns raised regarding the preliminary CHRP and how Trans Mountain has addressed or responded to them.*
- b) ***Final CHRP – to be filed on or before 1 November after the first complete growing season after commencing operations. This version of the CHRP must include the following:***
- i) *The preliminary CHRP, with any updates identified in a revision log that includes the rationale for any changes.*
 - ii) *A detailed decision-making tree(s) or process that will be used to identify and prioritize restoration actions among selected habitat restoration sites.*
 - iii) *A complete tabular list of caribou habitat restoration sites, including locations, spatial areas, habitat quality descriptions, site-specific restoration activities, and challenges.*
 - iv) *Maps or updated Environmental Alignment Sheets showing the site locations.*
 - v) *Specification drawings for the implementation of each restoration method.*
 - vi) *A quantitative and qualitative assessment of the total area of direct and indirect disturbance to caribou habitat that will be restored, the duration of spatial disturbance, and the area-based extent of the resulting unavoidable and residual effects to be offset.*
 - vii) *A summary of Trans Mountain's consultation with appropriate government authorities and any potentially affected Aboriginal groups regarding the final CHRP. This summary must include any issues or concerns raised regarding the final CHRP and how Trans Mountain has addressed or responded to them.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 21 be amended as follows:

~~Caribou~~-Critical Habitat Restoration Plan (CHRP)

Where residual effects remain following avoidance and mitigation, Trans Mountain must file with the NEB for approval, in accordance with the timelines below, preliminary and final versions of a CHRP for each ~~caribou range~~ species with early draft, candidate, proposed, or final critical habitat ~~caribou range~~ potentially affected by the Project.

- a) Preliminary CHRP – to be filed **at least 6 months prior to commencing construction of any project component potentially affecting each each ~~caribou range~~ species with early draft, candidate, proposed or final critical habitat..** This version of the CHRP must include the following:
 - i) The CHRP’s goals and measureable objectives for each ~~caribou range~~ species with early draft, candidate, proposed or final critical habitat, including the goal of avoidance of critical habitat destruction, and where avoidance is not incorporated into to the Project, the goal of avoiding if achievable, or lessening of any increased risk to the survival or recovery of the species.
 - ii) A detailed description of measures that will be used to avoid the destruction of critical habitat.
 - iii) Identification and review of alternative measures to avoid or lessen project activities that impact critical habitat, and the rationale for selecting the measure.
 - iv) A list of criteria used to identify potential ~~caribou~~ critical habitat restoration sites to address residual impacts that remain following the application of ii) and iii).
 - v) Conceptual decision-making tree(s) or decision framework(s) that will be used to identify and prioritize restoration sites, and mitigative actions to be used at different types of sites, including consideration of typical site factors that may constrain implementation.
 - vi) A literature review upon which the decision-making tree(s) or decision framework(s) are based, including:
 - 1) an identification of applicable temporal and spatial ~~caribou~~ critical habitat restoration methodologies;
 - 2) an assessment of the relative effectiveness of the identified methodologies;
 - 3) a description of how selected restoration measures are consistent with applicable recovery strategies and action plans; and
 - 4) a detailed methodology of how the literature review was conducted.
 - vii) The quantifiable targets and performance measures that will be used to evaluate the extent of predicted residual effects, CHRP effectiveness, the extent to which the goals

and objectives have been met, and the need for further measures to offset unavoidable and residual effects on **critical** habitat.

- viii) A schedule indicating when mitigation measures will be initiated and their estimated completion dates.
- ix) A description of how Trans Mountain has taken available and applicable Aboriginal traditional ecological knowledge studies into consideration in identifying potential ~~earibou~~ **critical** habitat restoration sites.
- x) A summary of Trans Mountain's consultation with appropriate government authorities and any potentially affected Aboriginal groups regarding the preliminary CHRP. This summary must include any issues or concerns raised regarding the preliminary CHRP and how Trans Mountain has addressed or responded to them.

- b) Final CHRP – to be filed **on or before 1 November after the first complete growing season after commencing operations**. This version of the CHRP must include the following:
 - i) The preliminary CHRP, with any updates identified in a revision log that includes the rationale for any changes.
 - ii) A detailed decision-making tree(s) or process that will be used to identify and prioritize restoration actions among selected habitat restoration sites.
 - iii) A complete tabular list of ~~earibou~~ **critical** habitat restoration sites, including locations, spatial areas, habitat quality descriptions, site-specific restoration activities, and challenges.
 - iv) Maps or updated Environmental Alignment Sheets showing the site locations.
 - v) Specification drawings for the implementation of each restoration method.
 - vi) A quantitative and qualitative assessment of the total area of direct and indirect disturbance to ~~earibou~~ **critical** habitat that will be restored, the duration of spatial disturbance, and the area-based extent of the resulting unavoidable and residual effects to be offset.
 - vii) A summary of Trans Mountain's consultation with appropriate government authorities and any potentially affected Aboriginal groups regarding the final CHRP. This summary must include any issues or concerns raised regarding the final CHRP and how Trans Mountain has addressed or responded to them.

Rationale:

In ECCC's written evidence (Exhibit C121-3-1), ECCC recommended that, given the importance of critical habitat, the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA (see Exhibit C121-3-1, Recommendation 2-2, PDF page 34).

ECCC noted in Recommendation 2-2 of ECCC's written evidence (Exhibit C121-3-1, PDF page 34) that *"there are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC's recommended approach."*

In the event that avoidance is not fully incorporated into the Project, ECCC has suggested in its written evidence (Exhibit C121-3-1, PDF page 34) that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) states that the RA *"must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them"*. ECCC's suggested amendments to the condition are provided to ensure that such measures are taken and, as required by s. 79(2), are consistent with any applicable recovery strategies and action plans.

ECCC recommends incorporating all species at risk whose early draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project into draft condition #21. As such, ECCC suggests deleting the word "caribou" from the condition. ECCC's recommendation 2-2 (Exhibit C121-3-1, PDF page 34) applies to all species with the potential for Project impacts to critical habitat (early draft, candidate, proposed or final), and not just to Southern Mountain Caribou. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific. ECCC is suggesting a number of similar amendments to the NEB's draft condition 44 which may result in some repetition.

Notwithstanding the above, as highlighted in ECCC's written evidence (Exhibit C121-3-1, PDF page 34); *"there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels. Furthermore, ECCC notes that individuals, residences and critical habitat of listed species at risk could potentially be protected under SARA should prohibitions be put in place or invoked under, for example, sections 34, 58, or 61 of SARA. If such a prohibition is put in place or invoked, then a permit would be required"* (Exhibit C121-3-1, PDF page 35). For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm.

The Proponent's Reply Evidence to ECCC Recommendation 2-2 (Exhibit B418-19, PDF pages 8-10) indicates that mitigation and monitoring plans will be prepared for Southern Mountain Caribou, Pacific Water Shrew, Williamson's Sapsucker, Oregon Forestsnail, Townsend's Mole,

Lewis's Woodpecker, Coastal Giant Salamander, Oregon Spotted Frog, Grizzly Bear, and the Spotted Owl. The Proponent further states that *"the detailed species-specific mitigation plans requested by Environment Canada cannot be provided at this time pending refinement of the Project footprint, results of ongoing field work and continued consultation with provincial regulators."*

In addition, the Proponent's Reply Evidence to ECCC Recommendation 2-2 (Exhibit B418-19, PDF page 10) indicates the following: *"As stated in NEB IR No. 4.10 (Filing ID A4K4W3), Trans Mountain does not contemplate preparing stand-alone mitigation plans for the following species: American badger (jeffersonii subspecies), western barn owl or western screech owl (macfarlanei and kennicottii subspecies). Stand-alone mitigation plans will also not be prepared for Great Basin gopher snake (Pituophis catenifer deserticola), Great Basin spadefoot (Spea intermontana) and western rattlesnake (Crotalus oreganus) for the same reasons provided in NEB IR No. 4.10. These are that critical habitat mapping is considered candidate or early draft for these species and will be subject to change pending receipt and review of new information and consultation outcomes during development of the species recovery strategies."*

As noted in ECCC's written evidence, in order for Project decision-making to be fully informed of the implications of the Project for critical habitat for species at risk, it would be important that detailed species-specific mitigation and monitoring plans be available to project decision-makers as soon as possible, and before project decisions are made (Exhibit C121-3-1, PDF page 34 and Appendices C-1 to C-16). Furthermore, as noted in ECCC's written evidence, ECCC indicates that *"in the case where a recovery document has not yet been posted as final on the SARA registry, EC recommends that proposed, candidate and early draft critical habitat information should be treated as best available information for the purposes of the environmental assessment"* (Exhibit C121-3-1, PDF page 34). Thus, ECCC continues to suggest that, in the event that avoidance is not fully incorporated into the Project, detailed species-specific mitigation and monitoring plans be developed for all species with early draft, candidate, proposed or final critical habitat, as soon as possible and before Project decisions are made (Exhibit C121-3-1, PDF page 34 and Appendices C-1 to C-16).

In addition, the Proponent states that critical habitat mapping had not been shared with Trans Mountain for Great Basin Gopher Snake, Great Basin Spadefoot, Western Rattlesnake, and Mexican Mosquito Fern (Proponent's Reply Evidence to ECCC Recommendation 2-2, Exhibit B418-19, PDF pages 4 & 10). ECCC shared early draft critical habitat mapping for these species with the Proponent on August 25, 2015.

Evidence Relied On:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 34 and 35, as identified under Rationale above, as well as Appendix C, PDF pages 159-290:

- C-1: Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*)
- C-2: Pacific Water Shrew (*Sorex bendirii*)
- C-3: Toothcup (*Rotala ramosior*)
- C-4: Williamson's Sapsucker (*Sphyrapicus thyroideus*)
- C-5: Oregon Forestsnail (*Allogona townsendiana*)
- C-6: Townsend's Mole (*Scapanus townsendii*)
- C-7: American Badger – *jeffersonii* ssp. (*Taxidea taxus jeffersonii*)
- C-8: Coastal Giant Salamander (*Dicamptodon tenebrosus*)
- C-9: Great Basin Gophersnake (*Pituophis catenifer deserticola*)
- C-10: Great Basin Spadefoot (*Spea intermontana*)
- C-11: Lewis's Woodpecker (*Melanerpes lewis*)
- C-12: Mexican Mosquito-fern (*Azolla mexicana*)
- C-13: Oregon Spotted Frog (*Rana pretiosa*)
- C-14: Western Rattlesnake (*Crotalus oreganus*)
- C-15: Western Screech Owl *macfarlanei* spp. (*Megascops kennicottii subspecies macfarlanei*)
- C-16: Whitebark Pine (*Pinus albicaulis*)

DRAFT CONDITION # 44

Wildlife Species at Risk Mitigation and Habitat Restoration Plans

Trans Mountain must file with the NEB for approval, at least 4 months prior to commencing construction, Wildlife Species at Risk Mitigation Plans for each species whose draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project. Each plan must include

- a) a summary of supplementary pre-construction survey results, including surveys for biophysical attributes of critical habitat*
- b) the area and type of critical habitat, including biophysical attributes, potentially directly and indirectly affected by the Project footprint;*
- c) mitigation and habitat restoration measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable goals for evaluating mitigation success;*
- d) details on post-construction monitoring of mitigation measures and habitat restoration measures, including survey methods, corrective measures, detailed criteria using clear and*

- unambiguous language that describes the circumstances under which each measure will be applied, and a proposed reporting schedule;*
- e) a commitment to include the results of the monitoring in the post-construction environmental monitoring reports filed under Condition No. 140;*
 - f) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plans;*
 - g) a summary of Trans Mountain's consultation concerning a) to f) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; and*
 - h) confirmation that Trans Mountain will update the relevant Environmental Protection Plans to include any relevant information from the Wildlife Species at Risk Mitigation and Habitat Restoration Plans.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 44 be amended as follows:

Wildlife Species at Risk Mitigation and Critical Habitat Restoration and Management Plans

Where avoidance of critical habitat destruction is not fully incorporated into the project, Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, Wildlife Species at Risk Mitigation and Critical Habitat Restoration and Management Plans for each species whose early draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project. Each plan must include:

- a) a summary of supplementary pre-construction survey results, including surveys for **new occurrences, and** biophysical attributes of critical habitat **(as appropriate);**
- b) the area and type of critical habitat, including biophysical attributes, potentially directly and indirectly affected by the Project footprint;
- c) mitigation and critical habitat restoration measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable goals for evaluating mitigation success;
- d) **a detailed description of measures that will be used to avoid the destruction of critical habitat and in the event that avoidance of critical habitat destruction is not fully incorporated into the project:**
 - i) a detailed description of the measures to be used to avoid if achievable or lessen any increased risk to the survival or recovery of the species, including measures to address the potential for time lags between when Project impacts occur and when**

- mitigation measures are implemented and fully functional (this may include non-habitat measures, where appropriate, to enhance survival, enhance recruitment, and/or reduce primary threats); and
- ii) a description of how all of the suggested components of the detailed mitigation and monitoring plans as noted in Appendices C-1 to C-16 of Environment Canada’s written evidence (Exhibit C121-3-1) are incorporated into each plan;
 - e) a description of how the mitigation and critical habitat restoration measures are consistent with applicable recovery strategies and action plans.
 - f) identification and review of alternative measures to avoid or lessen project activities that impact species at risk or their critical habitat, and the rationale for selecting the measure;
 - g) details on post-construction monitoring of mitigation measures and habitat restoration measures, including survey methods, corrective measures, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and a proposed reporting schedule;
 - h) a commitment to include the results of the monitoring in the post-construction environmental monitoring reports filed under condition 140;
 - i) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plans;
 - j) a summary of Trans Mountain’s consultation concerning a) to f) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; **and**
 - k) confirmation that Trans Mountain will update the relevant Environmental Protection Plans to include any relevant information from the **Wildlife** Species at Risk Mitigation and **Critical Habitat Restoration and Management Plans**; **and**
 - l) **confirmation that Trans Mountain will update plans and develop new plans as new early draft, candidate, proposed or final critical habitat information becomes available.**

Rationale:

As noted by ECCC in its written evidence (Exhibit C121-3-1, PDF page 22), “*the scale and nature of the critical habitat identification depends on the geographic range (distribution), the population size, and the habitat specificity of the species involved, in combination with other known characteristics (e.g. life history, mobility and/or other unique species’ traits). For example, species that have only a few occurrences and are closely linked to particular ecological attributes will have the finest scale of detail in critical habitat identification. In some cases, the biophysical attributes may be mapped to such a fine scale that the area containing critical habitat represents the distribution of biophysical attributes exactly. In this case, the mapped area containing critical habitat will “represent” the critical habitat identification (excepting where*

particular features not known to support the species occur and are described as “excluded”, e.g. anthropogenic features such as roads or buildings). Some examples of species where the area containing critical habitat “represents” critical habitat include Toothcup and Mexican Mosquito Fern.” As such, surveys for biophysical attributes are not appropriate for these species, and ECCC recommends adjusting the condition to reflect this fact.

In its written evidence (Exhibit C121-3-1), ECCC recommends that, given the importance of critical habitat, the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA (see Exhibit C121-3-1, Recommendation 2-2, PDF page 34). ECCC noted in Recommendation 2-2 that *“there are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC’s recommended approach.”*

Table 2-3 of ECCC’s written evidence (Exhibit C121-3-1, PDF pages 25-32) provides a summary of how critical habitat is identified for each species, and, based on the nature of biophysical attributes, the potential for impacts to critical habitat destruction based on the use of conventional trenched pipeline construction methods. For some species (e.g., Pacific Water Shrew, Toothcup, Oregon Forestsnail, Townsend’s Mole, Coastal Giant Salamander, Great Basin Gophersnake, Great Basin Spadefoot, Mexican Mosquito Fern, Oregon Spotted Frog) the scale of the critical habitat identification and the nature of the biophysical attributes are such that the level of potential project impacts are inherently high for the entire areas containing critical habitat, at all times of the year. For other species (e.g., Williamson’s Sapsucker, American Badger, Lewis’s Woodpecker, Western Rattlesnake, Western Screech-Owl, Whitebark Pine) the scale of critical habitat identification and the nature of biophysical attributes are such that the level of potential project impacts will depend more heavily on the specific location of Project impacts and/or timing of Project activities, within the geospatial areas containing critical habitat.

In the event that avoidance is not fully incorporated into the Project, ECCC has suggested in its written evidence (Exhibit C121-3-1, PDF page 34) that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) states that the RA *“must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them”*. ECCC’s suggested amendments to the condition are provided to ensure that such measures are taken and, as required by s. 79(2), are consistent with any applicable recovery strategies and action plans.

In order to assist the RA in meeting its obligations under ss. 79(2) of SARA, ECCC suggests the following additions to this condition, as provided in the preceding recommendations section:

- a detailed description of measures that will be used to avoid the destruction of critical habitat and in the event that avoidance of critical habitat destruction is not fully incorporated into the project:
 - a detailed description of the measures to be used to lessen any increased risk to the survival or recovery of the species, including measures to address the potential for time lags between when Project impacts occur and when mitigation measures are implemented and fully functional (this may include non-habitat measures, where appropriate, to enhance survival, enhance recruitment, and/or reduce primary threats), and
 - a description of how all of the suggested components of the detailed mitigation and monitoring plans as noted in Appendices C-1 to C-16 of ECCC's written evidence (Exhibit C121-3-1) are incorporated into the plan;
- a description of how the mitigation and critical habitat restoration measures are consistent with applicable recovery strategies and action plans;
- an identification and review of alternative measures to avoid or lessen project activities that impact species at risk or their critical habitat, and the rationale for selecting the chosen measure; and
- confirmation that Trans Mountain will update plans and develop new plans as new critical habitat information becomes available.

ECCC recommends incorporating all species at risk, including plants, whose early draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project into draft condition 44. While SARA defines plants as “wildlife” species, the NEB filing manual separates wildlife from plants. As such, ECCC recommends that the term “wildlife” be deleted from this condition, as it may cause confusion. ECCC's recommendation 2-2 (Exhibit C121-3-1, PDF page 34), applies to all species, regardless of taxonomic group. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific. ECCC is suggesting a number of similar amendments to the NEB's draft conditions 20, 21, 110, 144, and 145, which may result in some repetition.

Notwithstanding the above, as highlighted in ECCC's written evidence (Exhibit C121-3-1, PDF page 34); *“there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels. Furthermore, ECCC notes that individuals, residences and critical habitat of listed species at risk could potentially be protected under SARA*

should prohibitions be put in place or invoked under, for example, sections 34, 58, or 61 of SARA. If such a prohibition is put in place or invoked, then a permit would be required” (Exhibit C121-3-1, PDF page 35). For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm.

The Proponent’s Reply Evidence to ECCC Recommendation 2-2 (Exhibit B418-19, PDF pages 8-10) indicates that mitigation and monitoring plans will be prepared for Southern Mountain Caribou, Pacific Water Shrew, Williamson’s Sapsucker, Oregon Forestsnail, Townsend’s Mole, Lewis’s Woodpecker, Coastal Giant Salamander, Oregon Spotted Frog, Grizzly Bear, and the Spotted Owl. The Proponent further states that *“the detailed species-specific mitigation plans requested by Environment Canada cannot be provided at this time pending refinement of the Project footprint, results of ongoing field work and continued consultation with provincial regulators.”*

In addition, the Proponent’s Reply Evidence to ECCC Recommendation 2-2 (Exhibit B418-19, PDF page 10) indicates the following: *“As stated in NEB IR No. 4.10 (Filing ID A4K4W3), Trans Mountain does not contemplate preparing stand-alone mitigation plans for the following species: American badger (jeffersonii subspecies), western barn owl or western screech owl (macfarlanei and kennicottii subspecies). Stand-alone mitigation plans will also not be prepared for Great Basin gopher snake (Pituophis catenifer deserticola), Great Basin spadefoot (Spea intermontana) and western rattlesnake (Crotalus oreganus) for the same reasons provided in NEB IR No. 4.10. These are that critical habitat mapping is considered candidate or early draft for these species and will be subject to change pending receipt and review of new information and consultation outcomes during development of the species recovery strategies.”*

As noted in ECCC’s written evidence, in order for Project decision-making to be fully informed of the implications of the Project for critical habitat for species at risk, it would be important that detailed species-specific mitigation and monitoring plans be available to project decision-makers as soon as possible, and before project decisions are made (Exhibit C121-3-1, PDF page 34 and Appendices C-1 to C-16). Furthermore, as noted in ECCC’s written evidence, ECCC indicates that *“in the case where a recovery document has not yet been posted as final on the SARA registry, EC recommends that proposed, candidate and early draft critical habitat information should be treated as best available information for the purposes of the environmental assessment”* (Exhibit C121-3-1, PDF page 34). Thus, ECCC continues to suggest that, in the event that avoidance is not fully incorporated into the Project, detailed species-specific mitigation and monitoring plans be developed for all species with early draft, candidate, proposed or final critical habitat, as soon as possible (Exhibit C121-3-1, PDF page 34 and Appendices C-1 to C-16).

In addition, the Proponent states that critical habitat mapping had not been shared with Trans Mountain for Great Basin Gopher Snake, Great Basin Spadefoot, Western Rattlesnake, and Mexican Mosquito Fern (Proponent's Reply Evidence to ECCC Recommendation 2-2, Exhibit B418-19, PDF pages 4 & 10). ECCC shared early draft critical habitat mapping for these species with the Proponent on August 25, 2015.

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 22, 25-32, 34 and 35) and the Proponent's Reply Evidence to ECCC Recommendation 2-2 (Exhibit B418-19, PDF pages 4, 8, 9 and 10), as identified under Rationale above, as well as written evidence of ECCC, Appendix C (Exhibit C121-3-1, PDF pages 159-290):

- C-1: Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*)
- C-2: Pacific Water Shrew (*Sorex bendirii*)
- C-3: Toothcup (*Rotala ramosior*)
- C-4: Williamson's Sapsucker (*Sphyrapicus thyroideus*)
- C-5: Oregon Forestsnail (*Allogona townsendiana*)
- C-6: Townsend's Mole (*Scapanus townsendii*)
- C-7: American Badger – *jeffersonii* ssp. (*Taxidea taxus jeffersonii*)
- C-8: Coastal Giant Salamander (*Dicamptodon tenebrosus*)
- C-9: Great Basin Gophersnake (*Pituophis catenifer deserticola*)
- C-10: Great Basin Spadefoot (*Spea intermontana*)
- C-11: Lewis's Woodpecker (*Melanerpes lewis*)
- C-12: Mexican Mosquito-fern (*Azolla mexicana*)
- C-13: Oregon Spotted Frog (*Rana pretiosa*)
- C-14: Western Rattlesnake (*Crotalus oreganus*)
- C-15: Western Screech Owl *macfarlanei* spp. (*Megascops kennicottii subspecies macfarlanei*)
- C-16: Whitebark Pine (*Pinus albicaulis*)

Government of Canada Information Request (IR) No. 2 to Trans Mountain, Exhibit C249-4-1 on PDF page 56:

“To ensure that the recovery and survival of species at risk is not affected by the Project, mitigation activities within the species' habitat would need to address the potential for lags between when Project impacts occur and when mitigation measures are implemented and fully functional.”

Some mitigation measures have inherent time lags (i.e. habitat restoration activities can take years to be effective). Accordingly, in some cases non-habitat mitigation measures may be appropriate to ensure the recovery and survival of the species while habitat mitigation measures establish.”

DRAFT CONDITION # 50

Rare Ecological Community and Rare Plant Population Management Plan

Trans Mountain must file with the NEB for approval, at least 4 months prior to commencing construction, an updated Rare Ecological Community and Rare Plant Population Management Plan that includes ecological communities of concern; rare plants and lichens; and draft, candidate, proposed, or final critical habitat for plant and lichen species under the Species at Risk Act that are potentially affected by the Project during construction or operations. The plan must include the following:

- a) A summary of supplementary survey results.*
- b) Mitigation measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable goals for evaluating mitigation success.*
- c) A description of how the avoidance, mitigation, and offset hierarchy was considered in developing the plan.*
- d) Details on post-construction monitoring, including survey methods, corrective measures, and detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied.*
- e) A Preliminary Rare Ecological Community and Rare Plant Population Offset Plan for ecological communities and rare plant and lichen species that have an at-risk status of S1 or SIS2 or that are listed under federal or provincial legislation for protection and that, after five years of operations, have not achieved reclamation success. This preliminary plan must include the following:*
 - i) A discussion of whether the community, species, or critical habitat can be avoided by a sufficient distance to avoid both direct and indirect residual effects.*
 - ii) If avoidance by a sufficient distance is not feasible:*
 - 1) the expected residual effects on that community, species, or critical habitat, taking into account the success on past projects of the proposed mitigation and corrective measures in b) and d) above;*
 - 2) an explanation of how the need for offset measures will be determined and quantified, including offset ratios;*
 - 3) the potential offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and*

- 4) *a discussion of how the effectiveness of offsets measures will be monitored, assessed, and reported on.*
- f) *A description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan;*
- g) *A summary of Trans Mountain's consultation concerning a) to f) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.*
- h) *Confirmation that the relevant Environmental Protection Plans will be updated to include any relevant information from the Rare Ecological Community and Rare Plant Population Management Plan, including confirmation that the mitigation, monitoring, corrective, and offset measures in the Rare Ecological Community and Rare Plant Population Management Plan will be implemented in the case of discovery via their inclusion in the Rare Ecological Communities or Rare Plant Species Discovery Contingency Plan.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 50 be amended as follows:

Rare Ecological Community and Rare Plant Population Management Plan

Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, an updated Rare Ecological Community and Rare Plant Population Management Plan that includes ecological communities of concern; **and rare plants and lichens that have an at-risk status of S1 or S1S2 or that are listed under provincial legislation for protection; and draft, candidate, proposed, or final critical habitat for plant and lichen species under the *Species at Risk Act*** that are potentially affected by the Project during construction or operations. The plan must include the following:

- a) A summary of supplementary survey results.
- b) Mitigation measures to be implemented, including all relevant measures committed to throughout the OH-001-2014 proceeding, any new mitigation measures resulting from supplementary surveys, detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied, and measurable goals for evaluating mitigation success.
- c) A description of how the avoidance, mitigation, and offset hierarchy was considered in developing the plan

- d) Details on post-construction monitoring, including survey methods, corrective measures, and detailed criteria using clear and unambiguous language that describes the circumstances under which each measure will be applied.
- e) A Preliminary Rare Ecological Community and Rare Plant Population Offset Plan for ecological communities and rare plant and lichen species that have an at-risk status of S1 or S1S2 or that are listed under ~~federal or~~ provincial legislation for protection and that, after five years of operations, have not achieved reclamation success. This preliminary plan must include the following:
 - i) A discussion of whether the community, species, or ~~critical~~ habitat can be avoided by a sufficient distance to avoid both direct and indirect residual effects.
 - ii) If avoidance by a sufficient distance is not feasible:
 - 1) the expected residual effects on that community, species, or ~~critical~~ habitat, taking into account the success on past projects of the proposed mitigation and corrective measures in b) and d) above;
 - 2) an explanation of how the need for offset measures will be determined and quantified, including offset ratios;
 - 3) the potential offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and
 - 4) a discussion of how the effectiveness of offsets measures will be monitored, assessed, and reported on.
- f) A description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan;
- g) A summary of Trans Mountain's consultation concerning a) to f) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.
- h) Confirmation that the relevant Environmental Protection Plans will be updated to include any relevant information from the Rare Ecological Community and Rare Plant Population Management Plan, including confirmation that the mitigation, monitoring, corrective, and offset measures in the Rare Ecological Community and Rare Plant Population Management Plan will be implemented in the case of discovery via their inclusion in the Rare Ecological Communities or Rare Plant Species Discovery Contingency Plan.

Rationale:

ECCC recommends removing all references to critical habitat from draft condition 50 and instead incorporating all discussion of critical habitat for all SARA Schedule 1-listed species into conditions that refer to critical habitat for all species at risk (e.g. see ECCC's amendments to

condition #21, 44, 110). ECCC's recommendation 2-2 (Exhibit C121-3-1, PDF page 34), applies to all species, regardless of taxonomic group. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific. Additionally, amending the condition as recommended avoids the conclusion that offsets are likely to be effective in the context of critical habitat for plant species at risk, in particular.

Evidence Relied On:

Written evidence of ECCC (Exhibit C121-3-1, PDF page: 34):

“EC recommends that the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA.

[...]

EC recognizes that the NEB Panel may recommend that the Project proceed while choosing to not partially or fully implement EC's recommendation on avoidance. Furthermore, EC recognizes that conditions must be put forward by the Panel regardless of its overall project recommendation. In the event that avoidance is not fully incorporated into the Project, EC suggests that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) requires that the RA implement measures to avoid or lessen all adverse effects on species at risk and their habitats, and to monitor those effects.

There are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC's recommended approach.

Notwithstanding the above, there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels (See Recommendation 2-3 below).”

DRAFT CONDITION # 52

Wetland Survey and Mitigation Plan

Trans Mountain must file with the NEB for approval, at least 4 months prior to commencing construction, a pre-construction Wetland Survey and Mitigation Plan that includes:

- a) A summary of supplementary survey results for wetlands potentially affected by the Project.*
- b) A description of any wetlands for which ground-based surveys were not possible, an explanation as to why not, attempts made to obtain access, and what further information on each wetland will be collected immediately prior to or during construction.*
- c) A description of the functional condition of each wetland for comparison during post-construction monitoring, including individual functional conditions (e.g., habitat, hydrology and biogeochemistry) and a description of the methods used to determine functional conditions.*
- d) A description of the crossing methods, mitigation measures, and reclamation measures to be implemented for potentially affected wetlands, including clear and unambiguous criteria, and rationales for such criteria, explaining under what circumstances such methods and measures will be applied.*
- e) Measurable goals for evaluating wetland mitigation and reclamation success.*
- f) A description of how the avoidance, mitigation, and offset hierarchy, and the goal of no net loss of each individual wetland function, were considered in developing the plan.*
- g) Details of the monitoring plan for wetlands for the first five years of operations, including corrective actions that might be necessary and the circumstances under which each such action would be taken.*
- h) A Preliminary Wetland Offset Plan for those wetlands that will have a temporary loss in any individual functional condition and for those wetlands that, after five years of operations, have not achieved reclamation success. This plan must include:
 - i. an explanation of how the need for offset measures will be determined and quantified, including offset ratios;*
 - ii. the potential offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success;*
 - iii. a discussion of how the effectiveness of offsets measures will be monitored, assessed, and reported on; and*
 - iv. the offset measures that will be implemented during the first five years of operations to compensate for expected temporary losses to individual functional conditions, including a timeline for their implementation and monitoring.**

- i) *A description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan.*
- j) *A summary of Trans Mountain's consultation concerning a) to i) with appropriate government authorities, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.*

Recommendations:

Recommendation 1:

ECCC recommends that condition 52 (c) be amended as follows:

- c) A description of the functional condition of each wetland for comparison during post-construction monitoring, including individual functional conditions (e.g., habitat, hydrology and biogeochemistry) and a description of the methods used to determine functional conditions. **This description should be based on site-specific, quantitative baseline information, including:**
 - i. **Surveys to assess for the presence, abundance, density, and distribution of migratory birds and species at risk (red and blue listed species, SARA-listed, and COSEWIC assessed) in relation to potentially impacted wetlands and associated riparian areas. Surveys should:**
 - 1) **meet appropriate standards (e.g. Resource Information Standards Committee standards (RISC));**
 - 2) **be species or bird group specific as appropriate; and**
 - 3) **be conducted during the appropriate times of the year.**
 - ii. **Surveys for species at risk should:**
 - 1) **assess species individually (typically an indicator approach is not appropriate for species at risk);**
 - 2) **not be limited to species or groups of species that are wetland-obligate, but rather should include any species known to use wetland habitats as part of its lifecycle; and**
 - 3) **include data sufficiently robust to identify which wetland classes are important to which species (and for how many) on which to assess recovery and direct compensation.**

Recommendation 2:

ECCC recommends that condition 52 (e) be amended as follows:

- e) Measurable goals for evaluating wetland mitigation and reclamation success. A description of how reclamation success criteria for reclaimed wetlands would be designed to:
 - i. ensure that the type and amount of wetland function would be quantified for each individual function in the evaluation of recovery success;
 - ii. ensure that the quantification of the type and amount of each individual function would allow for natural variability (i.e., range of natural variation) while providing a benchmark for the amount of function that is deemed acceptable with respect to no-net-loss of wetland functions. For habitat functions, “acceptable” should be interpreted as avoiding, or minimizing, to the extent possible, any adverse effects to migratory birds and species at risk.

Recommendation 3:

ECCC recommends that condition 52 (f) be amended as follows:

- f) A description of how the avoidance, mitigation, and offset hierarchy, and the goal of no net loss of each individual wetland function, were considered in developing the plan. This should include rationales for moving from avoidance to minimization to compensation.

Recommendation 4:

ECCC recommends that condition 52 (h) (i) be amended as follows:

- h) A Preliminary Wetland Offset Plan for those wetlands that will have a temporary loss in any individual functional condition and for those wetlands that, after five years of operations, have not achieved reclamation success. This plan must include:
 - i. an explanation of how the need for offset measures will be determined and quantified, including:
 - 1) offset ratios, including a rationale for the ratio selected;
 - 2) method of compensation (restoration versus enhancement versus creation);
 - 3) a rationale for how indicator species would be selected and how they would inform the setting of the compensation objectives. This rationale should include a description of how wetland function assessment data and Bird Conservation Strategies were considered in selecting indicator species;

Recommendation 5:

ECCC recommends that condition 52 (h) (ii) be amended as follows:

- ii. the potential offset measures **and compensation sites**, the process for selecting which will be implemented, and an evaluation of the probability of their success. **This evaluation should include, for each wetland, a description of potential site-specific challenges and limitations associated with compensating for lost functions for each individual wetland;**

Recommendation 6:

ECCC recommends that condition 52 (h) (iv) be amended as follows:

- iv. the offset measures that will be implemented **before and/or** during the first five years of operations to compensate for expected temporary losses to individual functional conditions, including a timeline for their implementation and monitoring.

Recommendation 7:

ECCC recommends that condition 52 (h) (v) be added as follows:

- v. **an identification of the parties conducting implementation activities and their respective roles and responsibilities (provide advice, approvals, etc.).**

Rationale

For Recommendation 1:

(Rationale for changes to condition 52 (c))

As stated in ECCC's written evidence (Exhibit C121-3-1, pdf pages 51-52), ECCC notes that *"while the Proponent provided general information on wetland functions as part of its Application (Exhibit B9-1), as well as site cards for some representative wetlands (Exhibit B9-6, PDF pages 1 - 33) as part of the environmental assessment review, a detailed wetland functions assessment has not been provided to date for all wetlands that the Project would potentially impact.*

A quantitative, site-specific assessment of wetland functions is critical to assess potential effects of the Project on wetlands, and to effectively implement mitigation. Should the Project proceed,

the functions assessment would establish a baseline from which to assess mitigation and reclamation success, as well as to set quantitative-based compensation objectives.”

ECCC recommends that identification and characterization of wetland habitat functions for migratory birds and species at risk should include site-specific data about the species present at each wetland. It is important to not only gather general information about the types of habitat functions a particular wetland can provide, but to actually identify which functions are present at which wetland, and quantify these functions in terms of the species they support.

For example, it would be difficult to verify the effects of the Project against the predictions of the environmental assessment, or to evaluate the effectiveness of mitigation measures, in a situation where the characterization of a wetland habitat functions would be limited to “foraging for waterfowl”. Site-specific details such as how many individuals of which species are using the wetland, at which time of the year, for which purpose, and how they are spatially distributed in the habitat should be collected in a manner that ensures that both inter-annual and seasonal variation can be detected during monitoring and follow-up.

Specifically, in Recommendation 2-9 of ECCC’s written evidence (Exhibit C121-3-1, PDF pages 51-52), ECCC recommends *“that a detailed assessment of baseline wetland functions be completed prior to the start of Project construction for all wetlands that the Project would directly impact and for any wetland(s) that are hydrologically connected to these wetlands. [...] This assessment should be quantitative and include the collection of site-specific baseline information on wetland functions, including: a) surveys to assess for the presence, abundance, density, and distribution of migratory birds and species at risk (red and blue listed species, SARA-listed, and COSEWIC assessed) in relation to potentially impacted wetlands and associated riparian areas. Surveys should meet appropriate standards (e.g. Resource Information Standards Committee standards (RISC)), be species or bird group specific as appropriate, and be conducted during the appropriate times of the year. Surveys for species at risk should assess species individually (typically an indicator approach is not appropriate for species at risk). Surveys should not be limited to species or groups of species that are wetland-obligate, but rather should include any species known to use wetland habitats as part of its lifecycle. Data should be sufficiently robust to identify which wetland classes are important to which species (and for how many) on which to assess recovery and direct compensation.”*

As such, ECCC recommends amendments to condition 52 (c) so that site-specific habitat function data are collected for each wetland upon which quantitative and site-specific reclamation success criteria could be established, and compensation objectives could be set.

For Recommendation 2:

(Rationale for changes to condition 52 (e))

ECCC's advice is informed by the Federal Policy on Wetland Conservation's goal of no-net-loss of all individual wetland functions. As stated in ECCC's written evidence (Exhibit C121-3-1, PDF page 53), *"it is important to note that it is the combination of types and amounts of functions lost that set the quantitative-based compensation objectives in cases where recovery cannot be achieved. Therefore, recovery success criteria would need to consider the amount (level) and type of each function lost versus the amount and type of functions gained. Assessing each wetland function individually prevents the dilution of effects to wetland functions during the effects assessment."*

To ensure that each wetland function would be recovered to at least the same type and amount of function as assessed during baseline, consistent with the goal of no-net-loss, it would be important to ensure that the type and amount of each wetland function would be considered individually in determining recovery success. In this respect, ECCC recommends setting conservation objectives or recovery success criteria in the form of a quantitative "range" for each function such that these criteria would allow for natural variability while providing a benchmark for the level/amount of function that is deemed acceptable with respect to no-net-loss. For habitat functions, "acceptable" should be interpreted as avoiding, or minimizing, to the extent possible, any adverse effects to migratory birds and species at risk.

As such, ECCC recommends amendments to condition 52 (e) so that recovery success criteria can capture any net loss of wetland function, and that recovery success data could be used to develop quantitative compensation objectives.

For Recommendation 3:

(Rationale for changes to condition 52 (f))

As stated in ECCC's written evidence (Exhibit C121-3-1, PDF pages 48-49), *"three mitigation strategies should be used to achieve no-net-loss of wetland functions for the situations identified above. In order of priority, these strategies are:*

- 1) Avoidance refers to the prevention of adverse effects on wetland functions. It is the most efficient mitigation measure, as well as the most ecologically and economically effective way of maintaining wetland area and functions.*
- 2) Minimization refers to the reduction or control of adverse effects to wetland functions.*
- 3) Compensation through the use of offsets refers to the replacement of unavoidably lost wetland functions, through restoration, enhancement of existing wetlands, or creation of new wetlands.*

[...]

Current limitations to replacing lost wetland functions means that compensation should only be used as a last resort to addressing Project impacts. In order to ensure that the wetland

mitigation hierarchy is being appropriately considered, it is important that the Proponent provide a full accounting of how the mitigation hierarchy was applied, including in relation to wetlands and wetland functions.

In Recommendation 2-8 of ECCC's written evidence (Exhibit C121-3-1, PDF page 49), EC recommends that for wetlands where the no-net-loss of wetland functions objective of the Wetland Policy applies, that measures be applied to the Project to achieve this objective and that the hierarchy of avoidance, minimization and compensation be used in achieving this. EC recommends that supporting rationales be provided for moving from avoidance to minimization to compensation, in order to fully document application of the mitigation hierarchy."

As such, ECCC recommends amendments to condition 52 (f) in order to document efforts to apply the mitigation hierarchy in general, as part of the Preliminary Wetland Offset Plan.

For Recommendation 4:

(Rationale for changes to condition 52 (h) (i))

As stated in ECCC's written evidence (Exhibit C121-3-1, PDF page 55), "where impacts cannot be mitigated through avoidance and minimization, impacts should be monitored and compensation provided where it is demonstrated that there are ongoing effects (i.e. effects lasting longer than 5 years). Effects include any loss of function even if no physical impact is anticipated or has occurred (e.g. partial drainage of wetland area).

Compensation for wetlands typically requires replacement of wetland function or rehabilitation of wetland areas with similar functions as those being affected or lost. This can require, for example, replacement of bird or amphibian habitat, water storage or groundwater recharge functions, or nutrient or sediment removal functions that have been lost as a result of a project.

Compensation sites are generally required to be larger than the original wetland area impacted, to compensate for the inherent uncertainty of replacing the loss of wetland functions and the lag time between the loss of wetland functions in the impacted wetland and gain in wetland functions in the compensation wetland. Therefore, compensation ratios are based on the probability of success of replacement of wetland functions, length of time required to bring a compensation site to functioning condition, the expertise of the compensation project proponent, threats to the site, etc."

In Recommendation 2-12 of ECCC's written evidence (Exhibit C121-3-1, PDF page 56-57), ECCC recommends that a Wetland Compensation Plan (WCP) be developed that "*identifies the compensation ratio for each wetland for which compensation would be required.*"

As such, ECCC recommends amendments to condition 52 (h) (i) so that compensation ratios can be determined in a manner as to ensure a higher probability of compensation success, and that the process for determining this would be described in the Preliminary Wetland Offset Plan.

ECCC also recommends that compensation objectives for wetland habitat functions should be determined based on indicator species. Specifically, in Recommendation 2-12 of ECCC's written evidence (Exhibit C121-3-1, PDF page 56), ECCC recommends that *"identification of indicator species should be based on wetland function assessment data, Bird Conservation Strategies, and other information where available (note: listed species should not be used as indicator species; compensation efforts need to be directed specifically to these species)."*

As such, ECCC recommends amendments to condition 52 (h) (i) so that indicator species and their associated abundance are considered in the determination of quantitative wetland habitat functions compensation objectives, and that the process by which this is determined is described as part of the Preliminary Wetland Offset Plan.

For Recommendation 5:

(Rationale for changes to condition 52 (h) (ii))

In Recommendation 2-12 of ECCC's written evidence (Exhibit C121-3-1, PDF page 57), *"EC advises that the preferred method of compensation is restoration of drained or altered naturally occurring wetlands. Restored wetlands are preferred over enhanced wetlands, both of which are preferred over newly created wetlands. Furthermore, preference is for restoration of the same wetland types as those impacted, as wetland functions are often inextricably tied to wetland type. In addition, lost wetland functions should be compensated on-site if site conditions are suitable for wetland functions. Second preference is in the same watershed from which they were lost. Third preference is in the same ecosystem from which they were lost."*

As such, ECCC recommends amendments to condition 52 (h) (ii) so that the process by which potential compensation sites would be selected is described in the Preliminary Wetland Offset Plan to provide an understanding of how offset measures would be identified and selected.

As stated in ECCC's written evidence (Exhibit C121-3-1, PDF pages 57-58), *"EC notes that while the Proponent has committed to achieving no-net-loss of function for wetlands along the entire Project (Exhibit B239-27, PDF page 7), if avoidance and minimization could not be achieved and compensation would be considered, the Proponent should be aware that it may not be possible to compensate for lost functions in cases where wetlands are unique, or have habitat functions that support large proportions of migratory birds, or provide habitat required by species at risk."*

Because of the variability in the types of functions that wetlands provide, including within the same wetland classes and types, an evaluation of the probability of success of compensation measures in replacing lost functions should identify potential site-specific challenges and limitations associated with compensating for lost functions for each individual wetland.

As such, ECCC recommends amendments to condition 52 (h) (ii) so that the evaluation of the probability of success of compensation measures in replacing lost functions include a full accounting of any potential site-specific challenges and limitations associated with compensating for lost functions for each individual wetland, and that this be presented as part of the Preliminary Wetland Offset Plan.

For Recommendation 6:

(Rationale for changes to condition 52 (h) (iv))

As noted in ECCC's written evidence (Exhibit C121-3-1, PDF pages 52), ECCC's advice is informed by the Federal Policy on Wetland Conservation's goal of no-net-loss of wetland functions, and that this also applies to temporary loss of functions. ECCC states that *"impacts from temporary losses of wetland functions can affect migratory birds and species at risk that are dependent on wetland habitats for part of, or all their entire lifecycle. For species at risk in particular, temporary impacts can exacerbate some of the effects from other existing threats and potentially jeopardize the survival and recovery of the species."*

EC notes that loss of wetland functions could be prolonged by the following:

- *construction activities that occur over an extended time period, over which impacts to wetlands would be expected to occur;*
- *limitations related to infrequency of monitoring of wetland recovery, which includes identifying the need to implement additional reclamation measures, e.g. proposed to occur in the first growing season post construction but limited to bi-annually after this time (Exhibit B239-27, PDF page 9);*
- *compensation measures that are implemented only after year 5 of the Wetland Function Post-construction Monitoring Program, when the need for compensation would be evaluated and confirmed; and*
- *the timeframe within which functions of the compensated wetland would achieve an equivalent, or higher, level than the functions lost from the original wetland."*

In Recommendation 2-10 in ECCC's written evidence (Exhibit C121-3-1, PDF page 53), *"EC recommends that measures be implemented (for example, the installation of nest boxes) such that the temporary loss of wetland functions is reduced to the extent possible"*. In particular, ECCC recommends that mitigation measures be implemented prior to impacts occurring or as early as possible after impacts are confirmed to minimize delay between functional loss and replacement.

Any mitigation measures aimed at reducing the temporary loss of wetland functions to the extent possible should be implemented prior to predicted impacts occurring and as soon as possible when unanticipated impacts are detected, to increase the likelihood of mitigation success. In some cases, it may be appropriate to implement mitigation measures before the project is initiated, based on predicted effects. For example, where the installation of nest boxes would help to reduce impacts on wetland habitat functions that support breeding birds, this measure should be implemented prior to the impacts occurring, to minimize the time lag between the time of nest box installation, the time at which the species learns of its existence/successfully uses it as habitat, and the time at which impacts to the wetland habitat functions occur.

As such, ECCC recommends amendments to Condition 52 (h) (iv) so that the mitigation measures are implemented sufficiently early to allow successful mitigation of predicted or confirmed effects, and that this be documented as part of the Preliminary Wetland Offset Plan.

For Recommendation 7:

(Rationale for changes to condition 52 (h) (v))

As noted in ECCC's written evidence (Exhibit C121-3-1, pdf pages 55-56), *"it is important to understand the jurisdictional context for the Wetland Compensation Plan and any associated agreement(s). A project impacting a wetland that serves as fish habitat could potentially require habitat compensation through the federal Fisheries Act... The Federal Policy on Wetland Conservation promotes the harmonization of requirements for wetland compensatory mitigation so that a single Wetland Compensation Plan and any associated agreement(s) can meet the requirements and goals of the Federal Policy on Wetland Conservation and provincial policies."*

In Recommendation 2-12 of ECCC's written evidence (Exhibit C121-3-1, pdf page 56), ECCC recommends that a Wetland Compensation Plan (WCP) be developed that *"lists the parties conducting implementation activities and their respective responsibilities."*

As such, ECCC recommends adding condition 52 (h) (v) so that parties that may have a role in the implementation of the Wetland Offset Plan would be identified prior to Project construction and selection of final compensation measures. The intention is to plan compensation activities in an integrated manner and to meet the requirements of other related legislation and policies.

Evidence relied upon:

For Recommendation 1:

(Evidence relied upon for changes to condition 52 (c))

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 51-52), as identified under the Rationale section.

For Recommendation 2:

(Evidence relied upon for changes to condition 52 (e))

Written evidence of ECCC section 2.3.2.5 - Recovery Success Criteria for Reclaimed Wetlands (Exhibit C121-3-1, PDF pages 53-55):

“EC advises that the Federal Policy on Wetland Conservation’s goal of no-net-loss of wetland functions applies to all wetland functions, individually. Here we provide particular guidance on how to interpret the policy’s expectation for attaining a no-net-loss outcome.

It is important to note that it is the combination of types and amounts of functions lost that set the quantitative-based compensation objectives in cases where recovery cannot be achieved. Therefore, recovery success criteria would need to consider the amount (level) and type of each function lost versus the amount and type of functions gained. Assessing each wetland function individually prevents the dilution of effects to wetland functions during the effects assessment.

As currently proposed in the Preliminary Wetland Compensation Plan (Exhibit B239-27, PDF page 23), each wetland will be assigned to a functional condition category, based on the sum of scores of individual functions. The Plan also indicates that reclamation measures for impacted wetlands would aim to return each wetland to the same functional I category as that assigned during pre-construction.

The Board, as part of its information request No. 2.051 (Exhibit 239-13, PDF page 214), indicated that the functional category methodology could allow a wetland to fall within the same category post-construction that it was in during pre-construction while the total score within this category is reduced because each category is based on a range of score values.

EC is of the opinion that the functional category methodology could also allow for the total score to remain constant, while the individual score of particular functions would be reduced. For example, for functions in the first tier, if function A is assigned a value of 10/16, and function B is assigned a value of 10/16 pre-construction, but post-construction function A scores 16/16 and function B scores 4/16, the sum of the scores for functions A and B would not change; consequently, this could lead to the loss of function for function B not being identified when determining recovery success for the entire wetland. In this

case, identification of net loss of wetland function would be missed due to the diluting effect of the total score.

In support of the functional category method, the Proponent provides the following rationale:

“The purpose of assigning a range of scores and corresponding percentages to the functional condition categories is to try and accommodate the seasonal and annual variation and dynamic nature of wetlands found in Alberta and British Columbia. As well, having a range allows for some subjectivity inherent in these types of assessments. The intent is for the overall functional condition outcomes to be reproducible by different wetland ecologists.”

“As well, the functional assessment considers a landscape review of the wetland ecosystem, and the actual assessment location of a given wetland may vary depending on accessibility from pre- to post-construction surveys (e.g. high water levels may prevent access to the original assessment location).”

“The functional condition categories are designed so that a difference in score is not likely to change the overall functional category outcome” (Exhibit B239-13, PDF page 218).

In addition, the Proponent has committed to the following:

“[...] For instance, if a wetland is determined to be within the same functional condition category but received a lower score post-construction relative to the pre-construction score, this difference will be considered by the assessment team and additional remedial measures may be recommended to improve the inhibited parameters [...] to ensure the wetland reaches its full potential recovery within the functional condition category” (Exhibit B239-13, PDF page 219).

Recommendation 2-11:

EC recommends that the Wetland Function Post-construction Monitoring Program (see Exhibit B239-27) be designed in such a way as to ensure that the type and amount of each wetland function would be considered individually in determining recovery success and that each wetland function would be recovered to at least the same type and amount of function as assessed during baseline. In particular, EC recommends setting compensation objectives in the form of a quantitative “range” for each function such that these objectives would allow for natural variability while providing a benchmark for the level/amount of function that is deemed acceptable with respect to no-net-loss.”

For Recommendation 3:

(Evidence relied upon for changes to condition 52 (f))

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 48-49), as identified under the Rationale section.

For Recommendations 4 and 7:

(Evidence relied upon for changes to condition 52 (h) (i), (ii) and (v))

Written evidence of ECCC section 2.3.2.6 - Wetland Compensation Plan (Exhibit C121-3-1, PDF pages 55-57):

“Where impacts cannot be mitigated through avoidance and minimization, impacts should be monitored and compensation provided where it is demonstrated that there are ongoing effects (i.e. effects lasting longer than 5 years). Effects include any loss of function even if no physical impact is anticipated or has occurred (e.g. partial drainage of wetland area).

Compensation for wetlands typically requires replacement of wetland function or rehabilitation of wetland areas with similar functions as those being affected or lost. This can require, for example, replacement of bird or amphibian habitat, water storage or groundwater recharge functions, or nutrient or sediment removal functions that have been lost as a result of a project.

Compensation sites are generally required to be larger than the original wetland area impacted, to compensate for the inherent uncertainty of replacing the loss of wetland functions and the lag time between the loss of wetland functions in the impacted wetland and gain in wetland functions in the compensation wetland. Therefore, compensation ratios are based on the probability of success of replacement of wetland functions, length of time required to bring a compensation site to functioning condition, the expertise of the compensation project proponent, threats to the site, etc.

It is important to understand the jurisdictional context for the Wetland Compensation Plan and any associated agreement(s). A project impacting a wetland that serves as fish habitat could potentially require habitat compensation through the federal Fisheries Act in addition to the Wetland Policy and provincial wetland conservation policies. The Wetland Policy promotes the harmonization of requirements for wetland compensatory mitigation so that a single Wetland Compensation Plan and any associated agreement(s) can meet the requirements of the Fisheries Act, the Wetland Policy, and provincial policies.

Recommendation 2-12:

EC recommends that a Wetland Compensation Plan (WCP) be developed and filed on or before January 31st after the fifth complete growing season after the start of operations.

The WCP should, among other things:

- *Identify indicator species for setting compensation objectives. Identification should be based on wetland function assessment data, Bird Conservation Strategies¹, and other information where available (note: listed species should not be used as indicator species; compensation efforts need to be directed specifically to these species). Indicator species and associated abundance determine the quantitative wetland functions compensation objectives and wetland area.*
- *[...]*
- *Describe the process of selecting proposed compensation site(s) and associated baseline condition(s).*
- *Identify the compensation ratio for each wetland for which compensation would be required.*
- *[...]*
- *List the parties conducting implementation activities and their respective responsibilities.*
- *[...]*

With respect to wetland compensation, EC recommends:

- a) *[...]*
- b) *The preferred method of compensation is restoration of drained or altered naturally occurring wetlands. Restored wetlands are preferred over enhanced wetlands, both of which are preferred over newly created wetlands. Furthermore, preference is for restoration of the same wetland types as those impacted, as wetland functions are often inextricably tied to wetland type.*
- c) *Lost wetland functions should be compensated on-site if site conditions are suitable for wetland functions. Second preference is in the same watershed from*

¹ BCR Conservation Strategies were developed by the North American Bird Conservation Initiative (NABCI) according to a series of broad, ecologically based set of “ecoregions” referred to as the Bird Conservation Regions (BCR). BCR Conservation Strategies highlight conservation needs by habitat types to provide more detail on the threats, objectives and actions for priority species using each type of habitat. For the wetland habitat type, key actions to address threats include, but are not limited to:

- avoiding further loss of wetland habitat and establishment; and
- maintenance of suitable vegetated buffers to maintain water quality.

The Project overlaps four BCR regions: Region 5: Northern Pacific Rainforest; Region 6: Boreal Taiga Plains; Region 9: Great Basin; Region 10: Northern Rockies. For the four regions above, priority species for wetland habitats have been identified, including some that are protected under SARA, COSEWIC and/or the MBCA.

which they were lost. Third preference is in the same ecosystem from which they were lost.”

For Recommendation 5:

(Evidence relied upon for changes to condition 52 (h) (ii))

Written evidence of ECCC (Exhibit C121-3-1 PDF pages 55, 57, and 58) as identified in the Rationale section, and PDF pages 55-57 as identified in the Evidence Relied upon for Recommendations 4 and 7, as well as PDF page 53:

“Recommendation 2-13:

For any wetlands to which the no-net-loss goal of the Wetland Policy applies (and for consideration in other areas where there is a commitment to no-net-loss), EC recommends that the following be provided:

- a) an evaluation of the uniqueness (in terms of nature and extent) of each wetland and associated functions;*
- b) an identification of the difficulties associated with mitigating for, reclaiming, and compensating for these functions, should they be degraded or lost;*
- c) an evaluation of the probability of success of any compensation measures in replacing lost functions. Consultation with the authority responsible for the wetland designation is highly recommended for evaluating whether compensation would be possible for the wetland; and*
- d) a consideration of all possible routing alternatives in order to avoid impacts to this wetland if it is anticipated that compensation would not be possible for the particular wetland.*

EC further recommends that these measures be documented and submitted as part of the Pre-construction Wetland Survey and Mitigation Plan, to be submitted to the Board at least 4 months prior to commencing construction, additional to the elements of the Plan as proposed in NEB Draft Condition 23 (Exhibit A19-1, PDF page 197 and 20).”

For Recommendation 6:

(Evidence relied upon for changes to condition 52 (h) (iv))

Written evidence of ECCC (Exhibit C121-3-1) PDF pages 52-53, as identified in the Rationale section, as well as PDF page 53:

Recommendation 2-10:

EC recommends that measures be implemented (for example, the installation of nest boxes) such that the temporary loss of wetland functions is reduced to the extent possible.

EC further recommends that these measures be documented and submitted as part of the Pre-construction Wetland Survey and Mitigation Plan, to be submitted to the Board at least 4 months prior to commencing construction, and that these measures be additional to the elements of the Plan as proposed in NEB Draft Condition 23 (Exhibit A19-1, PDF page 19 and 20).

DRAFT CONDITION # 53

Weed and Vegetation Management Plan

*Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, an updated Weed and Vegetation Management Plan for the Project that includes:*

- a) a summary of supplementary survey results, including pre-construction weed surveys, and a justification of the adequacy of such surveys;*
- b) measurable goals;*
- c) criteria describing when and where problem vegetation will be managed for each project phase, including pre-construction, construction, post-construction, and operations;*
- d) management procedures and a decision-making framework for selecting the appropriate treatment measures, including how stakeholder concerns and potential adverse effects of treatment measures will be considered;*
- e) short- and long-term vegetation monitoring;*
- f) a summary of Trans Mountain's consultation concerning a) to e) with appropriate government authorities, landowners, invasive plant councils or committees, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; and*
- g) confirmation that the relevant Environmental Protection Plans will be updated to include any relevant information from the Weed and Vegetation Management Plan.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 53 be amended as follows:

Weed and Vegetation Management Plan

Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, an updated Weed and Vegetation Management Plan for the Project that includes:

- a) a summary of supplementary survey results, including pre-construction weed surveys, and a justification of the adequacy of such surveys;

- b) measurable goals;
- c) criteria describing when and where problem vegetation will be managed for each project phase, including pre-construction, construction, post-construction, and operations;
- d) a description of how Project maintenance clearing/vegetation management will be minimized, to the extent feasible, in priority habitat areas for migratory birds, as determined in Priority Habitat Area Management Plan (condition #____) (in addition to measures undertaken to comply with the prohibitions under the *Migratory Birds Convention Act*);
- e) management procedures and a decision-making framework for selecting the appropriate treatment measures, including how stakeholder concerns and potential adverse effects of treatment measures will be considered;
- f) short- and long-term vegetation monitoring;
- g) a summary of Trans Mountain's consultation concerning a) to e) with appropriate government authorities, landowners, invasive plant councils or committees, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; and
- h) confirmation that the relevant Environmental Protection Plans will be updated to include any relevant information from the Weed and Vegetation Management Plan.

Rationale:

In its written evidence (Exhibit C121-3-1, PDF pages 42-43), given the high habitat values associated with priority areas for migratory birds, ECCC advises that additional mitigation be planned to reduce the effects of habitat loss/alteration/fragmentation, and disturbance to migratory birds arising from construction and operational activities (maintenance clearing) of the Project. In ECCC's Recommendation 2-7 (Exhibit C121-3-1, PDF page 43), it is recommended that, in Priority Habitat Areas, "*the frequency of Project maintenance clearing/vegetation management be minimized, to the extent feasible.*" As such, ECCC recommends incorporating this approach in the requirements for condition 53.

ECCC recommends that Priority Habitat Areas be determined through the Priority Habitat Area Management Plan, which ECCC recommends be included as a separate condition for the Project (see above).

ECCC highlights that disturbance, destruction, or taking of a migratory bird nest, nest shelter or eggs should be avoided. The onus remains with the Proponent to comply with the *Migratory Birds Convention Act* at all times (See Recommendation 2-5 in ECCC's written evidence, Exhibit C121-3-1, PDF page 39-40 for details).

Evidence relied upon:

Written evidence of ECCC, Exhibit C121-3-1, PDF pages 35-36:

“Given the high habitat values associated with the above-mentioned priority areas for migratory birds, EC has outstanding concerns regarding habitat loss/alteration/fragmentation, and disturbance to migratory birds arising from construction and operational activities (maintenance clearing) of the Project. Consideration of additional mitigation (e.g. habitat avoidance, reduced habitat fragmentation) for these areas would be appropriate.

The following recommendations relate to the priority habitat areas for migratory birds and species at risk.

Recommendation 2-7:

[...]

b) EC recommends that the frequency of Project maintenance clearing/vegetation management be minimized, to the extent feasible.

Written evidence of ECCC, Exhibit C121-3-1 on PDF pages 39-40:

“Recommendation 2-5:

Disturbance, destruction, or taking of a migratory bird nest, nest shelter or eggs should be avoided. At all times, the onus remains with the Proponent to comply with the legislation. In this regard, the Proponent shall take into account the Avoidance Guidelines, the edition modified in 2014 by the Department of the Environment, as amended from time to time, and in particular the section of the Avoidance Guidelines entitled General Nesting Periods of Migratory Birds in Canada. The Proponent’s actions in applying the Avoidance Guidelines, including the section with the aforementioned subject matter, shall be in compliance with the MBCA and with the SARA.

EC advises that habitat destruction (e.g. vegetation clearing and disturbance-related activities) has a high risk of disturbing or destroying migratory bird eggs and nests between March 15 and August 15 in BC and between April 15 and August 15 in AB. Some species nest outside this period and depending on the specific location along the pipeline corridor, a narrower window may be applicable. Refer to EC’s website for detailed nesting windows: http://ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#_04. The Proponent is advised to develop beneficial management practices to avoid impacts to migratory birds.

Anytime nests containing eggs or young are encountered, irrespective of the time of year, a species appropriate buffer must be put in place until nesting is complete (i.e. the young have left the vicinity of the nest) (http://ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1#_03_1_1).

EC advises that protection is not limited to active nests of migratory birds, and there are species that reuse nests from year to year (e.g. Great Blue Heron, Barn Swallow); therefore damage, destruction or removal of a non-active nest is prohibited.

EC advises that incidental take can arise from various activities, and therefore recommends that Project activities, such as filling, draining or other destruction of wetlands with wetland dependent species, for example, not take place until migratory birds have had sufficient time to fledge and disperse. In some cases, such as for migratory birds listed under SARA, more specific information on breeding periods and buffers may be available and should be considered.”

DRAFT CONDITION # 54

Fugitive Emissions Management Plan for the Westridge Marine Terminal

Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, a Fugitive Emissions Management Plan for the Westridge Marine Terminal that includes:

- a) a description of the sources of the fugitive emissions that will be generated from the Westridge Marine Terminal during construction and operations;
- b) a description of the emission and odour controls that will be employed to reduce fugitive emissions during tanker loading and other sources identified in a);
- c) procedures for verifying, tracking, and reporting on:
 - i) volatile organic compound collection efficiency;
 - ii) the vapour recovery unit's hydrogen sulphide and mercaptan removal efficiency, as well as its BTEX reduction efficiency; and
 - iii) the vapour combustion unit's hydrogen sulphide and mercaptan removal efficiency, as well as its combustion efficiency;
- d) procedures for identifying any leaks or equipment malfunctions during operation of the vapour recovery and vapour combustion units;
- e) methods for quantifying emissions (with vapour recovery and vapour combustion units in operation);
- f) any additional mitigation measures that will be employed to further reduce fugitive emissions;
- g) a description of Trans Mountain's program for addressing complaints with respect to fugitive emissions, including a communication and notification plan; and

- h) a summary of consultation with appropriate regulatory or government authorities and any potentially affected landowners and Aboriginal groups, including any issues or concerns raised with respect to the Fugitive Emissions Management Plan and how Trans Mountain has addressed or responded to them.*

Recommendation:

Recommendation 1:

Environment and Climate Change Canada (ECCC) recommends that condition 54 (a) be amended as follows:

- a) a description of the sources of the fugitive emissions that will be generated from the Westridge Marine Terminal during construction and operations, **including fugitive emissions from tankers that call at Westridge during transit through and anchorage in the Burrard Inlet;**

Recommendation 2:

ECCC recommends that condition 54 (c) be amended as follows:

- c) procedures for verifying, tracking, and reporting on:
- i) fugitive emissions during tanker loading and other sources identified in a);**
 - ii) volatile organic compound collection efficiency;
 - iii) the vapour recovery unit's hydrogen sulphide and mercaptan removal efficiency, as well as its BTEX reduction efficiency; and
 - iv) the vapour combustion unit's hydrogen sulphide and mercaptan removal efficiency, as well as its combustion efficiency;

Rationale:

For Recommendation 1:

For draft condition 54 a), section 3.2.2.4 (ECCC Analysis of Anchorage Locations and Anchorage Times) of ECCC's written evidence (Exhibit C121-3-1, PDF page 101) states that:

“Additional time at anchor also has an impact on fugitive VOC emissions from the tanker holds. According to the Proponent's estimates in the December 2013 filing and subsequent technical reports, fugitive VOC emissions during transit and anchorage will be approximately 800 tonnes per year. Assuming that 50% of the tankers calling require

anchorage for an average of 70 hours as EC has observed above, and applying US EPA emission factors for emissions from tanker holds during transit, EC then estimates that about 1600 tonnes/year of fugitive VOCs during anchorage would be emitted. EC further estimates that 75% of those emissions occur in the Burrard Inlet, near urban areas”

Therefore, the condition should explicitly include fugitive emissions from tankers that call at Westridge during transit through and anchorage in the Burrard Inlet.

For Recommendation 2:

For draft condition 54 c), section 3.2.2.4 (ECCC Analysis of Anchorage Locations and Anchorage Times) of ECCC’s written evidence (Exhibit C121-3-1, PDF page 102) states that:

“EC’s analysis indicates that the marine-source of emissions of NOx and fugitive VOCs could be substantially underestimated and therefore lacks confidence in the Proponent’s maximum modeled concentrations, some of which are close to the applicable Ambient Air Quality Objectives, such as for NO2. Unless additional modelling is done, it is uncertain whether exceedances of some of these pollutants would be reached if the additional marine emissions were included.”

Therefore, in conjunction with the addition of the text in draft condition 54 a) to include fugitive emissions from tankers that transit through and anchor in Burrard Inlet, associated procedures for verifying, tracking, and reporting on these fugitive emissions should be in place. The addition of the text provided in the recommendation section will address this.

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 101-202) as identified in the Rationale section.

DRAFT CONDITION # 65

Marine Sediment Management Plan

*In the event that dredging is required during the expansion of the Westridge Marine Terminal, Trans Mountain must file with the NEB, **at least 90 days prior to commencing construction**, and also include as part of its Westridge Marine Terminal Environmental Protection Plan, a Marine Sediment Management Plan. This plan must include:*

- a) a summary of any supplemental marine sediment survey results;*
- b) quantification of the area and the volume of marine sediment to be dredged;*
- c) results of sediment plume modelling for any areas to be dredged;*

- d) *disposal options for dredged sediment, including the volumes of sediment that will be re-used or disposed of at sea or on land, as well the criteria and methods for determining how the dredged sediment will be disposed of;*
- e) *an update to any site-specific mitigation identified in the Westridge Marine Terminal Environmental Protection Plan;*
- f) *details of monitoring that will be undertaken during construction;*
- g) *a summary of consultation with appropriate government authorities and potentially affected stakeholders and Aboriginal groups; and*
- h) *details of monitoring (both abiotic and biotic parameters) that will be undertaken during operations, including a discussion on evaluating the level of contaminants in the marine environment*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 65 be amended as follows:

Marine Sediment Management Plan

In the event that dredging is required during the expansion of the Westridge Marine Terminal, Trans Mountain must file with the NEB, **at least 90 days prior to commencing construction**, and also include as part of its Westridge Marine Terminal Environmental Protection Plan, a Marine Sediment Management Plan. This plan must include:

- a) a summary of any supplemental marine sediment survey results;
- b) **if dredging is demonstrated to be unavoidable**, quantification of the area and the volume of marine sediment to be dredged **along with an explanation of the measures that have been taken to eliminate or reduce the dredge footprint and volume proposed for disposal at sea;**
- c) results of sediment plume modelling for any areas to be dredged;
- d) **disposal** options for dredged sediment **management**, including the volumes of sediment that will be re-used or disposed of at sea or on land, as well the criteria and methods for determining how the dredged sediment will be **disposed managed recognizing that any proposed disposal at sea will only be considered for approval under the *Canadian Environment Protection Act, 1999* if it is demonstrated to be the most technically and environmentally preferable option;**
- e) an update to any site-specific mitigation identified in the Westridge Marine Terminal Environmental Protection Plan;
- f) details of monitoring that will be undertaken during construction;
- g) a summary of consultation with appropriate government authorities and potentially affected stakeholders and Aboriginal groups; and
- h) details of monitoring (both abiotic and biotic parameters) that will be undertaken during operations, including a discussion on evaluating the level of contaminants in the marine

environment and any changes from pre-construction levels, as well as a proposed reporting schedule.

Rationale:

The condition should clearly state that any disposal at sea must be approved in accordance with the *Canadian Environmental Protection Act, 1999* and will only be considered if it is demonstrated to be the most technically and environmentally preferable option. The proposed wording addresses this along with the additional requirement to ensure measures have been taken to eliminate or reduce any dredge footprint.

Evidence replied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 129):

“Recommendation 5-1:

- a) EC recommends that the Proponent, in finalizing the Project design, demonstrate a consideration of engineering options and construction methods that could reduce or eliminate the dredge footprint and volume of material proposed for disposal at sea.*
- b) EC recommends that the Proponent, in advancing any detailed plans for disposal at sea, demonstrate how the NEB review process outcomes related to protection of the marine environment (e.g. fish and fish habitat) will be respected. This should take into account the concerns identified by Aboriginal groups and other users of the sea”.*

DRAFT CONDITION # 78

Updates under the Species at Risk Act

Trans Mountain must file with the NEB, at least 60 days prior to commencing construction, a summary of any relevant updates under the Species at Risk Act, including new Schedule 1 listings and new or amended Recovery Strategies, Action Plans, and Management Plans for species that have the potential to be affected by the Project. For each species-specific update, the summary must include:

- a) a discussion of the Project activities’ potential effects on the listed species or its critical habitat;*
- b) identification of all reasonable alternatives to the Project activities referred to in a), including avoidance measures, and a discussion on the potential effects of the alternatives, the chosen approach, and the rationale for selecting the chosen approach;*
- c) any additional site-specific mitigation;*

- d) any monitoring to be undertaken and a commitment to include monitoring results as part of the post-construction environmental monitoring reports filed under Condition No. 140;
- e) confirmation that Trans Mountain, throughout the life of the Project, will continue to track (under its Environmental Protection Program) updates under the *Species at Risk Act*, to consult with the appropriate government authorities, and to consider changes to construction and operational measures, plans, and procedures; and
- f) a summary of Trans Mountain's consultation concerning a) to d) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 78 be amended as follows:

Updates under the *Species at Risk Act*

Trans Mountain must file with the NEB, **at least 60 days prior to commencing construction**, a summary of any relevant updates under the *Species at Risk Act*, including new Schedule 1 listings and new or amended Recovery Strategies, Action Plans, and Management Plans for species that have the potential to be affected by the Project. For each species-specific update, the summary must include:

- a) a discussion of the Project activities' potential effects on the listed species or its critical habitat;
- b) a summary of all additional surveys conducted for species at risk, including any surveys not yet completed for species at risk that are currently listed;
- c) a summary of measures taken to avoid or lessen adverse Project effects on the species at risk or its critical habitat consistent with applicable recovery strategies and actions plans, including any new Species at Risk Mitigation and Critical Habitat Restoration Plans, as required in condition 44;
- d) ~~identification of all reasonable alternatives to the Project activities referred to in a); including avoidance measures, and a discussion on the potential effects of the alternatives, the chosen approach, and the rationale for selecting the chosen approach~~ identification and review of alternative measures to avoid or lessen project activities that impact species at risk or their critical habitat, and the rationale for selecting the measure;
- e) any additional site-specific mitigation;
- f) any monitoring to be undertaken and a commitment to include monitoring results as part of the post- construction environmental monitoring reports filed under Condition No. 140;

- g) confirmation that Trans Mountain, throughout the life of the Project, will continue to track (under its Environmental Protection Program) updates under the *Species at Risk Act*, to consult with the appropriate government authorities, and to consider changes to construction and operational measures, plans, and procedures; and
- h) a summary of Trans Mountain's consultation concerning a) to f) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Rationale:

SARA ss. 79(2) states that the RA “*must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them*”. ECCC’s suggested amendments to the condition are provided to ensure that such measures are taken and, as required by s. 79(2), are consistent with any applicable recovery strategies and action plans.

In order to assist the RA in meeting its obligations under ss. 79(2) of SARA, ECCC suggests the amendments in condition 78 (c) and (d).

Notwithstanding the above, as highlighted in ECCC’s written evidence (Exhibit C121-3-1, PDF page 34); “*there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels. Furthermore, ECCC notes that individuals, residences and critical habitat of listed species at risk could potentially be protected under SARA should prohibitions be put in place or invoked under, for example, sections 34, 58, or 61 of SARA. If such a prohibition is put in place or invoked, then a permit would be required*” (Exhibit C121-3-1, PDF page 35). For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm.

In addition, ECCC recommends amending this condition to require a summary of specific surveys conducted for species at risk, including any surveys not yet completed for species at risk that are currently listed (as provided in proposed condition 78 (b)). As noted in ECCC’s written Evidence (Exhibit C121-3-1, PDF page 21) “*surveys are important for establishing credible baseline information and informing mitigation and monitoring, consistent with ss. 79(2) of SARA*”. There are a number of species at risk currently at risk for which Project surveys have not been conducted to date. “*This survey information should be considered in determining micro-routing, along with species-specific Best Management Practices and information from recovery strategies, in finalizing specific mitigation measures in the Pipeline Environmental Protection*

Plan and Westridge Marine Terminal Environmental Protection Plan” (Exhibit C121-3-1, PDF page 21).

The Proponent’s Reply Evidence to ECCC Recommendation 2-1 (Exhibit B418-19, PDF pages 4-6) further indicates that:

“The proposed pipeline corridor does not encounter any abandoned mines. The following work has been completed and/or is ongoing in an effort to identify rock features (cliffs, crevices, caves) within the Project footprint that have the potential to support bat hibernacula:

- desktop review of aerial imagery and topographical data;*
- review of immersive video of the existing TMPL right-of-way along segments paralleled by TMEP;*
- aerial overflights completed as part of the wildlife field work include a review of rock features;*
- review of the BC CDC and the Alberta Fish and Wildlife Management Information System (FWMIS) records for known bat occurrences (none recorded);*
- consultation with provincial regulators to receive available information on bats; and*
- collaboration with TMEP Project engineers to review and discuss their assessment of surface rock encountered along the proposed pipeline corridor.*

In the event that disturbance to a rock feature with potential to support bats is identified, Trans Mountain will contact the appropriate regulatory agency to discuss if further survey work is needed (e.g., use of acoustic monitors to detect bats). This commitment was previously stated for spotted bats in Government of Canada (GoC) Information Request (IR) No. 2.037a (Filing ID A4H6A5).

Summer roosts may include old mixed wood or deciduous forests containing large-diameter decaying trees with cavities, crevices or sloughing bark. Similar to the approach taken for migratory birds, clearing should avoid the period when maternity roosts are active. This period is typically from April to July (Taylor 2006). In the event that clearing occurs within this period, searches for bat roost trees will be conducted in combination with non-intrusive surveys for migratory bird nests. In the event an active maternity roost tree is found, a protective buffer will be implemented based on consultation with provincial regulators.”

As noted in ECCC’s written evidence, surveys for bats should be conducted as soon as possible and prior to the finalization of the detailed pipeline route (Exhibit C121-3-1, PDF page 21). ECCC notes that in the absence of baseline studies for roost sites and hibernacula for Little Brown Myotis and Northern Myotis, due to the inter-annual variation in the use of habitat features by bats, conducting only pre-disturbance surveys may not provide a complete

understanding of where roost sites and hibernacula are located and might result in destruction of features that are required by Little Brown Myotis and Northern Myotis.

Thus, ECCC continues to recommend that specific surveys for species at risk for which Project surveys have not been completed be completed as soon as possible and prior to the finalization of the detailed pipeline route, as suggested in Recommendation 2-1 of ECCC written evidence (Exhibit C121-3-1, PDF page 21).

Evidence Relied Upon:

Written evidence of ECCC, Exhibit C121-3-1 on PDF page 21, 34, and 35 and the Proponent's Reply Evidence to ECCC Recommendation 2-1 (Exhibit B418-19, PDF pages 4-6), as identified in the Rationale section, as well as ECCC's written evidence (Exhibit C121-3-1) on PDF page 21:

“To help the Responsible Authority meet its obligations under SARA s. 79, EC recommends that measures be taken to avoid or lessen adverse effects to listed wildlife species (Tables 2-1 and 2-2) and monitor those effects, consistent with any applicable recovery strategy and action plan.”

DRAFT CONDITION # 79

Riparian Habitat Management Plan

*Trans Mountain must file with the NEB for approval, **at least 60 days prior to commencing construction**, a Riparian Habitat Management Plan for any riparian areas that will be impacted by Project construction. This plan must include:*

- a) a pre-construction assessment of riparian habitat functionality (e.g., for fish, wildlife, and rare plants) and a quantification of the riparian habitat within the Project footprint;*
- b) measureable goals to determine that riparian habitat has returned to pre-construction functionality;*
- c) site-specific reclamation plans, including a discussion on the length of time it will take to return riparian habitat to pre-construction functionality;*
- d) details of monitoring that will be undertaken;*
- e) a Preliminary Riparian Habitat Enhancement and Offset Plan for any riparian habitat that has not returned to pre-construction functionality, which must include:*

- i) *how the need for enhancement and offset measures will be determined and quantified, including offset ratios;*
- ii) *potential enhancement and offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and*
- iii) *how the effectiveness of enhancement and offset measures will be monitored, assessed, and reported on;*
- f) *a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan; and*
- g) *a summary of Trans Mountain's consultation concerning a) to e) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 79 be amended as follows:

Riparian Habitat Management Plan

Trans Mountain must file with the NEB for approval, **at least 60 days prior to commencing construction**, a Riparian Habitat Management Plan for any riparian areas that will be impacted by Project construction. This plan must include:

- a) a pre-construction assessment of riparian habitat functionality (e.g., for fish, wildlife, and rare plants) and a quantification of the riparian habitat within the Project footprint;
- b) measureable goals to determine that riparian habitat has returned to pre-construction functionality;
- c) site-specific reclamation plans, including a discussion on the length of time it will take to return riparian habitat to pre-construction functionality;
- d) details of monitoring that will be undertaken;
- e) a Preliminary Riparian Habitat Enhancement and Offset Plan for any riparian habitat that has not returned to pre-construction functionality, which must include:
 - i) how the need for enhancement and offset measures will be determined and quantified, including offset ratios;
 - ii) potential enhancement and offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and
 - iii) how the effectiveness of enhancement and offset measures will be monitored, assessed, and reported on;

- f) a description of how the outcomes of the Priority Habitat Management Plan (Condition No. ____) for riparian habitat have been considered in the development of this plan;
- g) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan; and
- h) a summary of Trans Mountain’s consultation concerning a) to e) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Rationale:

ECCC recommends in this written argument-in-chief (on page 95), that a Priority Habitat Management Plan be included as a separate condition for the Project, which would include riparian areas as priority habitat areas for migratory birds. While the Priority Habitat Management Plan and the Riparian Habitat Management Plan would both address impacts to riparian areas, the focus of the Priority Habitat Management Plan is on migratory birds, specifically. Given the clear connection between the two plans, ECCC recommends that the Riparian Habitat Management Plan should require a description of how the outcomes of the Priority Habitat Management Plan have been considered in the development of this plan. This amendment would ensure that the two plans are appropriately linked and developed in coordination with the other.

Evidence relied upon:

Written evidence of ECCC (Exhibit Number C121-3-1, PDF pages 41-43), as identified under ECCC’s recommendation regarding the addition of a condition for a Priority Habitat Areas Management Plan (proposed condition ECCC-02 on page 95).

DRAFT CONDITION # 98

Authorizations under paragraph 35(2)(b) of the *Fisheries Act* and *Species at Risk Act* permits –pipeline

- a) *For those watercourse crossings that will require Authorization under paragraph 35(2)(b) of the Fisheries Act, Trans Mountain must file with the NEB, at least 5 months prior to commencing their construction, the following:*
 - i) *A draft Application Form for Paragraph 35(2)(b) Fisheries Act Authorization;*
 - ii) *A draft application package for authorization that includes all the information detailed in Fisheries and Oceans Canada’s Applicant’s Guide to Submitting an Application for Authorization under Paragraph 35(2)(b) of the Fisheries Act, including (as per the guide):*

- *contact information;*
 - *a description of the proposed work, undertaking, or activity;*
 - *detailed design;*
 - *the timeline;*
 - *location;*
 - *a description of fish and fish habitat (aquatic environment);*
 - *a description of effects on fish and fish habitat;*
 - *measures and standards to avoid or mitigate serious harm to fish;*
 - *a description of the monitoring measures;*
 - *residual serious harm to fish after implementing avoidance and mitigation measures and standards;*
 - *an offsetting plan; and*
 - *proof of a letter of credit.*
- iii) *A summary of Trans Mountain’s consultation with appropriate government authorities and any potentially affected Aboriginal groups and stakeholders regarding the works proposed to be authorized, as well as any offsetting measures proposed. This summary must include any issues or concerns raised regarding these works and how Trans Mountain has addressed or responded to them.*
- b) *Trans Mountain must file with the NEB, at least 10 days prior to commencing construction of each of the watercourse crossings identified in a), a copy of the Fisheries Act paragraph 35(2)(b) Authorization and any Species at Risk Act permits issued by Fisheries and Oceans Canada.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 98 (b) be amended as follows:

- b) Trans Mountain must file with the NEB, **at least 10 days prior to commencing construction of each of the watercourse crossings identified in a)**, a copy of the *Fisheries Act* paragraph 35(2)(b) Authorization ~~and any Species at Risk Act permits~~ issued by Fisheries and Oceans Canada, **and any Species at Risk Act permits issued by the competent minister under the Act.**

Rationale:

ECCC recommends that the condition be amended to require the filing of all SARA permits issued by the competent minister under SARA (i.e. not only those permits issued by Fisheries

and Oceans Canada, but also ECCC and Parks Canada, as applicable). In ECCC's written evidence (C121-3-1, Recommendation 2-3, PDF page 35), ECCC advised "*the Responsible Authority that for portions of the Project where SARA prohibitions apply, including project activities that could impact Threatened, Endangered, and Extirpated species at risk or their residences on federal lands, a permit under s. 73 of SARA would be required to undertake the work. The permit may only be issued under SARA if the activity that is being permitted falls under one of the purposes identified in ss. 73(2) and the ss. 73(3) preconditions are met. For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm."*

Evidence Relied Upon:

Written evidence of ECCC, Exhibit (C121-3-1, PDF page 35) as identified in the Rationale section.

DRAFT CONDITION # 110

Offset Measures Plan for residual effects on caribou habitat

Trans Mountain must file with the NEB for approval, in accordance with the timelines below, an Offset Measures Plan for each affected caribou range, the goal of which is to offset all unavoidable and residual direct and indirect Project-related effects on caribou habitat, after taking into account the implementation of Trans Mountain's Post-Construction Environmental Monitoring Program and CHRP (see Condition No. 21) measures.

- a) *A preliminary version, to be filed **at least 90 days prior to applying for leave to open**, with the plan's criteria and measurable goals and that includes:*
 - i) *an initial quantification of the area of caribou habitat directly and indirectly disturbed;*
 - ii) *a list of the potential offset measures available;*
 - iii) *each potential offset measure's appropriate offset ratio, based on consultation with expert federal and provincial authorities and on a review of the literature on conservation offsets;*
 - iv) *each potential offset measure's expected effectiveness;*
 - v) *each potential offset measure's relative qualitative and quantitative value toward achieving the offset; and*
 - vi) *a conceptual decision-making tree(s) or decision framework(s) that will be used to select which specific potential offset measures and accompanying offset ratios will be used under what circumstances.*

- b) *A final version, to be filed on or before 31 January after the second complete growing season after commencing operations, including:*
- i) *the preliminary Offset Measures Plan, with any updates identified in a revision log that includes the rationale for any changes;*
 - ii) *a detailed decision-making tree(s) or process that will be used to select which specific potential offset measures and accompanying offset ratios will be used under what circumstances;*
 - iii) *a tabular list of the potential offset measures and appropriate offset ratios to be implemented or already underway, including a description of site-specific details and maps showing the locations;*
 - iv) *a schedule indicating when potential offset measures will be initiated and their estimated completion dates;*
 - v) *either an assessment of the potential offset measures' effectiveness and their value in offsetting residual effects, or a plan for completing an assessment of the potential offset measures' effectiveness and value; and*
 - vi) *an update on the restoration success to support offset measure decisions.*

Both the preliminary and final versions of the plan must also include the following:

- 1) *A summary of Trans Mountain's consultation with appropriate government authorities and any potentially affected Aboriginal groups regarding the Offset Measures Plan. This summary must include any issues or concerns raised regarding the plan and how Trans Mountain has addressed or responded to them.*
- 2) *A description of how Trans Mountain has taken any available and applicable Aboriginal traditional land use and traditional ecological knowledge studies into consideration in developing the plan.*
- 3) *Evidence of Trans Mountain's consideration of any updates to the applicable Recovery Strategy, as well as to range boundaries and identified critical habitat made prior and up to the date on which leave to open is granted.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 110 be amended as follows:

Offset Measures Plan for residual effects on ~~caribou~~ critical habitat

Trans Mountain must file with the NEB for approval, in accordance with the timelines below, an Offset Measures Plan ~~for each affected caribou range, the goal of which is~~ to offset all unavoidable and residual direct and indirect Project-related effects on ~~caribou habitat species~~ with early draft, candidate, proposed, or final critical habitat. The goal of the Offsets Measures

Plan is to avoid if achievable, or lessen any increased risk to the survival or recovery of the species, ~~after~~ taking into account the implementation of Trans Mountain's Post-Construction Environmental Monitoring Program and CHRP (see Condition No. 21) measures.

- a) A preliminary version, to be filed **at least 90 days prior to commencement of construction applying for leave to open**, with the plan's criteria and measurable goals and that includes:
 - i) an initial ~~quantification~~ quantifiable estimate of the impact(s) to the biophysical attributes of critical ~~area of caribou~~ habitat directly and indirectly affected ~~disturbed~~;
 - ii) an account of how the avoidance, mitigation, and offset hierarchy was considered in developing the plan;
 - iii) an analysis determining the limitations and appropriateness of the use of offsets for the impact(s) to the biophysical attributes of critical habitat identified in (i) above;
 - iv) a list of the potential offset measures available;
 - v) each potential offset measure's appropriate offset ratio, based on consultation with ~~expert federal and provincial~~ appropriate government authorities and on a review of the literature on conservation offsets;
 - vi) each potential offset measure's expected effectiveness;
 - vii) each potential offset measure's relative qualitative and quantitative value toward achieving the offset; ~~and~~
 - viii) a conceptual decision-making tree(s) or decision framework(s) that will be used to select which specific potential offset measures and accompanying offset ratios will be used under what circumstances, **including an account of how the habitat measures are consistent with applicable recovery strategies and action plans;-**
 - ix) a list and description of measures to address the potential for time lags between when Project impacts occur and when mitigation measures are implemented and fully functional (this may include non-habitat measures, where appropriate, to enhance survival, enhance recruitment, and/or reduce primary threats);
 - x) identification and review of alternative measures to avoid or lessen project activities that impact critical habitat, and the rationale for selecting the measure; and

- b) A final version, to be filed **on or before 31 January after the second complete growing season after commencing operations**, including:
 - i) the preliminary Offset Measures Plan, with any updates identified in a revision log that includes the rationale for any changes;
 - ii) a detailed decision-making tree(s) or process that will be used to select which specific potential offset measures and accompanying offset ratios will be used under what circumstances;

- iii) a tabular list of the potential offset measures and appropriate offset ratios to be implemented or already underway, including a description of site-specific details and maps showing the locations;
- iv) a schedule indicating when potential offset measures will be initiated and their estimated completion dates;
- v) either an assessment of the potential offset measures' effectiveness and their value in offsetting residual effects, or a plan for completing an assessment of the potential offset measures' effectiveness and value; and
- vi) an update on the restoration success to support offset measure decisions.

Both the preliminary and final versions of the plan must also include the following:

- 1) A summary of Trans Mountain's consultation with appropriate government authorities and any potentially affected Aboriginal groups regarding the Offset Measures Plan. This summary must include any issues or concerns raised regarding the plan and how Trans Mountain has addressed or responded to them.
- 2) A description of how Trans Mountain has taken any available and applicable Aboriginal traditional land use and traditional ecological knowledge studies into consideration in developing the plan.
- 3) Evidence of Trans Mountain's consideration of any updates to the applicable Recovery Strategy, as well as to ~~range boundaries and~~ identified critical habitat made prior and up to the date on which leave to open is granted.

Rationale:

In ECCC's written evidence, ECCC recommended that, given the importance of critical habitat, the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA (see Exhibit C121-3-1, Recommendation 2-2, PDF page 34).

ECCC noted in Recommendation 2-2 (Exhibit C121-3-1, PDF page 34) that "*there are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC's recommended approach.*"

In the event that avoidance is not fully incorporated into the Project, ECCC has suggested in its written evidence (Exhibit C121-3-1, PDF page 34) that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) states that the RA "*must identify the adverse effects of the project on the listed wildlife species and its critical*

habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them". ECCC's suggested amendments to the condition are provided to ensure that such measures are taken and, as required by s. 79(2), are consistent with any applicable recovery strategies and action plans.

ECCC recommends incorporating all species at risk whose early draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project into draft condition #110: Offset Measures Plan for residual effects on critical caribou habitat. As such ECCC suggests deleting the word "caribou" from the condition. ECCC's recommendation 2-2 (Exhibit C121-3-1, PDF page 34) applies to all species with the potential for Project impacts to critical habitat (early draft, candidate, proposed or final), and not just to Southern Mountain Caribou. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific. ECCC is suggesting a number of similar amendments to the NEB's draft condition 44, which may result in some repetition; however, ECCC is providing amendments using the structure as set out by the NEB.

In Appendices C-1 to C-16 of ECCC's written evidence (Exhibit C121-3-1, PDF pages 159-290), ECCC suggested that detailed species-specific mitigation and monitoring plans should be consistent with the mitigation hierarchy. As such, ECCC suggests that the conditions require an account of how the avoidance, mitigation, and offset hierarchy was considered in developing the plan. The mitigation hierarchy is a conceptual framework that, in its basic form, has three steps:

- Avoid proposed impacts;
- Minimize proposed impacts; and
- Address any residual environmental effects that cannot be avoided or sufficiently minimized with the use of conservation allowances.

Offsets may be used to ensure that measures are taken to lessen adverse effects to critical habitat. A biodiversity offset is widely accepted as an initiative that provides measurable benefits to biodiversity in order to (at a minimum) compensate for a residual adverse impact of a project on biodiversity after appropriate avoidance and minimization measures have been taken. A biodiversity offset may include various activities, such as restoration, enhancement or creation of species' habitat, or measures that reduce threats to the provision of ecological services or to a species.

ECCC highlights that there are limits to what can be offset. Offsets cannot compensate for the loss of irreplaceable habitat. In addition, offsets may not be appropriate where there is a high probability of the offset failing or where the impacts of failure would be significant. Whether or not offsetting residual impacts to the biophysical attributes of critical habitat is possible will depend on a number of factors, including the nature of the critical habitat identification for the species and technological capabilities. ECCC suggests that this condition require that an analysis

be conducted to determine the limitations and appropriateness of the use of offsets for the impact(s) to the biophysical attributes of critical habitat.

As noted above, avoidance of the destruction of critical habitat is ECCC's recommendation. A biodiversity offset is only appropriate where it is intended to address the "residual" adverse impacts that remain after the project Proponent has considered and adopted the best technically and economically feasible:

- 1) alternative project design or location options that would avoid the impacts of the project (avoidance); and
- 2) measures to minimize the impacts of the project (minimization).

Notwithstanding the above, as highlighted in ECCC's written evidence (Exhibit C121-3-1, PDF page 34); "*there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels. Furthermore, ECCC notes that individuals, residences and critical habitat of listed species at risk could potentially be protected under SARA should prohibitions be put in place or invoked under, for example, sections 34, 58, or 61 of SARA. If such a prohibition is put in place or invoked, then a permit would be required*" (Exhibit C121-3-1, PDF page 35). For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm.

Evidence Relied On:

Written evidence of ECCC (Exhibit C121-3-1) PDF pages 34-35 as identified in the Rationale section, as well as Appendix C on PDF pages 159-290:

- C-1: Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*)
- C-2: Pacific Water Shrew (*Sorex bendirii*)
- C-3: Toothcup (*Rotala ramosior*)
- C-4: Williamson's Sapsucker (*Sphyrapicus thyroideus*)
- C-5: Oregon Forestsnail (*Allogona townsendiana*)
- C-6: Townsend's Mole (*Scapanus townsendii*)
- C-7: American Badger – *jeffersonii* ssp. (*Taxidea taxus jeffersonii*)
- C-8: Coastal Giant Salamander (*Dicamptodon tenebrosus*)
- C-9: Great Basin Gophersnake (*Pituophis catenifer deserticola*)
- C-10: Great Basin Spadefoot (*Spea intermontana*)
- C-11: Lewis's Woodpecker (*Melanerpes lewis*)
- C-12: Mexican Mosquito-fern (*Azolla mexicana*)
- C-13: Oregon Spotted Frog (*Rana pretiosa*)
- C-14: Western Rattlesnake (*Crotalus oreganus*)

C-15: Western Screech Owl *macfarlanei* spp. (*Megascops kennicottii* subspecies *macfarlanei*)

C-16: Whitebark Pine (*Pinus albicaulis*)

Government of Canada information request (IR) No. 2 to Trans Mountain (Exhibit C249-4-1, PDF page 56):

“To ensure that the recovery and survival of species at risk is not affected by the Project, mitigation activities within the species’ habitat would need to address the potential for lags between when Project impacts occur and when mitigation measures are implemented and fully functional.

Some mitigation measures have inherent time lags (i.e. habitat restoration activities can take years to be effective). Accordingly, in some cases non-habitat mitigation measures may be appropriate to ensure the recovery and survival of the species while habitat mitigation measures establish.”

DRAFT CONDITION # 114

Marine shipping-related commitments

Trans Mountain must file with the NEB, at least 90 days prior to loading the first tanker at the Westridge Marine Terminal with oil transported by the Project, confirmation, signed by an officer of the company, that it has implemented or caused to be implemented the following commitments related to oil tanker traffic and enhanced oil spill response:

- a) Enhanced tug escort through developing a tug matrix and including it as part of Trans Mountain’s Tanker Acceptance Standard. The tug matrix would prescribe minimum tug capabilities required to escort tankers between the Westridge Marine Terminal and the limit of Canada’s territorial sea, as described in Section 5.3.2.1 of Volume 8A of Trans Mountain’s Project application (Filing A3S4Y4), Trans Mountain’s response to NEB Information Request No. 1.59 (Filing A60392), and Trans Mountain’s response to the NEB’s Information Request regarding the TERMPOL report (Filing A65273).*
- b) An enhanced marine oil spill response regime capable of delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area, as described in Volume 8A of Trans Mountain’s application and Trans Mountain’s response to NEB Information Request No. 1.64 (Filing A3W9H8).*
- c) Inclusion of any future guidelines, standards, or best management practices designed to reduce underwater noise from commercial vessels within Trans Mountain’s Tanker Acceptance Standard, as amended from time to time, and as described in Trans*

Mountain's response to NEB Information Request No. 2.065(a) (Filing A3Z4T9). Trans Mountain must also include and report on the above-noted marine shipping-related commitments in its commitments tracking table (required by Condition No. 8).

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 114 (b) be amended as follows:

- b) An enhanced marine oil spill response regime capable of delivering 20,000 tonnes of capacity within 36 hours of notification, with dedicated resources staged within the study area, as described in Volume 8A of Trans Mountain's application and Trans Mountain's response to NEB Information Request No. 1.64 (Filing A3W9H8). **The enhanced regime should detail product recovery capacity as well as waste management capacity.**

Rationale:

For higher-volume spills the issue of waste management capacity is a concern. Therefore, ECCC recommends that the Proponent be required to provide this added level of detail.

Evidence relied upon:

Not applicable as ECCC did not provide a related recommendation in its written evidence submission.

DRAFT CONDITION # 116

Pre-operations full-scale emergency response exercises

- a) ***Prior to commencing operations***, Trans Mountain must complete full-scale exercises for the following scenarios:
 - i) *a 160-cubic-metre diluted bitumen release into Burrard Inlet as a result of a release from the Westridge Marine Terminal; and*
 - ii) *a credible worst case release volume at the Burnaby Tank Farm.*
- b) Trans Mountain must notify the NEB, **at least 45 days prior to the date of each exercise in a)**, of:
 - i) *the exercise's date(s) and location(s);*
 - ii) *the exercise's objectives;*
 - iii) *the participants in the exercise; and* iv) *the scenario for the exercise.*

- c) *Trans Mountain must file with the NEB, within 60 days after completing each exercise in a), a report on the exercise that includes:*
- i) *the results of the completed exercise;*
 - ii) *areas for improvement;*
 - iii) *steps to be taken to correct deficiencies; and*
 - iv) *confirmation that an independent third party has evaluated and assessed the emergency response exercises and that Trans Mountain will consider the comments generated for future exercises.*

Recommendations:

Recommendation 1:

Environment and Climate Change Canada (ECCC) recommends that condition 116 (a) be amended as follows:

- a) **Prior to commencing operations**, Trans Mountain must complete full-scale exercises for the following scenarios:
 - i) a 160-cubic-metre diluted bitumen release into Burrard Inlet as a result of a release from the Westridge Marine Terminal; and
 - ii) a credible worst case release volume **with ignition** at the Burnaby Tank Farm.

Recommendation 2:

ECCC recommends that condition 116 (c) (iv) be amended as follows:

- iv) confirmation that **an a qualified** independent third party has evaluated and assessed the emergency response exercises and that Trans Mountain will consider the comments generated for future exercises.

Rationale:

For Recommendation 1:

A fire scenario in association with a credible worst case release volume would constitute a full-scale emergency response exercise. Therefore, ECCC recommends explicitly adding ignition to condition 116 (a).

For Recommendation 2:

In condition 116 (c) (iv), ECCC recommends clearly stating that a “qualified” independent third party evaluator has evaluated and assessed the emergency response exercise as a person must have the appropriate qualifications to conduct any such evaluation.

Evidence relied upon:

Not applicable as ECCC did not provide a related recommendation in its written evidence submission.

DRAFT CONDITION # 121

Evacuation Plans

- a) *Trans Mountain must file with the NEB, at least 6 months prior to commencing operations, an Evacuation Plan for people present in areas potentially affected by an incident at each of Trans Mountain’s Edmonton, Sumas, and Burnaby tank facilities. Each Evacuation Plan must, at a minimum:*
 - i) *describe how areas for evacuation were determined;*
 - ii) *describe the circumstances under which evacuation may be required, as well as the respective methods and procedures for public notification;*
 - iii) *describe specific evacuation routes, methods, and destinations;*
 - iv) *be prepared in consultation with local municipalities and first responders;*
 - v) *state how input from local municipalities and first responders was considered in preparing the plan;*
 - vi) *define the roles, responsibilities, and jurisdictional authority all parties involved in implementing an evacuation; and*
 - vii) *confirm that an independent third party has reviewed and assessed the plan and that Trans Mountain has considered and incorporated comments generated by the review and assessment into the plan.*
- b) *Trans Mountain must include with its Evacuation Plan for the Burnaby tank facilities a plan specific to Simon Fraser University that includes the requirements in a)i) to vii) above.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 121 (a) be amended as follows:

- a) Trans Mountain must file with the NEB, **at least 6 months prior to commencing operations**, an Evacuation Plan for people present in areas potentially affected by an incident at each of Trans Mountain’s Edmonton, Sumas, and Burnaby tank facilities. Each Evacuation Plan must, at a minimum:
- i) describe how areas for evacuation were determined;
 - ii) describe the circumstances under which evacuation may be required, as well as the respective methods and procedures for public notification;
 - iii) describe specific evacuation routes, methods, and destinations;
 - iv) be prepared in consultation with local municipalities and first responders;
 - v) state how input from local municipalities and first responders was considered in preparing the plan;
 - vi) define the roles, responsibilities, and jurisdictional authority all parties involved in implementing an evacuation; ~~and~~
 - vii) **contain an Emergency Communications Plan; and**
 - viii) confirm that an ~~an~~ **a qualified** independent third party has reviewed and assessed the plan and that Trans Mountain has considered and incorporated comments generated by the review and assessment into the plan.

Rationale:

In condition 121 (a) (vii), ECCC recommends clearly stating that a “qualified” independent third party evaluator has reviewed and assessed the plan as a person must have the appropriate qualifications to conduct any such evaluation.

ECCC recommends adding condition 121 (a) (vii) as an enhanced Emergency Communications Plan would be required for initial evacuation notification for residents, including the university, and for incident status updates to the university and public.

Evidence relied upon:

Not applicable as ECCC did not provide a related recommendation in its written evidence submission.

DRAFT CONDITION # 123

Emergency Response Plan for the pipeline and the Edmonton, Sumas, and Burnaby Terminals

*Trans Mountain must file with the NEB, **at least 6 months prior to commencing operations**, an Emergency Response Plan for the pipeline to verify compliance with its commitments regarding emergency preparedness and response. The plan must*

demonstrate Trans Mountain's ability to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type and in any geographic region or season and must include the following:

- a) The following relevant emergency preparedness and response documents:
 - i) an emergency response plan to include the pipeline expansion.*
 - ii) updated facility response plans for the Edmonton, Sumas, and Burnaby Terminals.*
 - iii) all related and accompanying site-specific plans and documents, such as control point mapping, tactical plans, volunteer management plans, and fire safety plans.**
- b) An emergency response and preparedness table for the pipeline (including facilities) indicating which plans will be referred to in an emergency response for each 10-kilometre- long pipeline segment. For each pipeline segment, the table must also identify, at a minimum:
 - i) high consequence areas, including environmentally sensitive areas;*
 - ii) potentially affected persons or groups;*
 - iii) available access to the right-of-way and high consequence areas;*
 - iv) nearest control point(s);*
 - v) nearest available equipment cache(s);*
 - vi) response times for deployment of equipment and Trans Mountain personnel, mutual aid personnel, and third party contractors; and*
 - vii) geological, meteorological, and geographical hazards (e.g., snow avalanche, mud slides, rock slides, and steep slopes).**
- c) Maps depicting the information identified in b).*
- d) A description of the models used in response planning, including oil trajectory, fate and behavior, and air dispersion models.*
- e) A discussion of how the results of research initiatives, such as the Scientific Advisory Committee work noted in Trans Mountain's response to NEB Information Request No. 1.63 (Filing A3W9H8) and other research noted during the OH-001-2014 proceeding, have been considered and incorporated into Trans Mountain's emergency response planning.*
- f) A discussion of how the plan conforms to the requirements contained within the National Energy Board Onshore Pipeline Regulations.*
- g) A discussion of how the plan considers, and would allow coordination with, relevant provincial and municipal disaster response plans.*
- h) Confirmation that an independent third party has reviewed and assessed the Emergency Response Plan and that Trans Mountain has considered and incorporated the comments generated by the review and assessment into the plan.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 123 be amended as follows:

Emergency Response Plan for the pipeline and the Edmonton, Sumas, and Burnaby Terminals

Trans Mountain must file with the NEB, **at least 6 months prior to commencing operations**, an Emergency Response Plan for the pipeline to verify compliance with its commitments regarding emergency preparedness and response. The plan must demonstrate Trans Mountain's ability to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type and in any geographic region or season and must include the following:

- a) The following relevant emergency preparedness and response documents:
 - i) an emergency response plan to include the pipeline expansion.
 - ii) updated facility response plans for the Edmonton, Sumas, and Burnaby Terminals.
 - iii) all related and accompanying site-specific plans and documents, such as control point mapping, tactical plans, volunteer management plans, and fire safety plans.

- b) An emergency response and preparedness table for the pipeline (including facilities) indicating which plans will be referred to in an emergency response for each 10-kilometre-long pipeline segment. For each pipeline segment, the table must also identify, at a minimum:
 - i) high consequence areas, including environmentally sensitive areas (e.g. wetlands);
 - ii) potentially affected persons or groups;
 - iii) potentially affected species at risk, including their habitat and critical habitat, and migratory birds and their habitat;
 - iv) available access to the right-of-way and high consequence areas; including staging areas;
 - v) nearest control point(s);
 - vi) nearest available equipment cache(s);
 - vii) response times for deployment of equipment and Trans Mountain personnel, mutual aid personnel, and third party contractors; and
 - viii) geological, meteorological, and geographical hazards (e.g., snow avalanche, mud slides, rock slides, and steep slopes).

- c) Maps depicting the information identified in b). **All map information is to be shared and provided to Environment Canada's Environmental Emergencies Program in ESRI shape files, accompanied by any supporting metadata.**

- d) A description of the **predictive models and real-time modeling resources** used in response planning, including ~~oil~~ **hydrologic** trajectory, fate and behavior, and ~~air~~ **atmospheric transport and** dispersion models.
- e) A discussion of how the results of research initiatives, such as the Scientific Advisory Committee work noted in Trans Mountain's response to NEB Information Request No. 1.63 (Filing A3W9H8) and other research noted during the OH-001-2014 proceeding, have been considered and incorporated into Trans Mountain's emergency response planning.
- f) **A description of how species at risk, including their habitat and critical habitat, migratory birds, including their habitat, and wetlands have been considered in the development of the Plan.**
- g) A discussion of how the plan conforms to the requirements contained within the National Energy Board Onshore Pipeline Regulations.
- h) A discussion of how the plan considers, and would allow coordination with, relevant provincial and municipal disaster response plans.
- i) Confirmation that ~~an~~ **a qualified** independent third party has reviewed and assessed the Emergency Response Plan and that Trans Mountain has considered and incorporated the comments generated by the review and assessment into the plan.

Rationale:

For condition 123 (b) and (f), ECCC recommends that it specify migratory birds, species at risk and wetlands to ensure that they are adequately addressed in Emergency Response Plans.

For condition 123 (b) (iv) [originally 123 (b)(iii)], ECCC recommends that "staging areas" be included as adequate staging areas are important components to tactical response plans.

In condition 123 (c), ECCC requests access to this information so as to build upon its various data sets that support its Environmental Emergencies Mapping System (EEMAP) in preparation for the potential real-time provision of scientific and technical advice and mapping products at the time of a spill situation.

In condition 123 (d), ECCC recommends these changes as additional detail is required to differentiate between the assessment of potential impacts (i.e. predictive modeling) versus the Proponent's in-house capacity to conduct real-time modeling in an emergency situation.

In condition 123 (i) [originally 123 (b) (h)], ECCC recommends clearly stating that a "qualified" independent third party evaluator has reviewed and assessed the Emergency Response Plan as a person must have the appropriate qualifications to conduct any such evaluation.

Evidence relied upon:

Migratory birds

As noted in ECCC's written evidence (Exhibit C121-3-1, PDF page 37) "*Section 5.1 of the MBCA prohibits the deposit of a substance that is harmful to migratory birds in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area*". As such, ECCC recommends that migratory birds be specifically addressed in the Emergency Response Plans.

Species at risk

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 35-36):

"In addition to concerns regarding impacts to species at risk and critical habitat from Project construction and operations, it is EC's opinion that species at risk could be particularly vulnerable to impacts from an oil spill. [...] EC recommends to the Responsible Authority that species at risk be specifically addressed in the Emergency Response Plans for the Project as well as for facilities. In particular, EC recommends to the Responsible Authority that critical habitat in any section of the pipeline corridor, facility areas and Marine Project Area be considered in the development of Emergency Response Plans."

Wetlands

Written evidence of ECCC (Exhibit C121-3-1, PDF page 59):

"Pipeline Spills Reaching Terrestrial Wetlands - EC notes that although a brief discussion was provided on the effects of an oil spill on wetlands, wetlands were not included as an ecological receptor for the Ecological Risk Assessment for pipeline spills. The rationale for this is provided by the Proponent as: "Because of the uncertainty over the extent of burning or removal of soil and materials (i.e. peat), a conservative approach was taken in estimating the recovery of hydrocarbons. Without burning or aggressive excavation, a residual volume of approximately 20% to 30% of the spilled oil could remain on the wetland surface, in soil pore spaces, or bound to vegetation after initial weathering and recovery operations. Oil remaining after clean-up endpoints had been reached would continue to degrade, weather, and dissipate naturally. As a result, spill scenarios involving wetlands not having a free water surface were not considered further in the ERA" (Exhibit B18-15, PDF page 21).

Given that an oil spill reaching a terrestrial wetland would likely have adverse impacts on the functions of the wetland, emergency response plans should specifically consider wetlands.

Recommendation 2-15:

EC recommends that wetlands be specifically addressed in the Emergency Response Plan for the Pipeline (see Draft condition #52, Draft Conditions and Regulatory Oversight, Exhibit A19-1, PDF pages 32-33) as well as for facilities. In particular, EC recommends that location, type, and spatial extent of wetlands in any section of the pipeline corridor and facility areas be considered in the development of Emergency Response Plans.”

Environmental Emergencies

Reference to evidence is not applicable as ECCC did not provide a related recommendation in its written evidence submission.

DRAFT CONDITION # 124

Emergency Response Plan for the Westridge Marine Terminal

Trans Mountain must file with the NEB, at least 6 months prior to commencing operations, an Emergency Response Plan for the Westridge Marine Terminal to verify compliance with its commitments regarding emergency preparedness and response. The plan must demonstrate geographic familiarity with the area and the response needed to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type and must include:

- a) All related and accompanying site-specific plans and documents, such as geographic response plans, geographic response strategies, volunteer management plans, and fire safety plans;*
- b) A list of high consequence areas, including environmentally sensitive areas;*
- c) A list of potentially affected persons or groups;*
- d) Nearest available equipment cache(s);*
- e) Response times for equipment and personnel to the water and high consequence areas;*
- f) Maps depicting the information identified in a) to e);*
- g) A description of models used in response planning, including oil trajectory, fate and behavior, and air dispersion models;*
- h) A discussion of how the results of research initiatives such as the Scientific Advisory Committee work noted in Trans Mountain’s response to NEB Information Request No. 1.63 (Filing A3W9H8) and other oil fate and behavior research noted during the OH-001-2014 proceeding, have been considered and incorporated into Trans Mountain’s emergency response planning;*
- i) A discussion of how the plan conforms to the requirements contained within the National Energy Board Onshore Pipeline Regulations;*

- j) *A discussion of how the plan considers, and would allow coordination with, relevant provincial and municipal disaster response plans; and*
- k) *Confirmation that an independent third party has reviewed and assessed the Emergency Response Plans and that Trans Mountain has considered and incorporated comments generated by the review and assessment into the plan.*

Recommendation:

ECCC recommends that condition 124 be amended as follows:

Emergency Response Plan for the Westridge Marine Terminal

Trans Mountain must file with the NEB, **at least 6 months prior to commencing operations**, an Emergency Response Plan for the Westridge Marine Terminal to verify compliance with its commitments regarding emergency preparedness and response. The plan must demonstrate geographic familiarity with the area and the response needed to prepare for, respond to, recover from, and mitigate the potential effects of emergencies of any type and must include:

- a) All related and accompanying site-specific plans and documents, such as geographic response plans, geographic response strategies, volunteer management plans, and fire safety plans;
- b) A list of high consequence areas, including environmentally sensitive areas;
- c) A list of potentially affected persons or groups;
- d) **A list of potentially affected species at risk, including their habitat and critical habitat, and migratory birds and their habitat;**
- e) Nearest available equipment cache(s);
- f) Response times for equipment and personnel to the water and high consequence areas;
- g) Maps depicting the information identified in a) to e). **All map information is to be shared and provided to Environment Canada's Environmental Emergencies Program in ESRI shape files, accompanied by any supporting metadata;**
- h) A description of the **predictive models and real-time modeling resources** used in response planning, including **oil hydrologic** trajectory, fate and behavior, and **air atmospheric transport and** dispersion models;
- i) A discussion of how the results of research initiatives such as the Scientific Advisory Committee work noted in Trans Mountain's response to NEB Information Request No. 1.63 (Filing A3W9H8) and other oil fate and behavior research noted during the OH-001-2014 proceeding, have been considered and incorporated into Trans Mountain's emergency response planning;
- j) **A description of how species at risk, including their habitat and critical habitat, and migratory birds, including their habitat, have been considered in the development of the Plan.**
- k) A discussion of how the plan conforms to the requirements contained within the National Energy Board Onshore Pipeline Regulations;

- l) A discussion of how the plan considers, and would allow coordination with, relevant provincial and municipal disaster response plans; and
- m) Confirmation that ~~an~~ a qualified independent third party has reviewed and assessed the Emergency Response Plans and that Trans Mountain has considered and incorporated comments generated by the review and assessment into the plan.

Rationale:

For new sub-condition 124 (d) and (j), ECCC recommends that it specify migratory birds and species at risk to ensure that they are adequately addressed in Emergency Response Plans.

In condition 124 (g) [originally 124 (f)], ECCC requests access to this information so as to build upon its various data sets that support its Environmental Emergencies Mapping System (EEMAP) in preparation for the potential real-time provision of scientific and technical advice and mapping products at the time of a spill situation.

In condition 124(h) [originally 124 (g)], ECCC recommends these changes as additional detail is required to differentiate between the assessment of potential impacts (i.e. predictive modeling) versus the Proponent's in-house capacity to conduct real-time modeling in an emergency situation.

In condition 124 (m) [originally 124 (k)], ECCC recommends clearly stating that a "qualified" independent third party evaluator has reviewed and assessed the Emergency Response Plan as a person must have the appropriate qualifications to conduct any such evaluation.

Evidence relied upon:

Migratory birds

Written evidence of ECCC (Exhibit C121-3-1, PDF page 37):

"Section 5.1 of the MBCA prohibits the deposit of a substance that is harmful to migratory birds in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area."

Written evidence of ECCC (Exhibit C121-3-1, PDF page 61):

"With respect to impacts to marine birds, EC's greatest area of concern is the potential consequences of a spill resulting from an accident during loading or transportation of oil. In particular, depending on the specific timing, location and other conditions related

to an oil spill, it is EC's view that a large scale spill resulting from the Project has the potential to result in significant impacts to marine birds."

Species at Risk

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 35-36):

"In addition to concerns regarding impacts to species at risk and critical habitat from Project construction and operations, it is EC's opinion that species at risk could be particularly vulnerable to impacts from an oil spill. [...] EC recommends to the Responsible Authority that species at risk be specifically addressed in the Emergency Response Plans for the Project as well as for facilities. In particular, EC recommends to the Responsible Authority that critical habitat in any section of the pipeline corridor, facility areas and Marine Project Area be considered in the development of Emergency Response Plans."

Environmental Emergencies

Reference to evidence is not applicable as ECCC did not provide a related recommendation in its written evidence submission.

DRAFT CONDITION # 136

Full-scale emergency response exercises during operations

- a) ***Within 5 years after commencing operations, Trans Mountain must complete full-scale exercises to test each of the following five scenarios:***
 - i) *A full-bore rupture under ice and snow conditions in the Coquihalla Mountain Range.*
 - ii) *A full-bore rupture into the Athabasca River during high spring flow conditions.*
 - iii) *A full-bore rupture into Fraser River at the Port Mann Bridge, under peak flow conditions.*
 - iv) *A full-bore rupture into the North Thompson River during high spring flow conditions.*
 - v) *A tank fire at the Burnaby Terminal.*
- b) ***Trans Mountain must notify the NEB, at least 45 days prior to the date of each exercise in a), of:***
 - i) *the exercise's date and location(s);*
 - ii) *the exercise's objectives;*
 - iii) *the participants in the exercise; and iv) the scenario for the exercise.*
- c) ***Trans Mountain must file with the NEB, within 60 days after completing each exercise in a), a report on the exercise that includes:***

- i) *the results of the completed exercise;*
- ii) *areas for improvement;*
- iii) *steps to be taken to correct deficiencies; and*
- iv) *confirmation that an independent third party has evaluated and assessed the emergency response exercises and that Trans Mountain will consider the comments generated for future exercises.*

Recommendation:

ECCC recommends that condition 136 (c) (iv) be amended as follows:

- iv) confirmation that ~~an~~ **a qualified** independent third party has evaluated and assessed the emergency response exercises and that Trans Mountain will consider the comments generated for future exercises.

Rationale:

ECCC recommends clearly stating that a “qualified” independent third party evaluator has evaluated and assessed the emergency response exercises as a person must have the appropriate qualifications to conduct any such evaluation.

Evidence relied upon:

Not applicable as ECCC did not provide a related recommendation in its written evidence submission.

DRAFT CONDITION # 142

Rare Ecological Community and Rare Plant Population Mitigation Evaluation and Offset Plan

Trans Mountain must file with the NEB for approval, on or before 31 January after the fifth complete growing season after completing final clean-up, a Rare Ecological Community and Rare Plant Population Mitigation Evaluation and Offset Plan that includes:

- a) *for ecological communities of concern; rare plants and lichens; and draft, candidate, proposed, or final critical habitat for plant and lichen species under the Species at Risk Act, an evaluation of mitigation success with reference to the measurable goals outlined in the Rare Ecological Community and Rare Plant Population Management Plan required by Condition No. 50;*

- b) *identification of any residual effects on ecological communities and rare plant and lichen species that have an at-risk status of S1 or S1S2 or that are listed under federal or provincial legislation for protection, or on any draft, candidate, proposed, or final critical habitat under the Species at Risk Act;*
- c) *for the residual effects identified in b), a Final Rare Ecological Community and Rare Plant Population Offset Plan that updates the preliminary plan required by Condition No. 50, and that also includes details on the amount and type of offsets required, and on the offset measures to be implemented, including a timeline for their implementation and monitoring;*
- d) *a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration; and*
- e) *a summary of Trans Mountain's consultation concerning a) to d) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 142 be amended as follows:

Rare Ecological Community and Rare Plant Population Mitigation Evaluation and Offset Plan

Trans Mountain must file with the NEB for approval, **on or before 31 January after the fifth complete growing season after completing final clean-up**, a Rare Ecological Community and Rare Plant Population Mitigation Evaluation and Offset Plan that includes:

- a) for ecological communities of concern; ~~and~~ rare plants and lichens ~~that have an at-risk status of S1 or S1S2 or that are listed under provincial legislation for protection and draft, candidate, proposed, or final critical habitat for plant and lichen species under the Species at Risk Act~~, an evaluation of mitigation success with reference to the measurable goals outlined in the Rare Ecological Community and Rare Plant Population Management Plan required by Condition No. 50;
- b) identification of any residual effects on ecological communities and rare plant and lichen species that have an at-risk status of S1 or S1S2 or that are listed under ~~federal or~~ provincial legislation for protection ~~or on any draft, candidate, proposed, or final critical habitat under the Species at Risk Act~~;
- c) for the residual effects identified in b), a Final Rare Ecological Community and Rare Plant Population Offset Plan that updates the preliminary plan required by Condition No. 50, and that also includes details on the amount and type of offsets required, and on the offset measures to be implemented, including a timeline for their implementation and monitoring;

- d) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration; and
- e) a summary of Trans Mountain's consultation concerning a) to d) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Rationale:

ECCC recommends removing all references to critical habitat from draft condition #50 and instead incorporating all discussion of critical habitat for all SARA Schedule 1-listed species into conditions that refer to critical habitat for all species at risk (e.g. see ECCC's amendments to condition 21, 44, 110). ECCC's recommendation 2-2 (Exhibit C121-3-1, PDF page 34), applies to all species, regardless of taxonomic group. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific. Additionally, amending the condition as recommended avoids the conclusion that offsets are likely to be effective in the context of critical habitat for plant species at risk, in particular.

Evidence Relied On:

Written evidence of ECCC (Exhibit C121-3-1, PDF page 34):

"EC recommends that the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA.

[...]

EC recognizes that the NEB Panel may recommend that the Project proceed while choosing to not partially or fully implement EC's recommendation on avoidance. Furthermore, EC recognizes that conditions must be put forward by the Panel regardless of its overall project recommendation. In the event that avoidance is not fully incorporated into the Project, EC suggests that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) requires that the RA implement measures to avoid or lessen all adverse effects on species at risk and their habitats, and to monitor those effects.

There are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the

Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC's recommended approach.

Notwithstanding the above, there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels (See Recommendation 2-3 below)."

DRAFT CONDITION # 143

Wetland Reclamation Evaluation and Offset Plan

*Trans Mountain must file with the NEB for approval, **on or before 31 January after the fifth complete growing season after completing final clean-up**, a Wetland Reclamation Evaluation and Offset Plan that includes:*

- a) the extent (in hectares), by wetland type, that was impacted by pipeline and facilities construction and associated activities;*
- b) for each wetland impacted, an evaluation of reclamation success with reference to the measurable goals outlined in the Wetland Survey and Mitigation Plan required by Condition No. 52;*
- c) for any wetland that has achieved the intended degree of reclamation success, an evaluation of any temporary loss of each individual functional condition (e.g., habitat, hydrology and biogeochemistry);*
- d) an identification of any wetlands that have not yet achieved the intended degree of reclamation success;*
- e) for those wetlands that have had a temporary loss in any individual functional condition and for those that have not yet achieved reclamation success, a Final Wetland Offset Plan that updates the preliminary plan required by Condition No. 52, and that also includes details on the amount and type of further offsets required, and the offset measures to be implemented including a timeline for their implementation and monitoring;*
- f) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan; and*
- g) a summary of Trans Mountain's consultation concerning a) to f) with appropriate government authorities and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that Conditions #143 be amended as follows:

Trans Mountain must file with the NEB for approval, **on or before 31 January after the fifth complete growing season after completing final clean-up**, a Wetland Reclamation Evaluation and Offset Plan that includes:

- a) the extent (in hectares), by wetland type, that was impacted by pipeline and facilities construction and associated activities;
- b) for each wetland impacted, an evaluation of reclamation success with reference to the measurable goals outlined in the Wetland Survey and Mitigation Plan required by Condition No. 52;
- c) for any wetland that has achieved the intended degree of reclamation success, an evaluation of any temporary loss of each individual functional condition (e.g., habitat, hydrology and biogeochemistry);
- d) an identification of any wetlands that have not yet achieved the intended degree of reclamation success;
- e) for those wetlands that have had a temporary loss in any individual functional condition and for those that have not yet achieved reclamation success, a Final Wetland Offset Plan that updates the preliminary plan required by Condition No. 52, and that also includes details on the amount and type of further offsets required, ~~and~~ the offset measures to be implemented including **a rationale for their selection and a timeline for their implementation and monitoring, and a rationale for the selected compensation sites**;
- f) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan; and
- g) a summary of Trans Mountain's consultation concerning a) to f) with appropriate government authorities and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Rationale:

As stated in ECCC's written evidence (Exhibit C121-3-1, PDF page 55):

“Where impacts cannot be mitigated through avoidance and minimization, impacts should be monitored and compensation provided where it is demonstrated that there are ongoing effects (i.e. effects lasting longer than 5 years). Effects include any loss of function even if no physical impact is anticipated or has occurred (e.g. partial drainage of wetland area).

Compensation for wetlands typically requires replacement of wetland function or rehabilitation of wetland areas with similar functions as those being affected or lost. This can require, for example, replacement of bird or amphibian habitat, water storage or groundwater recharge functions, or nutrient or sediment removal functions that have been lost as a result of a project.

Compensation sites are generally required to be larger than the original wetland area impacted, to compensate for the inherent uncertainty of replacing the loss of wetland functions and the lag time between the loss of wetland functions in the impacted wetland and gain in wetland functions in the compensation wetland. Therefore, compensation ratios are based on the probability of success of replacement of wetland functions, length of time required to bring a compensation site to functioning condition, the expertise of the compensation project proponent, threats to the site, etc.”

ECCC recommends amendments to condition 143 (e) so that compensation ratios and compensation sites can be selected in a manner as to achieve the highest probability of compensation success, and that the process for determining this would be described in the final Wetland Offset Plan.

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1) PDF page 55, as identified in the Rationale section, as well as PDF pages 56-57:

“It is important to understand the jurisdictional context for the Wetland Compensation Plan and any associated agreement(s). A project impacting a wetland that serves as fish habitat could potentially require habitat compensation through the federal Fisheries Act in addition to the Wetland Policy and provincial wetland conservation policies. The Wetland Policy promotes the harmonization of requirements for wetland compensatory mitigation so that a single Wetland Compensation Plan and any associated agreement(s) can meet the requirements of the Fisheries Act, the Wetland Policy, and provincial policies.

Recommendation 2-12:

*EC recommends that a Wetland Compensation Plan (WCP) be developed and filed on or before January 31st after the fifth complete growing season after the start of operations. The WCP should, among other things:
[...]*

- *Describe the process of selecting proposed compensation site(s) and associated baseline condition(s).*
 - *Identify the compensation ratio for each wetland for which compensation would be required.*
- [...]

With respect to wetland compensation, EC recommends:

- a) [...]
- b) *The preferred method of compensation is restoration of drained or altered naturally occurring wetlands. Restored wetlands are preferred over enhanced wetlands, both of which are preferred over newly created wetlands. Furthermore, preference is for restoration of the same wetland types as those impacted, as wetland functions are often inextricably tied to wetland type.*
- c) *Lost wetland functions should be compensated on-site if site conditions are suitable for wetland functions. Second preference is in the same watershed from which they were lost. Third preference is in the same ecosystem from which they were lost.”*

DRAFT CONDITION # 144

Caribou Habitat Restoration and Offset Measures Monitoring Program

*Trans Mountain must file with the NEB for approval, **on or before 31 January after the first complete growing season after commencing operations**, a program for monitoring and verifying the effectiveness of caribou habitat restoration and offset measures implemented as part of the CHRP (Condition No. 21) and the Offset Measures Plan (Condition No. 110). This program must include:*

- a) *the scientific methods or protocols for short- and long-term monitoring of the restoration and offset measures, including their effectiveness;*
- b) *monitoring frequency, timing, and locations, and the rationale for each;*
- c) *protocols for how restoration and offset measures will be adapted, as required, based on the monitoring results from the program’s implementation; and*
- d) *a proposed schedule for filing reports on monitoring results and the adaptive management responses to the NEB, Environment Canada, and appropriate provincial authorities.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 144 be amended as follows:

Caribou Critical Habitat Restoration and Offset Measures Monitoring Program

Trans Mountain must file with the NEB for approval, **on or before 31 January after the first complete growing season after commencing operations**, a program for monitoring and verifying the effectiveness of **caribou critical** habitat restoration and offset measures implemented as part of the CHRP (Condition No. 21) and the Offset Measures Plan (Condition No. 110). This program must include:

- a) the scientific methods or protocols for short- and long-term monitoring of the restoration and offset measures, including their effectiveness;
- b) monitoring frequency, timing, and locations, and the rationale for each;
- c) protocols for how restoration and offset measures will be adapted, as required, based on the monitoring results from the program's implementation; and
- d) **a summary of Trans Mountain's consultation concerning a) to c) with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.**
- e) a proposed schedule for filing reports on monitoring results and the adaptive management responses to the NEB, Environment Canada, and appropriate provincial authorities.

Rationale:

In ECCC's written evidence, ECCC recommended that, given the importance of critical habitat, the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA (see Exhibit C121-3-1, Recommendation 2-2, PDF page 34).

ECCC noted in Recommendation 2-2 of ECCC's written evidence (Exhibit C121-3-1, PDF page 34) that *"there are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC's recommended approach."*

In the event that avoidance is not fully incorporated into the Project, ECCC has suggested in its written evidence (Exhibit C121-3-1, PDF page 34) that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) states that the RA *"must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them"*. ECCC's suggested amendments to the condition are provided to ensure that such measures are taken and, as required by s. 79(2), are consistent with any applicable recovery strategies and action plans.

ECCC recommends incorporating all species at risk whose early draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project into draft condition #144: Caribou Habitat Restoration and Offset Measures Monitoring Program. As such, ECCC suggests deleting the word “caribou” from the condition. ECCC’s recommendation 2-2 (Exhibit C121-3-1, PDF page 34) applies to all species with the potential for Project impacts to critical habitat (early draft, candidate, proposed or final), and not just to Southern Mountain Caribou. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific.

Notwithstanding the above, as highlighted in ECCC’s written evidence (Exhibit C121-3-1, PDF page 34); *“there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels. Furthermore, ECCC notes that individuals, residences and critical habitat of listed species at risk could potentially be protected under SARA should prohibitions be put in place or invoked under, for example, sections 34, 58, or 61 of SARA. If such a prohibition is put in place or invoked, then a permit would be required”* (Exhibit C121-3-1, PDF page 35). For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm.

In addition, ECCC recommends that a requirement for consultation with appropriate government authorities, species experts, and any potentially affected Aboriginal groups be included in this condition. It is not clear why consultation is not required for this condition, while it is required for other related conditions. ECCC suggests that the development of an appropriate monitoring program would benefit from additional input and expertise.

Evidence Relied On:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 34-35) as identified in the Rationale section.

DRAFT CONDITION # 145

Caribou habitat restoration and offset measures monitoring report(s)

*Trans Mountain must file with the NEB, based on the approved schedule for the **Caribou Habitat Restoration and Offset Measures Monitoring Program** (required by Condition No. 144), a report(s) describing the monitoring program’s results, including the observed effectiveness of habitat restoration and offset measures for each affected caribou range, and how those measures will be adapted, as required, based on monitoring results. Any*

proposed changes to the NEB-approved reporting schedule must be included within the relevant report prior to any reporting on a revised schedule.

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that Condition #145 be amended as follows:

Caribou Critical habitat restoration and offset measures monitoring report(s)

Trans Mountain must file with the NEB, **based on the approved schedule for the Caribou Critical Habitat Restoration and Offset Measures Monitoring Program** (required by Condition No. 144), a report(s) describing the monitoring program's results, including the observed effectiveness of habitat restoration and offset measures ~~for each affected caribou range,~~ **and** how those measures will be adapted, as required, based on monitoring results, **and a summary of consultation with appropriate government authorities, species experts, and any potentially affected Aboriginal groups, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.** Any proposed changes to the NEB-approved reporting schedule must be included within the relevant report prior to any reporting on a revised schedule.

Rationale:

In ECCC's written evidence, ECCC recommended that, given the importance of critical habitat, the Proponent avoid activities with the potential to destroy the critical habitat of species listed under Schedule 1 of SARA (see Exhibit C121-3-1, Recommendation 2-2, PDF page 34).

ECCC noted in Recommendation 2-2 of ECCC's written evidence (Exhibit C121-3-1, PDF page 34) that *"there are uncertainties and concerns regarding the effectiveness of many of the mitigation approaches (e.g. translocation, habitat restoration) proposed by the Proponent, especially if those approaches do not address the potential destruction of critical habitat. This is one reason why avoidance is EC's recommended approach."*

In the event that avoidance is not fully incorporated into the Project, ECCC has suggested in its written evidence (Exhibit C121-3-1, PDF page 34) that detailed species-specific mitigation and monitoring plans be developed as soon as possible, and before project decisions are made, that would assist the NEB as the Responsible Authority (RA) in meeting its obligations under ss. 79(2) of SARA (see Appendices C-1 to C-16 for details). SARA ss. 79(2) states that the RA *"must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them"*. ECCC's suggested amendments to the condition are provided

to ensure that such measures are taken and, as required by s. 79(2), are consistent with any applicable recovery strategies and action plans.

ECCC recommends incorporating all species at risk whose early draft, candidate, proposed, or final critical habitat is directly or indirectly affected by the Project into draft condition #145: Caribou habitat restoration and offset measures monitoring report(s). As such, ECCC suggests deleting the word “caribou” from the condition. ECCC’s recommendation 2-2 (Exhibit C121-3-1, PDF page 34) applies to all species with the potential for Project impacts to critical habitat (early draft, candidate, proposed or final), and not just to Southern Mountain Caribou. The overall approach to addressing potential impacts to critical habitat should be the same for all species, although particular measures will be species-specific.

Notwithstanding the above, as highlighted in ECCC’s written evidence (Exhibit C121-3-1, PDF page 34); *“there are current SARA prohibitions in place for species and their residences on federal lands. In these instances, a SARA permit would be required for any activities that would affect a listed species on these land parcels. Furthermore, ECCC notes that individuals, residences and critical habitat of listed species at risk could potentially be protected under SARA should prohibitions be put in place or invoked under, for example, sections 34, 58, or 61 of SARA. If such a prohibition is put in place or invoked, then a permit would be required”*(Exhibit C121-3-1, PDF page 35). For more information the Proponent is directed to the Public Registry at: www.sararegistry.gc.ca/sar/permit/permits_e.cfm.

In addition, ECCC recommends that a requirement for consultation with appropriate government authorities, species experts, and any potentially affected Aboriginal groups be included in this condition. It is not clear why consultation is not required for this condition, while it is required for other related conditions. ECCC suggests that reporting on appropriate monitoring program would benefit from additional input and expertise.

Evidence Relied On:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 34-35), as identified in the Rationale section.

DRAFT CONDITION # 149

Grasslands Survey and Mitigation Plan

*Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, a pre-construction Grasslands Survey and Mitigation Plan that applies to native grasslands in the British Columbia interior and that includes:*

- a) *a description of the extent of overlap of the Project with native grasslands in the British Columbia interior;*
- b) *a summary of survey results for such grasslands potentially affected by the Project, including but not limited to native plant species diversity, the density and distribution of existing invasive plant species, and the presence of cryptogamic crust;*
- c) *a description of the mitigation and reclamation measures to be implemented for potentially affected grasslands, including the extent to which native seed will be used, with rationales and unambiguous criteria explaining under what circumstances each such measure will be applied;*
- d) *measurable goals against which the success of grassland mitigation and reclamation will be evaluated, including goals related to cryptogamic crust recovery, invasive species control, and access control;*
- e) *a description of how the*
 - i) *avoidance, mitigation, and offset hierarchy, and*
 - ii) *the goal of no net loss for grasslands,**were considered in developing the plan;*
- f) *details of the post-construction monitoring plan for grasslands for the first ten years of operations, including corrective actions that might be necessary and the circumstances under which each such action would be taken;*
- g) *a Preliminary Grasslands Offset Plan for those grasslands that, after ten years of operations, have not achieved reclamation success – this plan must include:*
 - i) *an explanation of how the need for offset measures will be determined and quantified, including offset ratios;*
 - ii) *the potential offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and*
 - iii) *a discussion of how the effectiveness of offsets measures will be monitored, assessed, and reported on;*
- h) *a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan;*
- i) *a summary of Trans Mountain’s consultation concerning a) to h) with appropriate government authorities and any potentially affected Aboriginal groups and stakeholders, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; and*
- j) *confirmation that the relevant Environmental Protection Plans will be updated to include any relevant information from the Grasslands Survey and Mitigation Plan.*

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that condition 149 be amended as follows:

Grasslands Survey and Mitigation Plan

Trans Mountain must file with the NEB for approval, **at least 4 months prior to commencing construction**, a pre-construction Grasslands Survey and Mitigation Plan that applies to native grasslands in the British Columbia interior and that includes:

- a) a description of the extent of overlap of the Project with native grasslands in the British Columbia interior;
- b) a summary of survey results for such grasslands potentially affected by the Project, including but not limited to native plant species diversity, the density and distribution of existing invasive plant species, and the presence of cryptogamic crust;
- c) a description of the mitigation and reclamation measures to be implemented for potentially affected grasslands, including the extent to which native seed will be used, with rationales and unambiguous criteria explaining under what circumstances each such measure will be applied;
- d) measurable goals against which the success of grassland mitigation and reclamation will be evaluated, including goals related to cryptogamic crust recovery, invasive species control, and access control;
- e) a description of how the
 - i) avoidance, mitigation, and offset hierarchy, and
 - ii) the goal of no net loss for grasslands, were considered in developing the plan;
- f) details of the post-construction monitoring plan for grasslands for the first ten years of operations, including corrective actions that might be necessary and the circumstances under which each such action would be taken;
- g) a Preliminary Grasslands Offset Plan for those grasslands that, after ten years of operations, have not achieved reclamation success – this plan must include:
 - i) an explanation of how the need for offset measures will be determined and quantified, including offset ratios;
 - ii) the potential offset measures, the process for selecting which will be implemented, and an evaluation of the probability of their success; and
 - iii) a discussion of how the effectiveness of offsets measures will be monitored, assessed, and reported on;
- h) a description of how the outcomes of the Priority Habitat Management Plan (Condition No. ____) for grasslands have been considered in the development of this plan;

- i) a description of how Trans Mountain has taken available and applicable Aboriginal traditional land use and traditional ecological knowledge into consideration in developing the plan;
- j) a summary of Trans Mountain's consultation concerning a) to h) with appropriate government authorities and any potentially affected Aboriginal groups and stakeholders, including any issues or concerns raised and how Trans Mountain has addressed or responded to them; and
- k) confirmation that the relevant Environmental Protection Plans will be updated to include any relevant information from the Grasslands Survey and Mitigation Plan.

Rationale:

ECCC recommends in this written argument-in-chief (on page 95), that a Priority Habitat Management Plan be included as a separate condition for the Project, which would include grasslands as priority habitat areas for migratory birds. While the Priority Habitat Management Plan and the Grasslands Survey and Mitigation Plan would both address impacts to grasslands, the focus of the Priority Habitat Management Plan is on migratory birds, specifically. Given the clear connection between the two plans, ECCC recommends that the Grasslands Survey and Mitigation Plan should require a description of how the outcomes of the Priority Habitat Management Plan have been considered in the development of this plan. This amendment would ensure that the two plans are appropriately linked and developed in coordination with the other.

Evidence relied upon:

Written evidence of ECCC (Exhibit Number C121-3-1, PDF pages 41-43), as identified under ECCC's recommendation regarding the addition of a condition for a Priority Habitat Areas Management Plan (proposed condition ECCC-02 on page 95).

NEW PROPOSED CONDITION (ECCC-01)

Recommendation:

Environment and Climate Change Canada (ECCC) recommends adding the following condition:

Migratory Bird Baseline Survey and Biodiversity Hotspots Plan

Trans Mountain must file with the NEB for approval, **at least 1 year prior to commencing construction**, a Migratory Bird Baseline Survey and Biodiversity Hotspot Plan. This plan must include:

- a) A summary of the surveys conducted for swifts and swallows (following RISC Standard Inventory Methods for Swallows and Swifts:

<https://www.for.gov.bc.ca/hts/risc/pubs/tebiodiv/swallows&swifts/index.htm>), focused to areas where construction would coincide with high suitability habitat for these species.

- b) An identification of the locations of biodiversity hotspots for migratory birds based on the accumulated survey work and other data sources.
- c) A description of additional efforts other than what has been committed to in the Environmental Protection Plans that will be made to avoid and minimize impacts to the habitats for all migratory birds where biodiversity hotspots have been identified in (b).

Rationale:

ECCC provided the rationale for this condition in its written evidence (Exhibit C121-3-1) on PDF pages 40-41:

“2.2.2.3 Migratory Bird Baseline Surveys

Establishing an accurate baseline that reflects natural inter-annual variation is important for predicting potential Project impacts. It is necessary to effectively focus mitigation and monitoring (as part of a mitigation and monitoring strategy); to manage potential cumulative impacts; and to apply lessons to future proposals (as per Hanson et al., 2009). The Proponent has completed several surveys for migratory birds in relation to the terrestrial project components, as outlined in the Application’s associated technical data reports.

It is also important to note that a key purpose of collecting baseline data is to determine the presence of any biodiversity hotspots (i.e. specific habitats, such as riparian areas, that support higher densities of birds and/or numbers of species). In these areas, consideration of additional mitigation (e.g. habitat avoidance, reduced habitat impacts and fragmentation) may be appropriate.

Baseline conditions for swifts and swallows were limited to incidental observations during wildlife surveys. EC requested that the Proponent include specific surveys for swifts and swallows as a component of the baseline studies. The Proponent’s response to EC’s Information Request No. 2 stated that by taking a precautionary approach and assuming that species have the potential to occur, interact with, and be affected by the Project, that the conclusions of the effects assessment are not contingent on field survey data for swifts and swallows (Exhibit B310-2, PDF page 218).

EC is of the view that additional surveys would be needed to inform the pre-construction baseline conditions for these species. Surveys in areas of high suitability habitats for swifts and swallows are important because:

- *they are not well captured by Breeding Bird Surveys;*

- *they are aerial insectivores, which is a guild that is experiencing widespread population declines in North America (Nebel et al. 2010);*
- *several species within these groups (e.g. Bank Swallow, Barn Swallow) have either recently been assessed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or are identified in Bird Conservation Region Strategies as Priority Species (e.g. Black Swift); and*
- *many species within these groups are colonial nesters (i.e. nest in relatively higher densities than other species); identifying and avoiding such key areas for these species is of relative importance.*

Recommendation 2-6:

- a) *EC recommends that the Proponent complete specific surveys for swifts and swallows (following RISC Standard Inventory Methods for Swallows and Swifts: <https://www.for.gov.bc.ca/hts/risc/pubs/tebiodiv/swallows&swifts/index.htm>) prior to any clearing or construction activity. These surveys should be focused to areas where construction would coincide with high suitability habitat for these species.*
- b) *EC recommends that the Proponent take additional efforts to avoid (e.g. micro-routing) and minimize (e.g. detailed mitigation measures developed within an environmental protection and management plan) impacts to the habitats for all migratory birds where biodiversity hotspots are identified based on the accumulated survey work and other data sources”*

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 40-41), as referenced in the Rationale section.

NEW PROPOSED CONDITION (ECCC-02)

Recommendation:

Environment and Climate Change Canada (ECCC) recommends adding the following condition:

Priority Habitat Areas Management Plan

Trans Mountain must file with the NEB for approval, **1 year prior to commencing construction**, a Priority Habitat Areas Management Plan for any Priority Habitat Area that will be impacted by Project construction. This plan must include:

- a) **the identification of priority habitat areas for migratory birds within the project footprint, including but not limited to wetlands, riparian areas, grasslands, protected areas, parks and Important Bird Areas (IBAs);**

- b) a summary of actions that avoid impacts to priority habitat areas during the nesting period, and for activities taking place within priority habitat areas for migratory birds, including Important Bird Areas, avoiding impacts during key times such as post-breeding dispersal, and staging areas during spring and fall migration;
- c) a summary of pre-construction surveys within priority habitat areas for migratory birds and a plan to and conduct post-construction surveys within these areas for migratory birds in order to:
 - i. establish a robust baseline for predicting potential impacts of the project within priority habitat areas, with a focus on impacts within IBAs;
 - ii. verify the accuracy of the predicted effects (as part of a mitigation and monitoring strategy);
 - iii. manage potential cumulative impacts; and
 - iv. apply the results in support of the mitigation and monitoring strategy.
- d) a description of how the use of conservation offsets for impacts to migratory bird habitat in priority habitat areas, particularly Important Bird Areas, were considered in the plan order to address impacts to migratory birds arising from Project activities (e.g. loss of habitat function due to fragmentation etc.);
- e) a description of how the use of habitat restoration and enhancement techniques for migratory birds (e.g. the installation of nesting and roosting structures) in priority habitat areas were considered in the plan.

Rationale:

ECCC provided the rationale for this condition in its written evidence section 2.2.2.4 – Priority Habitat Areas (Exhibit C121-3-1) on PDF pages 41-43:

“2.2.2.4 Priority Habitat Areas

The proposed Project crosses a number of priority habitat areas for migratory birds and species at risk, including but not limited to wetlands, riparian areas, grasslands, protected areas, parks and Important Bird Areas (IBAs). While all aforementioned areas are considered valuable habitat, areas such as Douglas Lake Plateau IBA and English Bay & Burrard Inlet IBA are known to have particularly high habitat value for migratory birds that regularly breed, overwinter, reside year-round or routinely migrate through the region, which is why they have been designated as IBAs. IBAs, identified and designated by Bird Studies Canada and Nature Canada, are sites that support specific groups of birds: threatened birds, large groups of birds, and birds restricted by range or by habitat. IBAs act as an important tool for identifying conservation priorities, and fostering greater success in the conservation of bird populations. IBAs are considered places of international significance for the conservation of birds and biodiversity.

English Bay & Burrard Inlet IBA supports globally significant populations of congregatory species and continentally significant concentrations of waterfowl. In addition to waterbird species utilizing the IBA - including Barrow's Goldeneye, Surf Scoter, Western Grebe and Great Blue Heron - the Purple Martin, a landbird that was once extirpated from the region, has returned and 50 pairs regularly nest within the IBA each year (IBA Canada 2015b).

Douglas Lake Plateau IBA is one of the largest IBAs in BC and acts as an important staging area for large populations of migrating Sandhill Cranes (>10 000 individuals), shorebirds, waterfowl and passerines during spring and fall migration. This area also functions as important breeding habitat for Sandhill Crane, a variety of waterfowl, and grassland-dependent landbirds (IBA Canada 2015a). Additionally, there are a number of at-risk birds including Burrowing Owl (Schedule 1, Endangered), Lewis's Woodpecker (Schedule 1, Threatened), and Flammulated Owl (Schedule 1, Special Concern), that depend on Douglas Lake Plateau IBA at various stages of their life cycles.

Grasslands, represented in the Douglas Lake Plateau IBA, are considered the most threatened and sensitive ecosystems in North America (McCracken 2005). A variety of wetland types also occur within these grasslands and are another important source of habitat for wildlife, supporting a high concentration and diversity of birds (Grasslands Conservation Council of BC 2012). See Wetlands Section 2.3 which specifically discusses wetland function in the context of wildlife habitat, particularly for birds.

Grassland birds are habitat specialists that depend on grasslands variously during the breeding, migration, and wintering periods. This makes grassland bird populations vulnerable to habitat loss and degradation throughout their life cycle. The primary cause of grassland bird population declines is related to loss of habitat quantity and quality (McCracken 2005). Additionally, more than 30% of BC's at-risk species (avian and non-avian) are grassland dependent (Grasslands Conservation Council of BC 2012). In addition to the Douglas Lake Plateau IBA, the Lac du Bois Grasslands Protected Area sits at a critical junction between several of BC's major grassland regions and represents an important habitat area for migratory birds and species at risk (Grasslands Conservation Council of BC 2009). The most effective means of conserving grassland bird populations is by protecting large grassland locations (>100 ha), and avoiding further loss and fragmentation of existing habitats by way of preservation and appropriate management of the largest tracts of existing native grasslands (Vickery et al 1999; McCracken 2005).

Given the high habitat values associated with the above-mentioned priority areas for migratory birds, EC has outstanding concerns regarding habitat loss/alteration/fragmentation, and disturbance to migratory birds arising from construction and operational activities (maintenance clearing) of the Project.

Consideration of additional mitigation (e.g. habitat avoidance, reduced habitat fragmentation) for these areas would be appropriate.

The following recommendations relate to the priority habitat areas for migratory birds and species at risk.

Recommendation 2-7:

- a) *In addition to avoiding impacts to habitat during the nesting period, EC recommends that for activities taking place within priority habitat areas for migratory birds, including Important Bird Areas, particular efforts be made to avoid impacts during key times such as post-breeding dispersal, and staging areas during spring and fall migration.*
- b) *EC recommends that the frequency of Project maintenance clearing/vegetation management be minimized, to the extent feasible.*
- c) *EC further recommends that pre- and post-construction surveys within priority habitat areas for migratory birds be completed in order to:*
 - v. *establish a robust baseline for predicting potential impacts of the project within priority habitat areas, with a focus on impacts within IBAs;*
 - vi. *verify the accuracy of the predicted effects (as part of a mitigation and monitoring strategy);*
 - vii. *manage potential cumulative impacts; and*
 - viii. *apply the results in support of the mitigation and monitoring strategy.*
- d) *In support of the environmental assessment, EC recommends that conservation offsets (along with other compensation measures) be considered for impacts to migratory bird habitat in priority habitat areas, particularly Important Bird Areas, in order to address impacts to migratory birds arising from Project activities (e.g. loss of habitat function due to fragmentation etc.).
In addition, EC recommends habitat restoration and enhancement, and the installation of nesting and roosting structures in priority habitat areas (e.g. nest boxes), for example, be considered for migratory birds.”*

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 41-43), as referenced in the Rationale section.

NEW PROPOSED CONDITION (ECCC-03)

Recommendation:

Environment and Climate Change Canada (ECCC) recommends adding the following condition:

Marine bird baseline monitoring plan

Trans Mountain must file with the NEB for approval, **within six months after project approval**, a marine bird baseline monitoring plan to describe species composition and their spatial and temporal abundance patterns that can be used to identify high consequence areas/habitats in the event of an oil spill. The plan must include:

- a) a requirement to complete marine bird baseline monitoring, consisting of
 - i) three years of surveys prior to commencement of operations and three years of surveys following commencement of operations (throughout the annual cycle and consecutive), as well as ongoing monitoring after this period at a reduced intensity for a subset of indicators; and
 - ii) physiological condition baseline data
- b) a description of how the marine bird baseline monitoring recommendations made by Environment Canada and submitted as part of ECCC's written evidence (Exhibit C121-3-1, Recommendation 2-16, PDF page 77-80) were incorporated into the development of the Plan.
- c) a summary of Trans Mountain's consultation with Environment Canada, appropriate provincial authorities, other appropriate stakeholders, and potentially affected Aboriginal groups regarding the development of (a) and (b). This summary must include a description of any issues or concerns raised by those consulted with and how Trans Mountain has addressed or responded to those issues or concerns, as well as a description of data sharing agreements developed between Trans Mountain and Environment Canada.

Rationale:

ECCC provided the rationale for this condition in several sections of its written evidence (Exhibit C121-3-1). These excerpts are provided in this section.

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 76-77):

“Baseline data are critical for evaluating the population and community level consequences following an oil spill event. In addition, this information is important for informing emergency response planning. One of the key limitations to the assessment of damages and biological resource recovery from the Exxon Valdez Oil Spill was the lack of baseline information (Esler et al., 2002).”

EC is of the opinion that the existing data used in the ecological risk assessment do not provide a sufficient baseline for marine birds to prioritize cleanup sites and direct management actions to locations that will have the most impact; inform the development of recovery initiatives; determine the types and levels of compensation measures; and, allow for an evaluation of recovery success in the event of a spill. Information Request No. 2.047 (Exhibit B310-2, PDF page 229) from EC also raises this point.

In section 2.2.1 of Volume 8A of the Application (Exhibit B18-20, PDF page 18), the Proponent states that the number of tanker loadings will increase from an average of 5 to an average of 34 per month. EC acknowledges that, in the event of an accident involving a marine vessel, loaded oil tankers carry more oil than other types of vessels such as cargo or fishing vessels. While other types of vessels can spill hydrocarbon fuels as a result of an accident, tankers have the potential to spill a much larger amount of oil and therefore potentially result in higher consequences to the marine environment in the event of a spill.

EC notes that the marine bird data used for both the marine transport effects assessment and for the ecological risk assessment of a spill from a tanker were based on literature and database reviews. Although substantial data exist on birds in the Project Marine Area, there are important gaps in our understanding of marine bird species abundance, distribution and movement patterns, as well as those habitats used by key species. EC is concerned with the limitations of existing data in allowing for a proper identification of marine bird “hot spot” areas/habitats, both spatially and temporally. Ocean and coastal ecosystems are dynamic, and therefore the best characterization of marine bird values will come from data that are as current as possible. In general, in the event of an oil spill in the Project area, the ability to assess impacts to marine birds and develop emergency response and recovery initiatives that are based on spatial and temporal priorities is limited by the following knowledge gaps:

- 1) Spatial and temporal habitat use patterns, including breeding, foraging, moulting and staging locations for many species. Examples of such information includes, but is not limited to:
 - a) distribution of species at risk and identification of marine critical habitat and other habitats where recovering populations could expand;*
 - b) distribution of pelagic species (both seasonal occurrences and estimates of regional levels of abundance);*
 - c) habitat use patterns in areas with poor/inconsistent survey coverage (e.g. the central Strait of Georgia and the central Gulf Islands);*
 - d) moult locations (especially given the susceptibility of marine birds to oiling during the period in which they have limited flight capabilities);*
 - e) staging areas (important concentrations of birds during migration);**

- f) *affiliations between important physical or biological features and marine bird distributions, to allow modelling of species-habitat relationships and prediction of suitable habitat locations (for example, see Rickbeil et al., 2014); and*
 - g) *an understanding of population connectivity between wintering, breeding and molting areas and level of site-fidelity to better understand how readily an area would be recolonized if a local population was decimated or severely reduced in size by an event. In particular, it is important to understand movement and connectivity patterns of sub-adult birds and how they enter the breeding cohort.*
- 2) *Threats and risks for which impacts are not well understood, including, but not limited to, long-term effects of oil on marine bird habitats and habitat components such as eelgrass, marsh, and biofilm.”*

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 77-80):

“Recommendation 2-16:

- 1) *EC recommends that the Responsible Authority require that the Proponent develop a marine bird baseline monitoring plan to describe species composition and their spatial and temporal abundance patterns that can be used to identify high consequence areas/habitats in the event of an oil spill. To foster efficiency and opportunities for collaboration, EC recommends that the Proponent work in consultation with EC-CWS, as well as others, as appropriate, during the development and implementation of their marine bird monitoring plans. This would allow for:*
- *spatial and temporal coverage optimization;*
 - *methodological consistency, such that the data are applicable/appropriate to subsequent incorporation into existing habitat-species modelling activities; and*
 - *coordination with existing and planned activities related to Area Response Planning within the ‘southern portion of BC’ priority area, as part of a set of federal measures designed to achieve a World Class Marine Tanker Safety System in Canada.*

The objectives for the baseline monitoring plan should focus on the spatial/temporal abundance and distribution patterns (over four seasons) of marine birds (including seabirds, waterbirds, waterfowl, and shorebirds, where relevant) within the Project Marine Area, including Burrard Inlet, the southern Georgia Strait, southern Gulf Islands and the Juan de Fuca Strait. Specifically, the activities associated with the monitoring plan should:

- a) *Ensure that marine birds are sampled at such effort as to allow an assessment of their use of key, sensitive habitats (marine and nearshore (subtidal/intertidal)). Specifically sampling efforts should include:*
- i) aerial and boat-based marine bird surveys;*
 - ii) surveys conducted three (3) years pre- and three (3) years post-expansion activities, (throughout the annual cycle and consecutive), as well as ongoing monitoring after this period at a reduced intensity for a subset of indicators; and*
 - iii) surveys conducted at such a frequency that information on distribution and abundance will be obtained during the breeding, wintering, and spring and fall migration seasons, thus allowing for a strong understanding of habitat use patterns. In this respect, EC recommends a minimum of monthly surveys or a survey frequency that results in population estimates with a coefficient of variation of $\leq 20\%$ for priority species or assemblages (Smith, 1995).*
- b) *With respect to pre-impact physiological condition baseline data needed to address the effects of both potential chronic and larger-scale oil spills, include for selected species:*
- i) hydrocarbon fingerprinting (the use of genetic-based biomarkers to identify hydrocarbon exposure in order to provide a pre-impact baseline; e.g. P450 studies; see Esler, D. et al, 2011); and*
 - ii) application of Avian Polymerase Chain Reaction (PCR) Gene Array tools on targeted species (refer to Appendix C of this submission for additional information including further detail on the recommendation).*
- With respect to i) and ii) above, consideration should be given to collecting a broader suite of samples from marine birds in collaboration with other specialists and/or studies to establish baseline levels for various physiological and chemical indicators with which to perform Baseline Health Assessments, as described in Mallory et al, 2010; and*
- c) *Use the most appropriate scale/resolution to inform effects and guide studies, in both confined marine and near shore areas.*
- 2) *EC recommends that the three (3) years of pre-expansion baseline studies (as described above) be conducted before Project operations (i.e. before any increase in tanker operation related to the expansion).*
- 3) *EC recommends that data sharing agreements between EC and the Proponent be developed with respect to any relevant marine bird monitoring data collected by the Proponent. This would allow for a “multiple outcome” use of the data with respect to emergency response planning, preparedness, and implementation, as well as species at risk recovery initiatives. The intent in sharing data would be to:*
- a) increase the predictive power and reliability of nearshore and pelagic predictive marine bird distribution models (and their products, such as dynamic predictive*

'hotspot' mapping tools) already being developed in EC-CWS for a wide range of focal migratory bird species;

- b) incorporate all data collected by the Proponent into existing government (e.g. EC-CWS and/or EC Environmental Emergencies databases), to improve Wildlife Emergency Response Preparedness and Planning. This would likely include the incorporation of data into an enhanced Environmental Emergencies Mapping System tool, as contemplated under the World Class Tanker Safety System (Phase II) Area Response Planning (ARP) initiative for the Southern BC ARP priority management unit; and*
- c) aid species at risk recovery planning, where applicable.*

The following are examples of baseline studies that provide the level of information that EC would recommend.

- Coletti, H.A., Bodkin, J.L., Dean, T.A., Dloecker, K.A. 2011. Nearshore marine vital signs monitoring in the Southwest Alaska Network of National Parks: 2010. Natural Resource Technical Report NPS/SWAN/NRTR-2011/497. National Park Service, Fort Collins, Colorado.*
- Drew, G.S., Speckman, S.G., Piatt, J.F., Burgos, J.M., Bodkin, J.L. 2008. Survey design considerations for monitoring marine predator populations in Glacier Bay, Alaska: results and post-hoc analyses of surveys conducted in 199-2003 [unpublished report]. Anchorage, AK: US Geological Survey.*

In addition, as noted in ECCC's response to the information request from the NEB (Exhibit C121-5-2, PDF pages 2-3), "EC implements and supports a number of science and monitoring programs and initiatives in marine ecosystems along the Pacific Coast, which primarily relate to migratory birds. However, EC does not typically collect Migratory Bird population abundance and seasonal distribution data at the spatial scale, or with the resolution required, to inform Emergency Response preparedness and planning at a local scale, or to develop particular post-incident recovery objectives and/or endpoints in the Marine Project Area. It should be noted that, as a component of the World Class Tanker Safety initiative (Phase 2), EC will collect additional marine bird data, for a 2.5 year period which started in winter 2015, within the 'Southern BC' Area Response Planning (ARP) area (for details see EC's Response to Information Request 4.2 from the Friends of Ecological Reserves, Exhibit C249-13-2), which includes portions of the Marine Project Area. These data will be used to inform Area Response Planning in BC. However, this short-term program is designed to address key knowledge gaps within the entire ARP and does not provide project-specific marine bird distribution and abundance data to the extent recommended by EC in the marine bird baseline monitoring plan (see Recommendation 2-16, EC written evidence, Exhibit C121-3-1, PDF pages 77-80)."

Regarding ECCC's recommendation 2-16, the Proponent has indicated in their Reply Evidence to Environment Canada that "*vessels associated with the Project represent a small portion of the total vessel traffic in the Marine Regional Study Area*" (B418-19, PDF page 24). As noted in ECCC's written evidence (Exhibit C121-3-1, PDF page 61), "*with respect to impacts to marine birds, EC's greatest area of concern is the potential consequences of a spill resulting from an accident during loading or transportation of oil.*" Given that tanker loadings will increase from an average of 5 to an average of 34 per month as a result of this Project (Volume 8A of the Application, Exhibit B18-20, PDF page 18), and oil tanker traffic in the Burrard Inlet, Georgia Strait, Boundary Pass, and Haro Strait is only associated with the Westridge marine terminal, ECCC continues to recommend that the Responsible Authority require that the Proponent develop a marine bird baseline monitoring plan, as described by ECCC in Recommendation 2-16 of ECCC's written evidence (Exhibit C121-3-1, PDF pages 77-80).

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 76-80), as identified in the Rationale section.

NEW PROPOSED CONDITION (ECCC-04)

Recommendation:

Environment and Climate Change Canada (ECCC) recommends adding the following condition:

Biofilm Study Plan

Trans Mountain must file with the NEB for approval, **within six months after project approval**, a plan to study the effects of crude oil, specifically the main types of crude oil proposed to be transported on tankers as a result of the Project, on biofilm with the aim to inform emergency response. The plan must include:

- a) a requirement to complete the studies before operations commence
- b) a description of how the data gaps indicated by Environment Canada and submitted as part of ECCC's written evidence (Exhibit C121-3-1, Recommendation 2-17, PDF page 82-83) were considered in the development of the Plan.
- c) a summary of Kinder Morgan's consultation with Environment Canada, other appropriate government authorities, other appropriate stakeholders, and potentially affected Aboriginal groups regarding the development of (a) and (b), including any issues or concerns raised with respect to the Biofilm Study Plan and how Kinder Morgan has addressed or responded to them.

Rationale:

ECCC provided the rationale for this condition in its written evidence (Exhibit C121-3-1, PDF pages 80-82):

“2.4.2.4 Effects of Oil on Biofilm and Shorebirds

Biofilm is a “thin (0.1-2mm) dense layer of microbes, organic detritus, and sediment in a mucilaginous matrix of extracellular polymeric substances, together with non-carbohydrate components secreted by microphytobenthos and benthic bacteria” (Characklis and Marshall 1990). Substantial research has been done by EC on biofilm within the Marine Project Area, in particular, on the mudflats of Roberts Bank, Sturgeon Bank, and Boundary Bay.

Intertidal biofilm is a major food source for calidrid sandpipers during their migration stop-overs. Roberts Bank, in particular, is relied upon by a majority of the global population of Western Sandpiper, as well as nearly the entire Pacific subspecies of Dunlin during their migration (Jardine, Bond, Davidson, Butler and Kuwae, 2015). The Fraser River Estuary is a critical link in the spring migration ecology of shorebirds; their migration and breeding success depends on the Fraser River Estuary and the biofilm and invertebrate prey items found there. Other important areas for Western Sandpiper in the Project Marine Area include the Tofino Wah-nah-jus Hilth-hoo-is Mudflats, which also provides essential habitat during migration stop-overs.

*For Western Sandpiper, estimates are that biofilm, on average, accounts for 50% * of the daily energy budget (*68% if nocturnal feeding is taken into account). For Dunlin, biofilm is estimated to make up approximately 20% of the daily energy budget (Kuwae et al., 2008). In the event of a spill where oil reached the Fraser River Estuary, effects such as changes to such important food supplies, including biofilm and infauna, could have population-level effects on Western Sandpiper and other shorebirds. Effects could range from acute, such as direct mortality of birds following ingestion of contaminated biofilm, to more chronic, such as impacts to reproduction on the breeding grounds. In the context of Western Sandpiper, biofilm is considered to be irreplaceable (Jiménez, Elner, Favaro, Rickards & Ydenberg, 2015). Should an oil spill occur during migration, a significant proportion of the Western Sandpiper population could be impacted given that most of the population is present at this site at approximately the same time.*

The Proponent has relied on studies on biofilm conducted by the Vancouver Airport Fuel Facilities Corporation (VAFFC) on Jet A fuel to make conclusions on the effects of oil on biofilm: “Biofilm has been observed to re-form within 24 hours following removal from mudflats (VAFFC 2012a), and it is likely that once shoreline clean-up has taken place, biofilm will readily regenerate” (Exhibit B18-2, Table 7.1.14, PDF page 90). Given the differences in chemical and physical properties between various types of oil and hydrocarbon fuels, which in turn influence their fate, behavior and clean-up efficiency

(Fingas, 2001), studies that pertain to effects of Jet A fuel on biofilm are not likely to reflect the actual effects of oil on biofilm. In addition, while biofilm may regenerate quickly in conditions where natural processes are undisturbed, no data currently exists on the effects of oil on biofilm or on the capacity of biofilm to regenerate following exposure to oil.

In addition, should shore oiling occur, clean-up activities themselves have the potential to adversely affect the environment (Fingas, 2001) and therefore could impact the natural processes that support and sustain biofilm. The nature and complexity of these processes are likely to make any effort to restore and compensate for these lost processes challenging, especially given that techniques to create or restore biofilm habitat do not currently exist.

With respect to effects on biofilm from an oil spill, the Proponent has indicated that for the Strait of Georgia spill modelling location, “the presence of crude oil is not considered likely to have lasting negative effects on the biofilm, which is likely to be robust, and to have the capacity to recover quickly from physical or chemical insults” (Exhibit B19-14, PDF page 65). This conclusion was provided in the context of effects to shoreline and nearshore habitats, but not considered in the context of effects to marine birds. While “the potential for exposure of shorebirds to oil was evaluated on the basis of the length of oiled shoreline (km), and that length as a percentage of the total shoreline in the RSA” (Written Evidence Exhibit B19-14, PDF page 67), no assessment of effects from biofilm grazing was completed. Also, while a Detailed Quantitative Ecological Risk Assessment for Loading Accidents and Marine Spills (DQERA) (Exhibit B32-25) was filed to provide additional quantitative information on ecological risk to marine receptors, biofilm was not addressed with respect to potential effects to shorebirds from biofilm grazing.

In the case of a full bore pipeline rupture spill occurring near the Port Mann Bridge, and reaching the Fraser River during spring or fall conditions, the Proponent indicated that “[t]he biofilm itself is not likely to be materially affected if weathered oil becomes stranded, and recovers quickly from disturbance. Therefore, biofilm and Western sandpiper are unlikely to be significantly affected in the event of a pipeline oil spill that results in oil entering the Fraser River near the Port Mann Bridge and any effects are likely to be reversible” (Exhibit B18-2, PDF page 95). The Proponent also stated that the magnitude of effects to Western Sandpiper would be low, and likely to persist only for 6 months or less (Exhibit B18-2, PDF page 98).

EC emphasizes that the oil spill mass balance results for the Strait of Georgia 16,500 m³ spill scenario indicate that about 2% of the spilled oil may reach mudflats associated with the Fraser River Delta (i.e. Roberts Bank and Sturgeon Bank) or in Boundary Bay (Exhibit B19-14, PDF page 65). In addition, for the Strait of Georgia 8,250 m³ spill scenario, the highest probability of spilled crude oil extending to the Fraser River estuary IBA has been identified as being $\geq 90\%$ for the winter and fall seasons and $\geq 50\%$ for the

spring and summer seasons. For a 16,500 m³ spill scenario at the same location the highest oiling probability is ≥90% for all four seasons (Exhibit B19-14, Tables 6.11 and 6.12, PDF page 71). In the scenario of a pipeline full bore rupture spill occurring near the Port Mann Bridge and reaching the Fraser River, the Application states that although qualified as “not high”, there is a probability that oil would reach Sturgeon and Roberts Banks in spring, summer, and fall conditions, and there is a 40% probability that oil on the water surface would reach the side channels and marshes near Ladner and Port Guichon (Written Evidence Exhibit B18-2, PDF pages 81-99).

Based on the probability of oil reaching the Fraser River Estuary, and the high dependence of Western Sandpiper on biofilm during spring and fall migration, EC is of the opinion that significant adverse population-level effects to Western Sandpiper, and potentially also for the Pacific subspecies of Dunlin, are possible in the case of an oil spill occurring during spring or fall migration.

Recommendation 2-17:

Given the limited understanding of oil spill effects on biofilm and the importance of biofilm in supporting shorebird populations, EC recommends that the Responsible Authority require that the Proponent undertake studies on the effects of oil on biofilm. The focus should be on crude oil, and more specifically on the main types of crude oil proposed to be transported on tankers as a result of the Project, for example diluted bitumen (Exhibit B1-1, PDF page 38). These studies would aim to inform emergency response and should be completed prior to the start of Project operations. Specifically, these studies should be developed in consultation with EC and aim to fill the following data gaps:

- acute and chronic effects of crude oil on biofilm;
- recovery capacity of biofilm following effects from exposure;
- improved methods for visually identifying and mapping biofilm that is grazed by shorebirds, especially on Roberts Bank, and determining composition and formation of biofilm to facilitate effective clean-up and remediation following an oil spill;
- methods for assessing biofilm “health”;
- analysis of potential impacts of various crude oil clean-up and remediation methods on biofilm and biofilm recovery and identification of methods that would be least harmful to biofilm; and
- potential extent of shorebird exposure to crude oil through biofilm grazing.”

The Proponent’s reply evidence to ECCC Recommendation 2-17 (Exhibit B418-19, PDF pages 24 and 25) is as follows:

“EC recommends that the Proponent undertake studies on the effects of oil on biofilm. Trans Mountain characterized potential effects of an oil spill in the Fraser River on

multiple ecological receptors, including biofilm and Western Sandpiper, in Volume 7 (Filing ID A3S4V6). Particular consideration was given to potential effects to Western Sandpiper in a spill scenario during spring or fall migration, when sandpipers use the Sturgeon and Roberts Banks as a stopover and feeding area. Oil fate modelling for this area (Technical Report 8C-12 of Volume 8C, Modelling the Fate and Behaviour of Marine Oil Spills from the Trans Mountain Expansion Project; Filing IDs A3S5G9 through A3S5I1) shows that the probability of oiling on Sturgeon and Roberts Banks is very low. Here, oil becomes stranded and would not exit from the Fraser River Delta during periods of low flow, or would be carried through and away from the Fraser River Delta and into the Strait of Georgia by the momentum of the freshwater jet created by the Fraser River during periods of moderate or high flow. Once in the Strait of Georgia, modelling predicts that the oil would continue to weather and disperse. Stranding would occur on the shorelines of Gabriola, Valdes and Galiano Islands and Point Roberts, but at low intensity and with low probability.

Stochastic oil spill modelling results for spill scenarios in the Strait of Georgia similarly identify that oiling potential along mudflats in the Fraser River Delta is limited. Crude oil would tend to accumulate near the high tide mark in these areas, so that most of the mudflat areas would experience low levels of oiling overall (Volume 8B, Technical Report 8B-7 of Ecological Risk Assessment of Marine Transportation Spills, Filing ID A3S4K7).

In either spill scenario, biofilm would be expected to regenerate quickly following disturbance from oiling and oil recovery activities, and is not predicted to be materially affected if weathered oil becomes stranded (Vancouver Airport Fuel Facilities Corporation 2012). Accordingly, both effects on biofilm and potential for changes in food availability or contamination to Western Sandpiper are unlikely to be significant and effects are expected to be reversible. As such, Trans Mountain is not proposing to undertake studies to investigate potential effects of oil on biofilm and shorebirds”

The Proponent’s Reply Evidence provides a summary of information previously included in its Application and does not address the concerns raised in ECCC’s written evidence. For example, the Proponent continues to rely on studies that pertain to effects of Jet A fuel on biofilm, which ECCC indicates are not likely to reflect the actual effects of oil on biofilm. ECCC highlights that “while biofilm may regenerate quickly in conditions where natural processes are undisturbed, no data currently exists on the effects of oil on biofilm or on the capacity of biofilm to regenerate following exposure to oil...The nature and complexity of these processes are likely to make any effort to restore and compensate for these lost processes challenging, especially given that techniques to create or restore biofilm habitat do not currently exist” (Exhibit C121-3-1, PDF page 81). In addition, “EC emphasizes that the oil spill mass balance results for the Strait of Georgia 16,500 m³ spill scenario indicate that about 2% of the spilled oil may reach mudflats

associated with the Fraser River Delta (i.e. Roberts Bank and Sturgeon Bank) or in Boundary Bay (Exhibit B19-14, PDF page 65)” (Exhibit C121-3-1, PDF page 82).

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 80-82) and the Proponent’s reply evidence to ECCC Recommendation 2-17 (Exhibit B418-19, PDF pages 24- 25), as referenced in the Rationale section.

NEW PROPOSED CONDITION (ECCC-05)

Recommendation:

Environment and Climate Change Canada (ECCC) recommends adding the following condition:

Avian Mitigation and Monitoring Plan

Trans Mountain must file with the NEB for approval, **within six months prior to the commencement of operations**, an Avian and Mitigation Monitoring Plan in order to assess the effectiveness of proposed mitigation measures to avoid harm (incidental take) to migratory birds that could arise from activities related to the Westridge Marine Terminal facility, marine transportation, or any other lighting sources.

The Plan must include:

- a) a commitment to install and use site or vessel lighting fixtures in a manner that reduces light pollution in the surrounding environment to avoid attracting migratory birds, including all relevant measures committed to throughout the OH-001-2014 proceeding.
- b) post-construction monitoring at the Westridge Marine Terminal, including berthed vessels;
- c) monitoring aboard tankers during shipping to assess the effectiveness of mitigation measures in avoiding incidental take through collisions and to identify the need for additional mitigation measures; and
- d) a description of how the avian monitoring recommendations made by Environment Canada and submitted as part of ECCC’s written evidence (Exhibit C121-3-1, Recommendation 2-18, PDF page 84-85) were considered in the development of the Plan.

Rationale:

ECCC provided the rationale for this condition in its written evidence (Exhibit C121-3-1, PDF pages 83-84):

“In the context of the potential for incidental take (i.e. incidental harm to birds, nests and eggs, which is prohibited under the MBCA (for further information see EC’s guidance to

avoid Incidental Take of Migratory Birds in Canada [http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=C51C415F-1]), EC is concerned with the detrimental effects of bird collisions at lit and floodlit structures. Attraction to lights can cause birds to collide with lit structures or their support structures, resulting in injury or death. In other instances, birds can get disoriented while circling a light source, and may deplete their energy reserves and either die of exhaustion or drop to the ground where they are at risk of depredation.

In the Application, the Proponent states that “Resident birds may be acclimated to night-lighting at this and proximal locations and information on bird strikes is lacking for the Marine RSA. Consequently, no specific thresholds for evaluation of this effect have been identified” (Exhibit B5-21, PDF page 76). Significance criteria ratings for the effects of expansion and operation of the Westridge Marine Terminal on mortality risk due to collisions appear to have been determined based on the assumption that birds have been, and will continue to be, acclimated to night-lighting. Further, the Proponent states that “Given the current context of dense marine foreshore development in Burrard Inlet, marine birds have been known to habituate to noise levels under 90 dB and to other sensory disturbances, such as marine activity, night-lighting, and vessel berthing and unberthing events that are periodic, predictable and not adverse experiences (Grubb et al. 2002, Steidl and Anthony 2000, Ward and Stehn 1989). Terminal operations are unlikely to have a substantial contribution to cumulative effects in the Marine RSA considering the context of high volume activity and marine industry within their current habitats” (Exhibit B5-23, PDF page 116).

EC is of the understanding that the continued presence of marine birds in the marine local and regional study areas where they are currently exposed to vessel traffic and industrial activity does not mean that they will continue to acclimate to increases in vessel traffic and industrial activity as a result of the proposed Project. Further, the response of marine birds can be expected to vary with volume and frequency of vessel traffic and industrial activity to such a point where birds abandon the area.

Recommendation 2-18:

EC recommends that the Responsible Authority require that the Proponent develop an Avian Monitoring Plan as part of due diligence and in order to assess the effectiveness of proposed mitigation measures to avoid harm (incidental take) to migratory birds that could arise from activities related to the Westridge Marine Terminal facility, marine transportation, or any other lighting sources. This plan should include post-construction monitoring at the Westridge Marine Terminal, including berthed vessels, as well as monitoring aboard tankers during shipping to assess the effectiveness of mitigation measures in avoiding incidental take through collisions and to identify the need for

additional mitigation measures. The Proponent should consider such things as the following in developing the Plan:

- a) describe how lighting would be avoided or minimized to the extent possible when occurring at night;*
- b) identify potential higher risk periods (i.e. migration), as well as specific structures, activities or locations that have the potential to contribute to bird collisions. This should take into account areas that are not able to be monitored due to substrate, health and safety concerns, etc.;*
- c) taking into consideration the results from a) above, monitor the effectiveness of mitigation measures in avoiding collisions and bird carcasses (this can include, but not be limited to, monitoring bird movement and behaviour using a marine radar); and*
- d) document monitoring results, including a demonstration of whether the mitigation measures have proven effective and if additional measures were required.*

With respect to a) above, in order to avoid the risk to migratory birds, the minimum amount of pilot warning and obstruction avoidance lighting should be used on tall structures. Based on scientific study (Gehring et al. 2009, Gauthreaux et al. 2006), strobe lights appear to reduce the risk of night time collisions. EC recommends lighting that contributes to a strategy to avoid potential impacts to migratory birds. For example, and subject to regulatory requirements, strobe lights with minimum intensity and minimum number of flashes per minute (longest duration between flashes) appear effective at reducing collision rates.

Additional considerations that could contribute to avoiding harm to migratory birds include:

- minimizing the number of light installations;*
- avoiding the use of solid burning or slow pulsing warning lights; and*
- using down-shielded lighting fixtures to further reduce light pollution.*

Further to the above recommendations, consideration should be given to avoiding or restricting the time of operation of exterior decorative lights such as spotlights and floodlights that function to highlight the exterior features of buildings. In particular on humid, foggy, or rainy nights, illumination glow can draw birds from distance. To mitigate this effect, consideration should be given to turning lights off during high risk periods such as during bird migration, during periods when birds are dispersing from their colony and during autumn and winter.”

Evidence relied upon:

Written evidence of ECCC (Exhibit C121-3-1, PDF pages 80-82), as referenced in the Rationale section, as well as Trans Mountain Pipeline ULC's Reply Evidence (Exhibit B418-19, PDF pages 25-26):

“Recommendation 2-18 :

Environment Canada recommends that the Proponent develop an Avian Monitoring Plan as part of due diligence and in order to assess the effectiveness of proposed mitigation measures to avoid harm (incidental take) to migratory birds that could arise from activities related to the Westridge Marine Terminal facility, marine transportation, or any other lighting sources.

As described in the responses to BC Nature & Nature Canada IR No. 1.11c (Filing ID A3Y2C5) and GoC EC IR No. 2.050b (Filing ID A4H6A5), Trans Mountain is committed to implementing several mitigation measures to reduce potential for light-induced incidental take of marine migratory birds at the Westridge Marine Terminal facility or from Project-related marine transportation activities (refer to Volume 5A, Table 7.6.12-2 in Filing ID A3S1R0; and Volume 5C, Table 6.1 in Technical Report 5C-14 of Marine Birds – Westridge Marine Terminal Technical Report, Filing ID A3S2R8). Mitigation measures include:

a) Informing all operators of Project-related vessels of the hazards regarding bird strikes occurring at night because of deck lighting or inclement weather and bird collisions with Westridge Marine Terminal structures.

b) Prevention, where feasible, of sky-lighting (which may lead to bird disorientation/collisions) by: using low level and low intensity lighting; using no lighting in areas where no work is planned; using downturned shaded fixtures in light standards; and using a higher lumen/watt (light out to power in) ratio, such as metal halide lighting.

c) Issuance of bird strike warning to berthed vessels during migratory bird periods and/or during extreme weather events, with a request to reduce deck lighting.

Bird strikes and collisions will be reported to Trans Mountain's Lead Activity Inspector and the Environmental Inspector or KMC's Operations Supervisor using a standard field report. This report will include, but is not limited to, date, time, location, environmental conditions, and the species and number of individuals involved, as well as recommended follow-up actions and communications. Where feasible, information regarding near-miss collisions will also be collected. Information regarding mortality and collision events will be compiled by the Environmental Monitor and included, as applicable, in PCM reports for the Westridge Marine Terminal; data can also be made available to regulatory agencies upon request. Further, in response to NEB IR No. 4.11a (Filing ID A4K4W3),

Trans Mountain has committed to including a section on marine birds in its future Port and Terminal Book, which will be submitted to the TERMPOL Review Committee a minimum of 6 months prior commencement of Project operations. The section will request that all vessel operators report any bird strikes/collisions to Marine Communication and Traffic Services. While Trans Mountain will not own or operate the vessels calling at the Westridge Marine Terminal, these mitigations demonstrate Trans Mountain's commitment to implementing activities, to the extent of its ability, to limit potential for incidental take of marine migratory birds."

NEW PROPOSED CONDITION (ECCC-06)

Recommendation:

Environment and Climate Change Canada (ECCC) recommends that the following condition be added:

Standard test data for hydrocarbon products

- a) Unless regulators and responders confirm that they have access without restriction to suitably specific and complete information for each of the parameters below, Trans Mountain must provide to spill responders and regulators the following standard test data for each specific type of hydrocarbon product prior to it being shipped:
 - i) Key chemical composition data of compounds known to have human health impacts and/or that can be used to determine oil provenance
 - Volatile compounds (e.g. BTEX, "light ends", etc...)
 - n-Alkanes
 - Polycyclic aromatic hydrocarbons (PAH) and alkylated PAHs
 - Hopane and sterane "biomarker" compounds
 - Hydrocarbon group constituents ("SARA")
 - Simulated distillations
 - ii) Oil properties (over a range of environmentally appropriate temperatures and conditions and over time after being released to the environment)
 - Density
 - Viscosity
 - Surface tension and interfacial tensions with salt and fresh water
 - Flash point
 - Vapour pressure

Trans Mountain should consult with Environment Canada when determining what data is required for proper response and preparedness. A summary of these consultations, including any issues or concerns raised and how Trans Mountain has addressed or responded to them should be filed with the NEB.

Trans Mountain should make all test data readily accessible to responders and regulators prior to shipping, to facilitate appropriate spill response preparedness.

- b) Trans Mountain must commit to provide to the NEB or other regulators, upon request, representative samples of any hydrocarbon products to be shipped for the purposes of verification and validation of the standard physical properties and chemical composition data they provide above in a) i) and ii).

Rationale:

Experience with real-world spills has demonstrated time and again that responders require immediate access to information on the exact physical, chemical and toxicological properties of the specific spilled oil product, and how these properties might vary over time once released to the environment. Response effectiveness and human health and safety will be compromised unless appropriate information is readily and immediately accessible to responders in the first few hours under emergency response conditions. Generic names representing groups of oil products with different properties and nonspecific MSDS data sheets are inadequate for guiding safe and effective spill response. There is often also a need to establish the provenance of spilled oil for legal purposes.

ECCC's written evidence (Exhibit C121-3-1) contains a section related to the fate and effects of hydrocarbon products (section 4.3.2, PDF page 128), including three recommendations concerning the properties, composition and behaviour of oils and other products proposed to be shipped by the pipeline expansion: recommendations 4-3 (PDF page 130), 4-4 (PDF page 130), and 4-5 (PDF page 132).

Recommendations 4-3 and 4-4 are the basis for this proposed condition:

“Recommendation 4-3:

EC recommends that the Proponent commit to provide to spill responders and regulators, the standard test data in Table 4-2 for all types of hydrocarbon products to be shipped. These data should be made readily accessible to responders and regulators prior to shipping, to facilitate appropriate spill response preparedness.”

“Recommendation 4-4:

EC recommends that the Proponent commit to provide, upon request, representative samples of any hydrocarbon products to be shipped for the purposes of verification and validation of the standard physical properties and chemical composition data they provide in Table 4-2.”

In their Reply Evidence of August 2015 (Exhibit B417-2, PDF page 276, lines 10-20), the Proponent notes:

“Trans Mountain is supportive of regulators having appropriate level of information on the properties of oil carried in pipelines but believes this is a matter that requires industry-wide development and consultation between regulators and industry. Many tests are already in the public domain on key oils and Environment Canada typically has maintained an extensive database on oils and properties (Environmental Science Technology Centre, Ottawa). Trans Mountain also collects and maintains comprehensive data related to the physical and chemical characteristics of all oils transported in the TMPL system and provides those to regulators and responders, as appropriate or upon request. The sources of that information include the Commodity Approval Process, Routine Testing Requirements described in the Service Standards, valid Material Data Safety Sheets (MSDS), and the Canadian Association of Petroleum Producers (CAPP) sponsored crudemonitor.ca.”

The generic information sources described by the Proponent above, are not specific enough to be useful and lack important property information such as surface and interfacial tensions for specific oils and how the parameters vary over time once released to the environment. MSDS sheets commonly report information for broad ranges for generic “oil” product names (categories) which may not characterize the full behavior of the product being shipped.

In their Reply Evidence the Proponent also states (Exhibit B417-2, PDF page 276, lines 31-39):

“In the unlikely event of a release, Trans Mountain provides MSDS and the product name to incoming first responders and communities as soon as possible to determine selection of appropriate recovery equipment, and assess immediate health and safety risks for both responders and the general public. In the event of a pipeline-related release, the Trans Mountain Control Centre communicates the MSDS information as part of the Emergency Condition Report, along with pertinent information about location, estimated volume, and related information. If an event were to occur after a tanker has loaded and been released from the Westridge Dock, the MSDS and representative samples would be onboard, as they are supplied to the vessel before departure.”

Not having access to product information before shipment hinders emergency preparedness, one of the most effective means of minimizing impacts of spills. In addition, accessing data which is only held by the Proponent can only serve to delay response action when timeliness is essential. Finally, the time required to obtain, ship and analyze representative samples in an accredited laboratory is inconsistent with the requirement for rapid decision-making needed during emergency response.

The Proponent's Reply Evidence states that (Exhibit B417-2, PDF page 277, lines 6-10), the Proponent notes:

“Trans Mountain disagrees that these [PAH/APAH, petroleum “biomarkers”, and “SARA”] additional tests should be prerequisites for Application approval or for shipments. These analyses have not been required for shipments of oils. The information gained from these additional analyses are of interest scientifically but are not expected to drive first response. Given that representative samples of both pipeline batches and ship cargo are collected and retained, these types of analysis can be performed post-event.”

ECCC notes that:

- a) PAH/APAH are significant contributors to oil toxicity, particularly for water and shore-dependent species, including fish, shellfish, sea mammals and sea and shore birds. Knowing the risks posed by a potentially spilled product are key to preparedness planning and deploying countermeasure resources, such as booms, during a spill event.
- b) “SARA” quantities are important in estimating the potential for oil emulsification, droplet formation and potentially for sediment interactions and shoreline retention of oil (“stickiness”). Without SARA information responders are unable to deploy countermeasure resources appropriately; and
- c) Biomarkers and PAH/APAH are the primary means of forensic oil identification should the source of a spill be unknown, or the type of oil is misidentified. Forensic verification of oil provenance is an essential legal tool and is only possible if a database of oil “fingerprints” exists. Biomarkers are a key tool for tracking and mapping the extent of spilled oil, and during use of chemical countermeasures, such as oil dispersants.

Evidence relied upon:

Written evidence of ECCC section 4.3.2.1 - Data for Hydrocarbon Products (Exhibit C121-3-1, PDF page 128):

“To prepare for and effectively respond to spills from the proposed pipeline or proposed increased tanker traffic, spill responders need to have information about the spilled oil. The Proponent has provided significant information on oil properties in section 5.1 of Volume 7 of their Application (Exhibit B18-1, PDF page 75), summarizing a report by Polaris Applied Sciences Inc., 2013, “A Comparison of the Properties of Diluted Bitumen Crudes with other Oils” (Exhibit B21-8). This provides a range of properties and oil composition data based on a review of existing literature, for select crude oils, fuels and diluted bitumen products. Extensive data sets for Cold Lake blend (CLB) and Access Western Blend (AWB), winter-season, high-condensate diluted bitumen blends, are provided in section 5.2.8 of volume 7 of the submission (Exhibits B18-1 and B18-2), based on the Witt O’Briens et al., 2013 report entitled “A Study of Fate and Behavior of Diluted Bitumen Oils on Marine Waters” (Exhibits B21-5, B21-6, and B21-7). EC recognizes the extent of data already provided and accepts it as useful for understanding possible spills of these products. However, data needs for emergency preparedness and effective response requires consistent data on key chemical constituents and certain physical properties for all products to be transported by the proposed project, and secondly, routine, periodic re-measurement to ensure that the data adequately represent the hydrocarbon products transported in the future. EC believes the list in Table 4-2 below represents the minimum set of standard data needed for spill modelling and preparedness, based on experience with previous hydrocarbon spills. There exist standard and/or widely-used best-practice methods for measuring these oil properties and compositions.”

Table 4-2: Oil property and composition needs for spill response

Key chemical composition data	<i>n</i> -Alkanes
	Polycyclic aromatic hydrocarbons (PAH) and alkylated PAHs
	Hopane and sterane “biomarker” compounds
	Hydrocarbon group constituents (“SARA”)
	Volatile compounds (e.g. BTEX, “light ends”, etc...)
	Simulated distillations
Oil properties (over a range of environmentally appropriate temperatures and conditions, where applicable)	Density
	Viscosity
	Surface tension and interfacial tensions with salt and fresh water
	Flash point
	Vapour pressure

NEW PROPOSED CONDITION (ECCC-07)

Recommendation:

ECCC recommends that the following condition be added:

Commitment to contribute to industry-wide research and development related to characterizing hydrocarbon behaviours in the environment

- a) Trans Mountain should contribute to an industry-wide approach to research and development to provide spill responders with improved information on how to effectively respond to spills.
- b) Trans Mountain should consult with Environment Canada on the proposed research program and file with the NEB a summary of these consultations, including any issues or concerns raised and how Trans Mountain has addressed or responded to them.

Rationale:

One of the primary limitations of current spill planning and preparedness is knowledge of the products being shipped. During the earliest stages of a spill accurate information on the spilled material is critical for operational spill planning, including deployment of equipment, forecasting

spill coverage and behaviour through modelling and possible impacts on human and environmental health

ECCC's written evidence (Exhibit C121-3-1) contains a section related to the fate and effects of hydrocarbon products (section 4.3.2, PDF page 128), including three recommendations concerning the properties, composition and behaviour of oils and other products proposed to be shipped by the pipeline expansion: recommendations 4-3 (PDF page 130), 4-4 (PDF page 130), and 4-5 (PDF page 132).

Recommendation 4-5 states the following:

“EC recommends that the Proponent, as part of an industry-wide approach, commit to supporting research on the development of standardized methods and research protocols for characterizing hydrocarbon behaviours in the environment, and to applying the new knowledge to the specific hydrocarbon products to be shipped. The resulting enhanced data and information on compositions, evaporation, emulsification, sediment mixing and other behaviours for the specific hydrocarbon products being shipped should be readily accessible to spill responders and regulators prior to transport.”

The goal of this recommendation is for Trans Mountain to develop and apply standardized methods for characterizing the behaviours of shipped hydrocarbon products that strengthen spill response preparedness, and apply these methods as needed should the products being shipped change with time. ECCC is prepared to aid the Proponent in selecting what should be measured and by which protocols.

In their Reply Evidence of August 2015 (Exhibit B417-2), the Proponent notes:

“Trans Mountain supports having well-considered and practical standardized methods and research protocols for characterizing hydrocarbon behaviours in the environment. However, this should not be done on a pipeline by pipeline basis and needs to be a joint initiative between the regulator, industry, and other government agencies. Instead, like the work currently being undertaken by the RSC (described above in Section 66.6.1) industry representation is best provided through organizations like the Canadian Energy Pipeline Association and CAPP. The products transported by Trans Mountain are not unique to Trans Mountain; rather they are representative of oils produced in the Western Canadian Sedimentary basin and moved to market by all other pipelines emanating from this basin. As such, Trans Mountain does not support this item as a condition on the Project.”

ECCC is not recommending that Trans Mountain undertake an independent research program, but that “the Proponent *commit to supporting research on the development of standardized methods and research protocols* for characterizing hydrocarbon behaviours in the environment, and to applying the new knowledge to the specific hydrocarbon products to be shipped.” (Emphasis added)

Additional information and context is provided in the following ‘Evidence relied upon’ section.

Evidence relied upon:

Written evidence of ECCC section 4.3.2.2 - Hydrocarbon Product Behaviour and Fate (Exhibit C121-3-1, PDF page 130):

“... studies on the fate and behaviour of dilbit in marine environments are limited. The Proponent has included two studies relevant to oil fate and behaviour which are summarized in Volume 7, section 5 of their Application (Exhibits B18-1 and B18-2). A comparison of a substantial study on the weathering for two types of diluted bitumen, “A Study of Fate and Behavior of Diluted Bitumen Oils on Marine Waters” (Exhibits B21-5, B21-6, and B21-7), includes examinations of: evaporation, dissolution, sinking and adherence to substrates. This study also includes information on the use of surface washing agents and a wide variety of skimmers for use in cleaning spills. Where there is overlap, EC notes that these results are, in general, in good agreement with the GoC technical report of 2014 (FGTR 2014), as well as subsequent testing by the Department of Fisheries and Oceans (King et al 2014, and King et al 2015). EC accepts the new experimental data provided by the Proponent for behaviour of the hydrocarbon product classes tested, but notes that there continue to be significant knowledge gaps and uncertainties. These include:

- *The evaporation data generated by the Proponent’s study are very valuable, including both behaviour and chemical changes and are also correlated to the efficiencies of clean-up methods. However, significant differences can be seen between the two product types. This result implies that distinct evaporation models and data will be necessary for all product types transported by the proposed project, that not all “dilbit” types are sufficiently similar for response purposes.*
- *The emulsion behaviour results are limited. Sufficient data to predict the thresholds for formations of emulsions, in terms of energy, time and weathering exposure were not provided by the Proponent.*
- *Shoreline adhesion testing was measured by surface adhesion on tiles. This type of test has been shown to provide useful information for clean-up of natural rock and artificial rip-rap shorelines. However, no experimental information was provided for*

cobble or sediment type shores, including, for example, penetration depths or rates, or for interactions with biofilms, as would be found on mudflats, found both south and north of the proposed terminal expansion and near the proposed tanker routes.

- *The majority of the data was measured over a 10 day period. Data on product behaviour beyond this time period were not determined. Data on shoreline retention, in particular and product removal from shorelines are particularly desirable. Long-term persistence and breakdown data were also not provided as part of the Witt O’Briens et al., study.*
- *The experimental study and the other data provided by the Proponent do not include data on oil–suspended particulate material aggregate (OSA) interactions specific to many of the products proposed to be transported. The spill model used does include some consideration of OSA mixing, using a standard model. For oils with densities which can approach that of water (e.g. both the diluted bitumen and synthetic crude-bitumen products), even small amounts of sediment can cause sinking. These models, developed for much lighter crude oils, may not be appropriate for predicting the behaviour of weathered dilbit products (FGTR 2014, King et al., 2014, King et al., 2015).*

EC views the data and results provided by the Proponent as valuable. Because of the knowledge gaps and uncertainties with respect to hydrocarbon product behaviours in the marine environment, additional research is needed to develop standardized methods for characterizing hydrocarbon product behaviours to further strengthen spill response planning and risk assessment.”