October 26, 2022

Roberts Bank Terminal 2 Project

Environment and Climate Change Canada (ECCC) Response to the Proponent's Public Comment Period Submissions

Summary

Environment and Climate Change Canada (ECCC) has reviewed two recent submissions provided by the Vancouver Fraser Port Authority (the Proponent) on April 22, 2022 (Part 1 submission, CIAR #3546) and on June 10, 2022 (Part 2 submission, CIAR #3553). The Proponent's submissions respond to the proposed draft conditions and public comments provided during the public comment period for the Roberts Bank Terminal 2 Project (the Project). The Proponent's Part 1 submission addresses comments on wetlands and wetland offsetting, and species at risk. The Part 2 submission responds to comments on biofilm, salinity and migratory birds, including the Western Sandpiper.

In preparing this response, ECCC has relied on data from all available sources, including local studies, peer-reviewed research, and the studies conducted by the Proponent.

The Proponent's Part 2 submission proposes a phased approach to construction. ECCC acknowledges that in theory, an appropriately designed phased approach could help reduce the likelihood that the species-level impact to the Western Sandpiper identified by ECCC experts would occur. Based on the details of the current proposal, however, it is not clear that the proposed approach will address the population level risk to Western Sandpiper. In order for ECCC to be able to assess the ability of the proposed approach to be effective, ECCC needs to understand the reversibility of any impacts; the scientific model that would inform the phased approach, and the choice of monitoring indicators, etc.; the indicators to be used in the monitoring program; and how these indicators are linked to thresholds for actions (i.e. stopping and decommissioning the project).

In addition to the need for more information about the proposed approach, the Proponent should consider changing the scope of phase 1 and providing for a longer time period between the construction phases.

Finally, ECCC reiterates that, even if the proposed phased approach is implemented, such an approach will not be able to fully eliminate the risk of a species-level impact on the Western Sandpiper. As stated in ECCC's last review of the Project in February 2022 (ECCC comments on the Proponents response to IR-2020-4, CIAR #2212), ECCC remains of the view that:

- The changes predicted as a result of the Project would likely constitute an unmitigable species-level risk to Western Sandpipers, and shorebirds more generally.
- The only apparent way to reduce the likelihood of these impacts is for the Proponent to consider further Project redesign options to maintain the current salinity profiles, which would support a comparable quality and quantity of biofilm on Roberts Bank.

ECCC's Response to the Proponent's Part 2 Submission

The Proponent's Part 2 submission responds to the draft conditions and comments received during the public comment period on biofilm, salinity, and migratory birds, including Western Sandpiper. The Part 2 submission also proposes a phased approach to the construction of the terminal, which includes follow-up monitoring to determine whether the predicted effects on Western Sandpipers occur as a result of initial phase of construction (Figures 1 and 2, Source: CIAR #3553).

Figure 1: Proposed first phase of Terminal Construction (Constructed East Basin)

Figure 2: Full Container Terminal Footprint (East and West Basin)

Western Sandpiper populations at Roberts Bank

In section 2.1 of the Part 2 submission, the Proponent cites a recent publication (Weiser *et al.* 2020) that estimated the current population trend of Western Sandpipers to be increasing. ECCC is aware of this publication, and notes that it was conducted over seven years (2008-2014) using demographic models that incorporated estimates of fecundity and adult survival from three breeding sites in Alaska. Weiser *et al.* (2020) estimated the rate of Western Sandpiper population change to be 1.13 (~13% annual increase) with a high likelihood that the population growth rate falls between 0.97 (~3% annual decline) and 1.28 (~28% annual increase) where the confidence interval (0.97-1.28) for stable populations is represented by 1.00, declining populations is <1.00 and increasing populations are >1.00.

ECCC Response

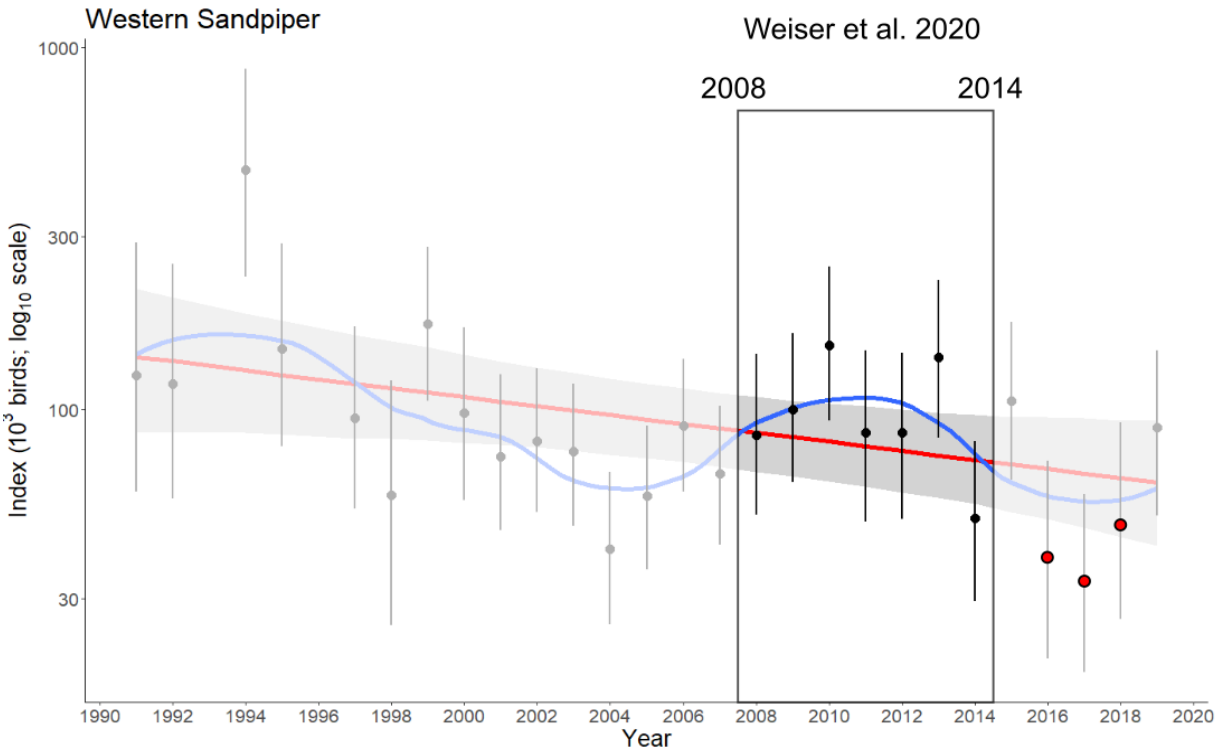
Assessments of the population status of migratory shorebirds can be made either through count-based population surveys, which measure abundance at a particular time or place, or with demographic models, which use estimates of vital rates to predict the population growth rate. Using a demographic model, Weiser *et al.* (2020) assessed an increase in Western Sandpipers over a 7-year period. The conclusions of that study contrast with the decreasing population trend estimated using 29 years (1991 to 2019) of spring shorebird surveys at Roberts Bank by Canham *et al.* (2021). Canham *et al.* (2021) estimated a 53% decline in Western Sandpiper abundance, after controlling for environmental variables (Fraser River discharge, tidal amplitude, and wind). Canham et al. also observed a positive average population growth rate in counts at Roberts Bank for the period assessed by Weiser *et al.* (2020) (average 1.08), suggesting the possibility of a short-term increase in the context of an overall long-term decline (average 0.97).

Short-term population fluctuations are often seen in long-term datasets (Figure 3). They can be driven by inter-annual variability in environmental conditions and predator-prey dynamics, and underscore the importance of long-term studies such as Canham *et al.* (2021).

Canham *et al.* (2021) also observed that the abundance of Western Sandpipers is negatively correlated with freshwater discharge from the Fraser River, the main driver of salinity at Roberts Bank. ECCC remains of the opinion that this correlation establishes a clear link between Western Sandpipers and salinity conditions at Roberts Bank, and indicates that changes to the hydrological regime arising from the Project would result in a lower abundance of sandpipers and exacerbate their ongoing long-term population decline.

Given the steep, long-term population decline at Roberts Bank, Western Sandpipers remain a shorebird species of high conservation concern (Hope *et al.* 2019). With this in mind, ECCC concurs with the Review Panel that "…the context of an apparent steep population decline mandates a highly precautionary approach in relation to the Project" (CIAR #2062, p.243).

Figure 3: Trends in Western Sandpiper counts conducted at Roberts Bank between 1991 and 2019



Note: Values represent population indices (with 95% confidence intervals) calculated as predicted values for each year from a final model with independent variables held at median values. This figure is modified from Canham *et al.* (2021) to show the period studied by Weiser *et al.* (2020). The red line shows the overall long-term population trajectory, while the blue line shows the short-term population variability. Red dots indicate years during which a salinity trigger is absent.

The Proponent's proposal to offset the effects of the Project on functional biofilm habitat by creating biofilm elsewhere or restoration on-site remains experimental

In section 2.2 of the Part 2 submission, the Proponent cites information from its response to IR2020-4 in Appendix IR2020-4-A (CIAR #2083), and states that biofilm creation is a proven effective mitigation that is being implemented in Japan. The Proponent concludes that biofilm is a common component of estuaries that can, and has been successfully created, enhanced, or restored, including at a large-scale.

ECCC Response

ECCC maintains its view that considerable uncertainty exists concerning the viability of re-creating functional biofilm habitat necessary to support shorebirds during migration. Importantly, none of the restoration projects in Japan considered fatty acid content in biofilm (biofilm quality). It is therefore uncertain as to whether such an approach can be used to mitigate the predicted effects of the Project. Advances in restoration of biofilm habitat show potential but key questions remain (Kuwae *et al.*. 2021), including whether such projects can provide important nutrients (such as essential fatty acids) during migration windows. All biofilm restoration projects, including those reviewed in the Proponent's biofilm habitat creation guidance manual, are small in spatial scale and remain preliminary in nature. None is of

the size that would be needed to mitigate the impacts from this Project, which may affect hundreds of thousands of shorebirds at a critical time in their annual cycle.

The Proponent cites the rehabilitation of Komuke Lagoon in Hokkaido, Japan as a successful case study of biofilm restoration, where biofilm feeding has been documented for Red-necked Stints, *Calidris ruficollis* (Kuwae *et al.*. 2012), small sandpipers that share ecological similarities with the Western Sandpiper. While a promising example, the Komuke Lagoon project does not reflect the large-scale biofilm habitat creation that would be required for the RBT2 Project. ECCC reiterates that the major management intervention at Komuke Lagoon was restoring the exchange of freshwater and seawater (Watanabe and Kuwae 2021). This restoration was followed by an increase in the proportion of marine diatoms in the biofilm assemblage and coincided with the increased shorebird usage. The result highlights the importance of the exchange of freshwater and saltwater at shorebird stopover sites and underscores the potential impacts that changes in the salinity regime associated with the RBT2 Project would have on Western Sandpipers.

ECCC remains concerned that the potential to offset the predicted effects of the Project on biofilm habitat is unknown. The biofilm restoration projects in Japan cited by the Proponent are small in spatial scale, and none have assessed biofilm quality (fatty acid content). It is therefore uncertain whether offsetting at the required scale can mitigate the predicted effects of the Project if they actually occur. The Roberts Bank local assessment area (Brunswick Point) accounts for 55% of the shorebirds observed at one time during spring migration over the entire Fraser River estuary, and this abundance is directly linked to biofilm consumption (Jardine *et al.*. 2015). Should the ecological functionality of the Roberts Bank site be compromised, remediation in multiple smaller areas in the estuary as proposed in the biofilm manual would not be sufficient to offset this loss.

The Project remains likely to lead to reductions in biofilm quantity and quality

In Section 2.3 of the Part 2 submission, the Proponent presents the results of two new analyses the Proponent conducted for the purpose of testing the 'salinity trigger hypothesis', and to evaluate the spatial scope of predicted Project effects on the salinity regime at Roberts Bank.

In the first analysis, the Proponent outlined a set of physical conditions that would be required for a change in salinity to stimulate production of polyunsaturated fatty acids (PUFAs) in intertidal biofilm, and then reviewed salinity records from three years of data at Roberts Bank. No associated fatty acid data are presented. The Proponent concluded that large daily fluctuations in salinity -- large shifts of 20-25 PSU (PSU = Practical Salt Units; spanning from fresh water at 0 PSU to marine water at ~30 PSU) -- were infrequent at Roberts Bank during 2016 and 2018. They concluded that 'there is no evidence of an existing consistent observable pattern of large, rapid salinity change (i.e., evidence of a salinity trigger) in the areas important to Western Sandpipers during the stopover period' (PDF, p. 33).

In the second analysis, the Proponent re-analyzed results from the original hydrological modelling conducted in the Environmental Impact Statement (EIS, CIAR #181). They considered the spatial extent (surface area) of the physical changes to the salinity regime that would result from the Project. No associated fatty acid data are presented. The Proponent concluded that the average surface area that would experience a compression in the range of salinity (a reduction in the variability) by >10 PSU, relative to baseline conditions, would cover 63 ha (range of 0 to 134 ha) of the total surface of biofilm area on Roberts Bank. This value would, on average, encompass ~10% of the available biofilm habitat during the stopover period. A more detailed spatial analysis indicates this compression will occur primarily over the upper intertidal area, in contrast to the Canoe Pass area. Because the total area

affected does not approximate 558 ha, the Proponent concluded that there is 'no evidence that the project would lead to a population-level impact to Western Sandpipers' (PDF, p. 40).

ECCC Response

Integrated management of estuaries requires an understanding of both the dynamics of the system and the consequences of management measures (Boerema and Meire 2017). The Proponent has argued that Project effects are expected to be minor given that the predicted salinity change with the Project will remain within the natural variability experienced under existing conditions. Within the context of management of estuarine habitats, ECCC's expert view is that this rationale should be considered with great caution. The salinity regime at Roberts Bank fluctuates nearly across the full spectrum of saline seawater to fresh river water. Further, acceptance of the Proponent's rationale could create a precedent for any modification to take place, given that by definition, it would always remain within the natural variability of the existing salinity regime.

In section 2.3 of the Part 2 submission, the Proponent describes new analysis conducted to test the "salinity trigger hypothesis", which predicts that variation in salinity stimulates fatty acid production in intertidal diatoms. The Proponent's analysis of the salinity trigger hypothesis only examined variation in salinity at Roberts Bank, and did not undertake an additional assessment of biofilm response (i.e., production of fatty acids). The time period that was examined (2016 to 2018) also coincides with a period of very low shorebird use at Roberts Bank (see the red dots on Figure 3 above), suggesting low variation in salinity and low fatty acid production by diatoms may have resulted in reduced shorebird use. Therefore, the data presented by the Proponent in the Part 2 submission are consistent with the hypothesis that variation in salinity plays an important role in fatty acid production in intertidal biofilm. ECCC retains its concerns regarding the potential Project effects on this ecological process at Roberts Bank.

The additional analyses provided by the Proponent on the spatial extent of the predicted compression in salinity variation provide more detail on where Project effects may occur, i.e., the upper intertidal zone. However, the precise surface area required for foraging sandpipers is currently unknown because the distribution of fatty acids across Roberts Bank during spring is very patchy. Schnurr *et al.* (2020) found very high concentrations of fatty acids at 16-20% of sample sites, accounting for up to 85% of the total fatty acid content available on the mudflat: Supplementary Material in Schnurr *et al.* (2020). High values likely occur where total diatom biomass is high and/or in areas where local conditions allow a high accumulation of fatty acids. The patchy nature of fatty acid distribution across Roberts Bank suggests it is premature to estimate the minimum required area for foraging sandpipers.

In Undertaking #29 (CIAR #1947), ECCC provided evidence for the salinity trigger hypothesis and its role in fatty acid production by diatoms in intertidal biofilm. The salinity trigger hypothesis relates to how environmental conditions that cause osmotic stress may induce or modulate the accumulation of lipids in microalgae, with emphasis on marine and estuarine diatoms. Osmotic stress or osmotic shock results from a sudden change in the solute concentration around a cell, which causes a rapid change in the movement of water across cellular membranes. The lipid accumulation response can be induced by factors such as changes in nutrients, light levels, temperature and salinity (CIAR #1947). The cell structures that enable the lipid accumulation response are ubiquitous in all eukaryotic microalgae (Leyland *et al.* 2020). Pennate diatoms in sediments at Roberts Bank need to regulate their lipid content carefully to maintain their buoyancy and enable them to live suspended in the photic zone as the salinity in the water column changes. Thus, a lipid accumulation response can be expected to form an important part of diatoms' adaptation to variable conditions at Roberts Bank, including daily desiccation,

inundation, and the large fluctuations in salinity associated with tidal cycles and discharge from the Fraser River.

The Proponent's proposed follow-up monitoring program with adaptive measures lacks detail

In section 4.2 of the Part 2 submission, the Proponent proposes a phased approach to construction, which it refers to as a precautionary construction approach. This approach would start by constructing the eastern portion of the terminal containment area. That construction would be accompanied by a monitoring program to determine whether the predicted effects on Western Sandpipers occur as a result of the initial construction. The remaining terminal construction would depend on the results of the monitoring, and could include completing the Project as planned, or removing some or all of the east basin of the marine terminal or containment dyke constructed in phase one.

The Proponent states that it chose this approach because its analysis indicates that the eastern portion of the terminal containment, once in place, will result in salinity changes similar to what the whole project will create in the areas important to the Western Sandpiper.

The proposed monitoring would look for early signals of any immediate population-level effect of the predicted change in salinity during the first northward migration. Construction would resume a month after the creation of the east basin and monitoring would be undertaken concurrently. The Proponent does not describe the follow-up program in detail but proposes that it be developed with input from Indigenous groups and relevant authorities, including ECCC and internationally recognized technical experts. The Proponent also states that the program would include clear follow-up criteria. The Proponent also proposes that an independent expert technical body be established to review and approve the monitoring program.

The Proponent states that these new elements, along with the measures already in the draft conditions, would serve to verify which, if any, of the adverse effects predicted by ECCC are actually occurring, including the immediate population effect to Western Sandpiper hypothesized by ECCC and the predicted changes to salinity and effects on biofilm and Western Sandpiper. The Proponent also explains that the proposed approach would also help determine the effectiveness of the mitigation measures being taken.

ECCC Response

<u>Overall</u>
ECCC acknowledges that in theory, an appropriately designed adaptive approach could help reduce the likelihood that the species-level impact to the Western Sandpiper identified by ECCC experts would occur. In order for ECCC to be able to assess the ability of the proposed approach to be effective, however, ECCC needs to understand:

- the reversibility of any impacts;
- the scientific model that would inform the phased approach, and the choice of monitoring indicators, etc.;
- the indicators to be used in the monitoring program; and
- how these indicators are linked to thresholds for actions (i.e. stopping and decommissioning the project).

ECCC currently has no information regarding the reclamation of the project, how feasible it is to bring the conditions to baseline and under what timelines.

ECCC also notes that VFPA suggests that phase 1 is expected to have the same magnitude of effect to salinity as the whole project. Testing a hypothesis with the full magnitude of potential effect (i.e. species level effect) is not advised.

ECCC expert advice also reiterates that, even if the proposed phased approach is implemented, it will not be able to eliminate the risk of a species-level impact on the Western Sandpiper because of key information gaps, including whether effects are reversible and an understanding of when, where and how effects are likely to start. Given the importance of the Roberts Bank site for the Western Sandpiper, the nutritional requirements for fatty acids of migrating shorebirds, and the predicted effects of the Project on biofilm quantity and quality, ECCC continues to advise that the changes predicted as a result of the Project, as currently designed, would likely constitute an unmitigable species-level risk to Western Sandpipers, and shorebirds more generally.

Timelines for the phased approach

The Proponent's proposed approach in its Part 2 submission focuses on tracking changes as they occur. ECCC is concerned that population-level effects to Western Sandpipers could start to occur before they can be detected.

The proposed monitoring timeline to detect changes to biofilm and Western Sandpiper during the phased construction approach for the terminal is defined in the Proponent's Part 2 submission to be months (PDF p. 60, CIAR # 3553). ECCC's view is that this timeline may not be long enough to collect appropriate data and detect adverse effects. An ecologically meaningful monitoring program capable of detecting population-level impacts must consider the annual timing of site use, inter-annual variation of populations and other ecological variables, and thus would require multi-year time scales. Without this information, it will be very difficult to identify early signals of a population level effect. ECCC therefore advises that the Proponent should provide for a longer time period between the construction phases to allow for collection of sufficient information to determine the impact of phase 1.

Considering that reversibility of impacts is unknown, ECCC does not recommend reliance on any approach that would use a measurable decrease in the population of a species as an appropriate mitigation to address the residual significant effects of a Project.

Need for more details about the monitoring program

In order to assess the ability of the proposed adaptive management approach to detect adverse impacts and reverse them, ECCC would need more information about the indicators to be used in the monitoring program and how these will be linked to thresholds that will determine whether to proceed from phase one to phase two or to decommission and deconstruct the Project.

The additional information needed includes but is not limited to the following:

- Methods and timelines;
  - The indicators (including salinity, biofilm community composition, fatty acid content of biofilm, Western Sandpiper abundance and distribution), along with a justification of their selection, to be used to determine effects;
  - Design of the monitoring program, including the identification of a robust baseline upon which to monitor change, pre-determined management thresholds for specific, predictable actions, and the schedule of monitoring activities that considers the phases of construction and iterative and precautionary steps;

- An accurate model of where the effects are likely to start including the ecological mechanisms and predictions that can be assessed with the monitoring program; and

A monitoring program that considers inter-annual variability of biofilm and/or Western Sandpiper population fluctuations and the inter-annual variability in Fraser River discharge and its impact on salinity.

Need for a More Complete Set of Possible Adaptive Responses After Phase One

The only mitigation measures identified in the Part 2 submission involve the discontinuation or deconstruction of the Project. Making that decision would be difficult unless evidence of adverse effects are clearly identified in the short period of time proposed for monitoring. As such, ECCC is of the opinion that the Proponent should identify a range of possible responses to any evidence of adverse effects during phase one monitoring.

References

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Annex 1: ECCC Comments on VFPA's Proposed Modifications or Additions to Draft Federal Conditions

Comment #	Reference	Draft Condition #	Proponent Comment/Suggested Change to Draft Conditions (Proponent's proposed additions reflected in bold and italicized text and deletions in strikethrough)	ECCC Comment/Suggested Change to Draft Conditions (ECCC's proposed additions reflected by bold text and deletions in strikethrough)	ECCC Comment on Proponent Response/Suggested Change to Draft Conditions
1.	Part 1, Appendix 3.2-A, PDF p. 301	Condition 9.2.6 – Wetlands 'use wetland plant species native to the Designated Project area, of importance to Indigenous groups, and of value to migratory birds, including plant species salvaged in condition 9.3 if technically feasible'	'use, ***if technically feasible*****,** wetland plant species native to the Designated Project area, of importance to Indigenous groups **(*Roberts Bank*)**, and of value to migratory birds, including plant species salvaged in condition 9.3 ~~if technically feasible~~; and'		ECCC notes that moving 'technically feasible' to the front end of the condition may alter the intent, for example, resulting in the use of non-native species. Further, ECCC does not consider requirements for native species that are both important to Indigenous groups and of value to migratory birds as conflicting values, but rather as complementary to each other. ECCC does not recommend adoption of these revisions.

2.	Part 1 , Appendix 3.2-A, PDF p. 301-302	Condition 9.4.2 – Wetlands 'monitor, using a qualified professional, wetland compensation habitats, annually from the start of compensation and for five years and every ten years thereafter until performance standards have been met;'	'monitor, using a qualified professional, wetland compensation habitats ***that are not included in the offsetting plan required pursuant to condition 7.11***, ~~annually from the start of compensation and for five years and every ten years thereafter~~ ***at the same frequency as monitoring of offsetting habitats determined in the Fisheries Act Authorization*** until performance standards have been met;'	ECCC recommends the following revisions: 'monitor, using a qualified professional, wetland compensation habitats, *that are not included in the offsetting plan required pursuant to condition 7.11,* **annually from the start of compensation and for five years and every ten years thereafter** ~~at the same frequency as monitoring of offsetting habitats determined in the Fisheries Act authorization~~ until performance standards have been met'.	ECCC recommends that monitoring requirements be retained within this condition, and supports the addition of '*that are not included in the offsetting plan, required pursuant to condition 7.11*'. ECCC does not recommend that both plans have the same monitoring requirements as those that are dictated by DFO may not be adequate or applicable to the requirements for offsetting wetland function. ECCC recommends the condition retain the original monitoring requirements, but specify that this may be different than those required under Condition 7.11.
3.	RBT2 Draft Potential Conditions (CIAR #2086)	Condition 9.4.3 – Wetlands 'monitor the effects of the Designated	'monitor the effects of the ~~Designated Project~~ ***marine terminal, the widened*** ***causeway, and the expanded tug basin*** on	Monitor the effects of the Designated Project on wetlands predicted to be affected by the Designated project, including**, but not limited to**:	ECCC recommends the inclusion of "but not limited to" in Condition 9.4.3 to avoid misinterpretation during

	PDF p. 30 Part 1 , Appendix 3.2-A, PDF p. 302	Project on wetlands predicted to be affected by the Designated Project, including’	wetlands predicted to be affected by the ~~Designated Project~~ ***marine terminal, the widened causeway, and the*** ***expanded tug basin***, including:’		design and implementation.

4.	RBT2 Draft Potential Conditions (CIAR #2086) PDF p. 33 Part 2, Appendix D, PDF p. 66-67	Condition 10.14.2 – Biofilm 'collect, during the northern migration period of the Western sandpiper (*Calidris mauri*) prior to and throughout construction and the first three years of operation, fatty acids and carbohydrates of invertebrate prey and biofilm and chlorophyll for biofilm, and record and report as both concentration (measure per m^2) and content (measure per gram of dry sediment)'	'collect, during the northern migration period of the Western sandpiper (*Calidris mauri*) prior to and ~~throughout construction~~, ***following completion of the construction of the marine terminal containment dykes,*** and the first three years of operation, fatty acids and carbohydrates of invertebrate prey and biofilm and chlorophyll-***a*** for biofilm, and record and report as both concentration (measure per m2) and content (measure per gram of dry sediment);'	Collect, during the northern migration period of the Western sandpiper (*Calidris mauri*) prior to and throughout construction and the first three years of operation, fatty acids, **lipids,** and carbohydrates of invertebrate prey and biofilm, and **taxonomic composition and chlorophyll-a** for biofilm, and record and report as both concentration (measure per m2) and content (measure per gram of dry sediment);	ECCC's proposed additions to Condition 10.14.2 supports consistency between future monitoring and the baseline studies already conducted by the Proponent, as specified in Condition 10.14. Further, community composition of biofilm is a strong driver of the fatty acid content. Without this information, the Proponent will not be able to identify the specific species that should be targeted in restoration/remediation efforts. This correction maintains consistency with Condition 10.14.3, which specifically indicates measuring lipids in the collected samples. The proposed change by the Proponent would restrict monitoring to a specific period in the construction phase, which would lessen the probability of detecting an

					effect on biofilm that could occur during other phases in the construction, e.g., during an accidental spill. ECCC recommends retaining monitoring for the full construction period (i.e., retaining 'throughout construction').
5.	Part 2, Appendix D, PDF p. 65	10.2.1 and 10.2.2 - new condition proposed on applying the lessons learned in the biofilm	***10.2.1: In designing and implementing any biofilm habitat creation or enhancement, including any biofilm habitat creation or***		This proposed condition describes detailed reporting on the implementation of wetland compensation/biofilm remediation. Condition 10.2.2. appears to indicate

		manual (see next column for proposed text by the Proponent)	***enhancement included in any wetland compensation plan developed pursuant to condition 9.2 and any biofilm habitat creation or enhancement implemented as a mitigation measure pursuant to condition 2.5.5 or 9.4.4, the Proponent shall apply the methods and best practices documented pursuant to condition 10.2.*** ***10.2.2: If the methods and best practices documented pursuant to condition 10.2 cannot be applied to biofilm habitat creation or enhancement undertaken by the Proponent, the Proponent shall document the reasons and the alternative methods or practices applied. The***		that the Proponent is not necessarily beholden to apply the best practices as long as the reasons are detailed in a response to the Agency, Indigenous groups (Roberts Bank), and Environment and Climate Change Canada.

			Proponent shall provide the reasons and the alternative methods or practices applied to the Agency, Indigenous groups (Roberts Bank), and Environment and Climate Change Canada.		
6.	Part 2, Appendix D, PDF p. 68	10.XX - new condition proposed on the implementation of a biofilm remediation project (see next column for proposed text by the Proponent)	***10.XX: The Proponent shall develop, in consultation with Indigenous groups (Roberts Bank) and Environment and Climate Change Canada, and implement prior to operation of the project, biofilm habitat creation or enhancement to support the western sandpiper population within the Lower Mainland region.***		This newly proposed condition from the Proponent would commit the Proponent to implement a biofilm remediation project. The specific timing ('prior to operation') means that the remediation project could be implemented after the construction phase when potential Project effects would have taken place.

7.	Part 2, Appendix D, PDF p. 67	Condition 10.14.5 - follow-up monitoring and evaluation program for biofilm and shorebirds 'submit the follow-up program, including the planned sampling and analysis methodology, before it is implemented for review and approval by an independent tripartite technical review process composed of representatives, who have knowledge or experience	'submit the follow-up program, including the planned sampling and analysis methodology, before it is implemented for ***technical*** review ~~and approval~~ by ~~an~~ independent ***experts*** ~~tripartite technical review process composed of representatives,~~ who have knowledge or experience relative to biofilm monitoring, sampling***,*** and statistical analysis and who have been appointed by the Proponent, Environment and Climate Change Canada and other relevant authorities.' ***(new condition proposed by the Proponent) 10.14.5.1:***		ECCC advises that given the lack of consensus on biofilm science, an independent review process is needed to provide oversight and guidance. A formal administrative body like an Environmental Monitoring Committee or subcommittee thereof, with representation from appointed by the Proponent, Environment and Climate Change Canada and other relevant authorities, would be able to provide the technical independent advice in a transparent manner to ensure public trust in the process. In response to new conditions proposed by the Proponent in its Part 2 submission in relation to the Proponent's phased construction and

		relative to biofilm monitoring, sampling and statistical analysis and who have been appointed by the Proponent, Environment and Climate Change Canada and other relevant authorities'. 10.14.5.1 - new sub-condition on reporting on the follow-up program (see next column for proposed text by the Proponent)	***The Proponent shall undertake an impartial consideration of all views, information, and recommendations provided by the independent experts and shall provide a response in writing to the independent experts and to the Agency, Environment and Climate Change Canada, and Indigenous groups (Roberts Bank), which sets out how the views, information, and recommendations have, or have not, been integrated into the follow-up program, including a rationale for why the views, information, and recommendations have, or have not, been integrated.*** ***(new conditions proposed by the Proponent) 10.XX:***		monitoring approach, ECCC advises that there is a likelihood that population-level effects to Western Sandpipers could start to occur before they can be detected. The proposed monitoring timeline to detect changes to biofilm and Western Sandpiper during the phased construction approach for the terminal is defined in the Port's Part 2 submission to be months (PDF p. 60, CIAR # 3553), ECCC's expert view is that this timeline may not be long enough to collect appropriate data and detect adverse effects. An ecologically meaningful monitoring program capable of detecting population-level impacts must consider the annual timing of site use, inter-annual variation of populations and other ecological variables, and thus would require multi-year time scales. Without

			develop, in consultation with Indigenous groups (Roberts Bank), Environment and Climate Change Canada, and qualified internationally recognized experts that are in possession of specialist or expert information or knowledge with respect to biofilm ecology and other relevant disciplines, and implement prior to and during construction, a follow-up program to identify early signals of an immediate population level effect, if any, of the Designated Project on Western sandpiper (Calidris mauri). The Proponent shall implement the follow-up program in accordance with conditions 2.5 to 2.9. As part of the follow-up program, the Proponent shall:		this information, it will be very difficult to identify early signals of a population level effect. Considering that reversibility of impacts is unknown, ECCC does not recommend reliance on any approach that would use a measurable decrease in the population of a species as an appropriate mitigation to address the residual significant effects of a Project. Additionally, the proposed adaptive management does not address the very high risk to the Western Sandpiper. Key information gaps, including whether effects are reversible and an understanding of where and how effects are likely to start, make the proposed framework very high risk.

			10.XX.1: identify suitable monitoring parameters; ***10.XX.2: establish, prior to construction, baseline conditions for the parameters identified pursuant to condition 10.XX.1, based on pre-construction monitoring and/or by compiling publicly available data;*** ***10.XX.3: monitor, in the months immediately following construction of the east basin containment dyke of the marine terminal, the parameters identified pursuant to condition 10.XX.1 and compare these against the baseline established pursuant to condition 10.XX.2.***		