

**From:** Ben Bisset  
**To:** [Panel RBT2 / Commission RBT2 \(CEAA/ACEE\)](#)  
**Subject:** Addendum: Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area (Tsawwassen First Nation independent crab study)  
**Date:** December 20, 2017 3:00:17 PM  
**Attachments:** [image001.png](#)  
[A.2 Crab Abundance and Movement Study Addendum.pdf](#)

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Good morning,

On July 12, 2017, Tsawwassen First Nation (TFN) submitted to the Review Panel the Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area (i.e. the TFN independent study on crab and crab habitat). In our cover letter, we noted that TFN may choose to offer further comment at a later date on how removal of the Intermediate Transfer Pit (ITP) from the project design may change the study's findings. To that end, please find attached a memorandum that provides information about the effect of the removal of the ITP on the results of the study. The memorandum also responds to questions from the Vancouver Fraser Port Authority regarding the study's assumptions, approaches, statements, and conclusions.

Thank You

**Ben Bisset**  
**Manager, Strategic Policy and**  
**Intergovernmental Affairs**  
**Tsawwassen First Nation**



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# Memorandum



To: Roberts Bank Terminal 2 Project Independent Review Panel  
From: Ben Bisset, Manager of Strategic Policy and Intergovernmental Affairs, Tsawwassen First Nation  
Christopher Burns, M.Sc., R.P.Bio., Senior Fisheries Biologist, LGL Limited  
Elmar Plate, Ph.D., R.P.Bio., Senior Fisheries Biologist, LGL Limited  
Subject: Addendum: Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area  
Date: December 6, 2017  
cc: Port of Vancouver  
Bob Bocking, M.R.M., R.P.Bio., President & CEO, LGL Limited

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## Introduction

On August 18, 2017, the Port of Vancouver submitted a discussion memo to Tsawwassen First Nation regarding LGL Limited's *Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area* (Burns et al. 2017). Upon receiving the discussion memo, Tsawwassen First Nation and LGL Limited reviewed the memo and drafted written responses. Tsawwassen First Nation and LGL Limited met with the Port of Vancouver on September 12, 2017 to discuss the comment responses.

The intent of this memorandum is to provide the Roberts Bank Terminal 2 Project Independent Review Panel with 1) clarification of LGL Limited's *Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area* study assumptions, approaches, statements, and conclusions; and 2) how the removal of the Intermediate Transfer Pit (ITP) footprint changes LGL Limited's crab study results. Comment responses are provided below and follow the structure provided in Port of Vancouver's discussion memo (dated August 18, 2017).

## Part A: Questions Pertaining to Study Assumptions, Approaches, Statements and Conclusions

### Comment 1:

#### Navigational Closure Area (NCA) boundary clarification

- Which existing NCA has been applied to this study (the existing NCA for recreational crab harvesting or the existing NCA for commercial crab harvesting)?
- Do the study results pertaining to crab abundance (CPUE), crab movements and associated biological characteristics of crab in the "proposed expanded NCA" include the portion of the proposed NCA for construction only, or operations?

- Do interview results with fisherman to determine crab harvesting extent, capabilities and preferences inside the proposed expanded NCA, include the portion of the proposed NCA for construction?
- What GIS sources were used to produce the spatial delineation of the existing NCA and proposed NCAs applied in the study?

The current NCA applied to this study includes both the current NCA for commercial crab harvesting and the current NCA for recreational crab harvesting. The NCA for commercial crab harvesting encompasses the current NCA for recreational crab harvesting as shown in the *Pacific region integrated fisheries management plan: Crab by trap: January 1 to December 31, 2016* (DFO 2016) and the Pacific Region Recreational Fishing Regulations (<http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/tidal-maree/a-s29-eng.html>).

However, it has come to our attention that the maps located in the *Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area* (Burns et al. 2017) only show the current NCA boundary for recreational crab harvesting. In addition, due to the omission of the current commercial crab harvesting NCA in the maps, the current recreational crab harvesting NCA was used for the depth stratum area calculations of the current NCA and proposed expanded NCA (see Table 25 of Burns et al. 2017); and for FSC crab fishing area balance calculations (see Table 27 of Burns et al. 2017). These tables and maps have been updated based upon the current NCA boundary for commercial crab harvesting and are provided in this memo (Tables 1 and 2; Figures 1 and 2). Note that the Terminal 2 footprint area between 2-20 ha is slightly smaller (100.4 ha vs. 102.9 ha) in Tables 1 and 2 compared to the Terminal 2 footprint area between 2-20 ha presented in Burns et al. 2017 (Tables 25 and 27). This is due to a refinement in the bathymetry interpolation method to more accurately reflect the depth contours.

The study results pertaining to crab abundance (CPUE) in the “proposed expanded NCA” includes the portions of the proposed NCA where crab trap lines were specifically set (see Figure 1 of Burns et al. 2017). However, it is predicted that crab abundance would be less in portions of the proposed NCA where crab trap lines were not specifically set compared to inside the current NCA, at a similar depth, based upon the study’s results (see Section 3.1 of Burns et al. 2017). The study results pertaining to crab movement and biological characteristics in the “proposed expanded NCA” includes both the portion of the proposed NCA for operations and construction. This is based upon 1) movement data results show that crabs move freely through the entire study area, and 2) commercial crab harvesting currently occurs within the “proposed expanded NCA”.

The GIS sources used to produce the spatial delineation of the proposed expanded NCA were from screen shots of scaled maps located in the *Roberts Bank Terminal 2 Project: Environmental Impact Statement* (PMV 2015), which were then transferred to a GIS environment.

The interview results with fisherman to determine crab harvesting extent, capabilities and preferences inside the proposed expanded NCA does include the portion of the proposed NCA for construction and operations.

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Comment 2:

Request for comment/discussion on the fisherman interview results, including to what extent do the interview results reflect harvesting characteristics of FSC crab harvesters, commercial crab harvesters or both?

In 2016, a total of 10 crab fishermen were interviewed during this study. The results in of the study show that all of the crab fishermen participate in the FSC fishery, while 6 fishermen participate in both the FSC and commercial fishery (see Table 24 of Burns et al. 2017).

Within Tsawwassen First Nation, the number of FSC crab fishermen has increased from 6 to 12 between 2009 and 2015 (Blakley et al. 2016). For the commercial fishery, Tsawwassen First Nation may not relinquish more than five commercial crab licences on an annual basis. Commercial crab fishermen must comply with the regulations and requirements set out in the Tsawwassen Harvest Agreement (which came into effect in 2009 for the purposes of increasing the commercial fishing capacity of Tsawwassen First Nation) and any licence issued by Fisheries and Oceans Canada (Blakley et al. 2016).

Furthermore, all references to FSC fishery in the study are related to Tsawwassen First Nation FSC fishery, however, it is noted that other First Nations have substantial FSC harvests of crab from the study area (see page 18 of Burns et al. 2017).

Comment 3 and 4:

The current NCA at Roberts Bank was put into effect in 2009, which differs from reference to closure timing of 2007 in the report (p.18). How might this impact the study findings?

On page 18 the report states that: "Trends in harvest and effort show that after 2007, harvest began to decline in sub-area 29-6 due to implementation of the current navigational closure expansion (AICFA, 2016)." A discussion on what other factors were considered that may influence crab populations and in turn influence harvest landings over time, such as biotic factors (such as predation, competition, and food availability), abiotic factors (such as temperature, winds, and currents) and larger scale climatic-forcing regimes.

The report states that "Trends in harvest and effort show that after 2007, harvest began to decline in sub area 29-6 due to implementation of the current NCA in 2009 (Area I Crab Fisherman Association 2016)." The reference to the current NCA timing (i.e., 2009) is correct in the report.

It is acknowledged that other regional factors may influence crab abundance and harvest in Area 29 and subareas. These other factors may include: human (e.g., economics), biotic (e.g., predation, competition, and food availability), abiotic factors (e.g., temperature, winds, and currents), and larger scale climatic-forcing regimes (Rasmuson 2013; Hemmera 2014). An in-depth analysis of these factors specific to Area 29 and subareas are beyond the scope of this study.

Comment 5:

Page 18, 2nd paragraph, first sentence states "The Terminal 2 footprint and proposed expanded NCA will negatively impact the ability for FSC fishermen to access preferred harvest areas." Request for

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discussion on how the proposed expanded NCA will negatively impact the ability for FSC fishermen to access preferred harvest areas, and any mitigation suggestions?

Factors that negatively impact the ability for FSC fishermen to access preferred harvest areas are identified in the report (see pg. 18 of Burns et al. 2017). From the perspective of the FSC fishermen, there was a general consensus that the Terminal 2 development would have a negative impact on FSC harvest, and the development would result in a loss of high quality crab habitat due to 1) increased boat traffic that will cause a displacement of traps to lower quality areas; 2) the fact that the majority of the proposed expanded NCA is in very shallow (<2 m) or deep water habitat (>50 m) that cannot be fished due to gear limitations; and 3) the proposed expanded NCA along the northern edge of Deltaport and the causeway is low quality crab habitat due to silt deposition.

## **Part B: Questions on Further Analysis / Potential Mitigation / Monitoring / Follow-up Program?**

### Comment 1:

Can more detail be provided on the specific gear limitations that limit crab harvesting to deeper depths?

Do these limitations apply to FSC crab harvesting, or do they also apply to commercial crab harvesting?

What type/different gear would assist with crab harvesting at deeper depths?

The results of this study show that a high proportion of the proposed expanded NCA is in deep water (>50 m) that FSC fishermen cannot fish due to gear limitations. Gear limitations include lack of hydraulic gear, power supply, and boat size. The study results reflect the current state of FSC fishery equipment, and how and where participants in this fishery choose to fish for crabs within the study area. Regarding options for improved fishing ability for crab harvesters, TFN needs to consult internally and with TFN crab fishers before responding.

### Comment 2:

Are there suggestions regarding the configuration of the proposed NCA expansion? Are there areas not currently captured within the proposed NCA expansion that TFN would like to see included/excluded?

At this point in time, Tsawwassen First Nation cannot comment upon a reconfiguration of the proposed NCA expansion. Tsawwassen First Nation will discuss potential reconfiguration of the proposed NCA expansion with their Natural Resource Council in future meetings.

### Comment 3:

As identified in the study covering letter, the study was completed prior to the VFPA's June 27, 2017 update stating that the ITP is no longer required as a temporary storage location to support RBT2 Project construction. Discussion on how ITP update may change the LGL study analysis, and additional analysis required.

Given the ITP is no longer required as a temporary storage location, the depth stratum area calculations of the project footprint, current NCA and proposed expanded NCA (see Table 25 of Burns et al. 2017) and for FSC crab fishing area balance calculations (see Table 27 of Burns et al. 2017) were reanalyzed and provided in this memo (Tables 1 and 2; Figures 1 and 2). Given these project changes, as well as updates using the current commercial crab harvesting NCA, the updated FSC crab fishing

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area balance calculation results show greater fishing area losses than gains compared to the previous FSC crab fishing area balance calculations.

Comment 4:

As discussed in the report, it appears that the current NCA is acting as a partial marine protected area and is providing harvest rates of almost 3 times as high as outside the current NCA for the FSC fishery. It is also noted from the LGL report that while the proposed NCA expansion is larger than the current NCA, it includes areas where the FSC fishery may not be able to fish (areas with depth less than 2m and areas with depths greater than 50m) that could be considered 'productivity buffers'. Would there be value in further analysis of the relative productivity gained in these 'productivity buffers' using data gathered during the LGL study?

An analysis of the relative productivity gained from potential 'productivity buffers' is beyond the scope of this study, and it is uncertain if the data collected from this study will support such an analysis.

## **Conclusion**

This concludes Tsawwassen First Nation and LGL Limited's written response to the Port of Vancouver's discussion memo regarding the *Dungeness Crab Abundance and Movement Study in the Roberts Bank Terminal 2 Project Area* (Burns et al. 2017). We trust that this memorandum provides the Roberts Bank Terminal 2 Project Independent Review Panel with 1) clarification of TFN/LGL Limited's crab study assumptions, approaches, statements, and conclusions; and 2) how the removal of the ITP footprint alters the crab study results.

## **Attachments**

Figure 1. Location of the current commercial NCA and proposed expanded NCA for construction and operations.

Figure 2. Location of optimal FSC fishermen crab fishing depths (2-20 m) within the current commercial NCA, proposed expanded commercial NCA (construction and operations), and Terminal 2 footprint.

Table 1. Summary the current NCA, proposed expanded NCA, and Terminal footprint by depth stratum (depth strata determined based upon available bathymetry data).

Table 2. Summary of FSC crab fishing area balance.

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## References

- Blakley, A. C., K. K. English, and L. Cassidy. 2016. Tsawwassen First Nation post-season fisheries report, 2015. Prepared by LGL Limited, Sidney, BC, and Tsawwassen Fisheries Department, Tsawwassen, BC
- Burns, C. W., E. Plate, and R. Bocking. 2017. Dungeness Crab abundance and movement study in the Roberts Bank Terminal 2 Project area. Prepared for Tsawwassen First Nation, Sidney, BC.
- DFO (Fisheries and Oceans Canada). 2016c. Pacific region integrated fisheries management plan: Crab by trap: January 1 to December 31, 2016.
- Hemmera. 2014. Roberts Bank Terminal 2 Technical Data Report: Marine invertebrates Dungeness Crab productivity. Prepared for Port Metro Vancouver, Vancouver, BC.
- Port Metro Vancouver (PMV). 2015. Roberts Bank Terminal 2 Project: Environmental impact statement. Prepared for Port Metro Vancouver, Vancouver, BC.
- Rasmuson, L. K. 2013. The biology, ecology and fishery of the Dungeness Crab, Cancer magister. Pages 95-148 in M. Lesser, editor. *Advances in marine biology*. Academic Press, Burlington, MA.
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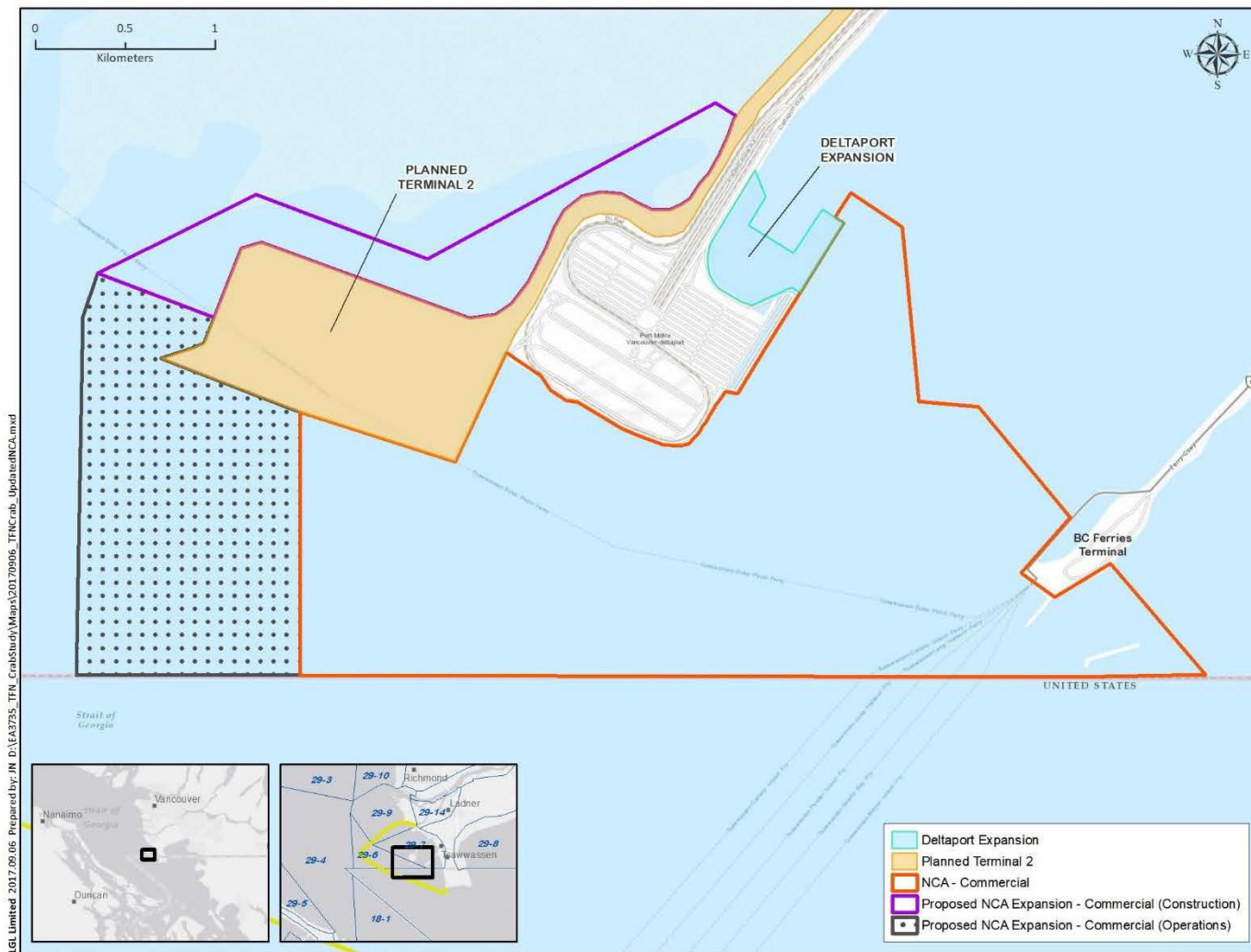


Figure 1. Location of the current commercial NCA and proposed expanded NCA for construction and operations. Note that the construction NCA overlaps with the operations NCA.



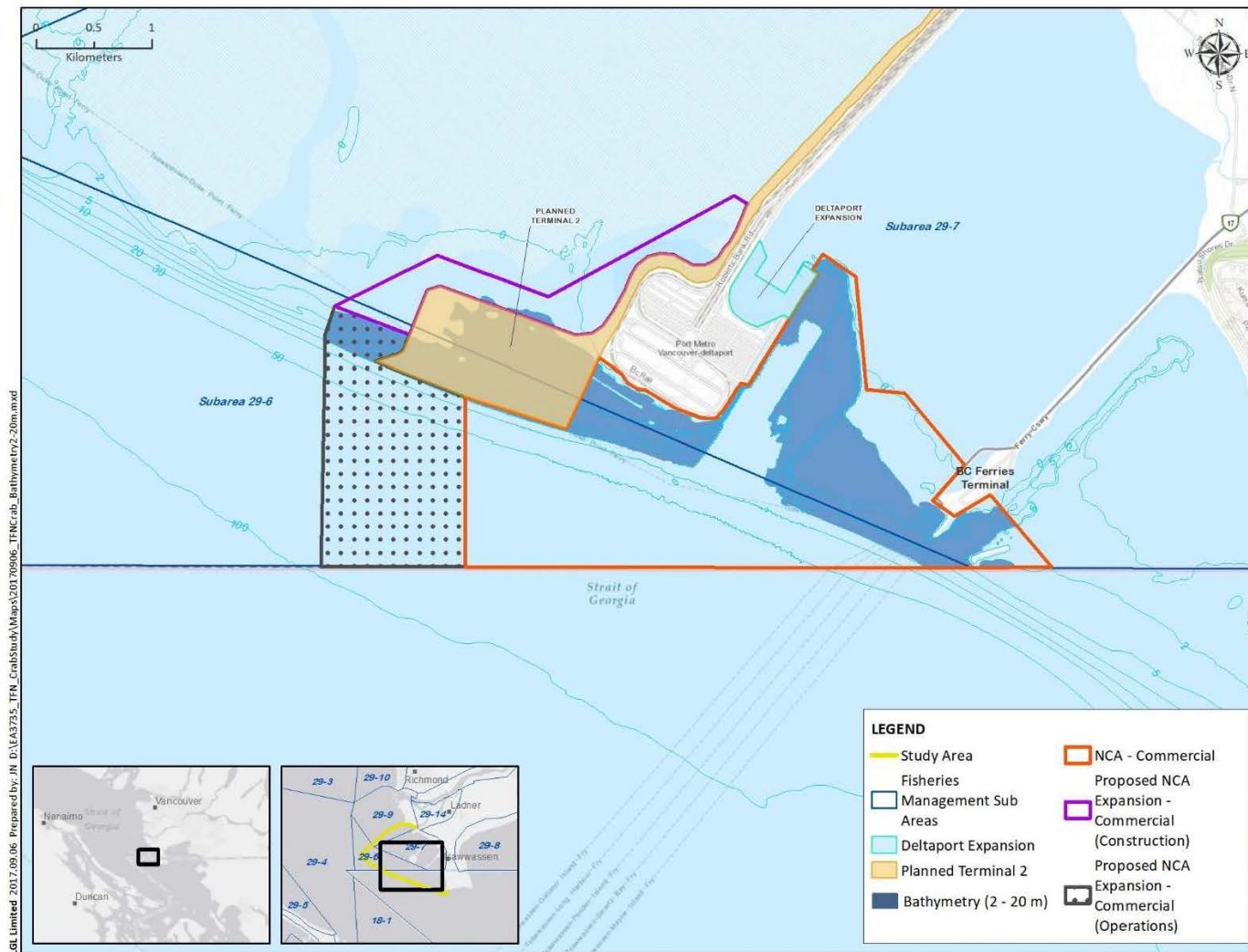


Figure 2. Location of optimal FSC fishermen crab fishing depths (2-20 m) within the current commercial NCA, proposed expanded commercial NCA (construction and operations), and Terminal 2 footprint. Note that the construction NCA overlaps with the operations NCA.

Table 1 Summary the current commercial NCA, proposed expanded commercial NCA, and Terminal footprint by depth stratum (depth strata determined based upon available bathymetry data).

Parameter	Location	Depth Stratum (m)							Total
		0-2	2-5	5-10	10-20	20-30	30-50	50-100	
Area (ha)	Current Commercial NCA	83.1	84.2	60.7	106.4	95.2	86.1	189.2	705.0
	Proposed Expanded Commercial NCA (Construction Only)	106.1	11.7	5.7	6.4	10.1	27.2	169.1	336.1
	Proposed Expanded Commercial NCA (Operations Only)	1.1	8.9	5.7	6.4	10.1	27.2	169.1	228.4
	Terminal 2 Footprint	72.1	76.8	13.7	9.9	-	-	-	172.5
Percentage of Total Area (%)	Current Commercial NCA	6.8%	6.9%	5.0%	8.8%	7.8%	7.1%	15.6%	58.1%
	Proposed Expanded Commercial NCA (Construction Only)	8.7%	1.0%	0.5%	0.5%	0.8%	2.2%	13.9%	27.7%
	Proposed Expanded Commercial NCA (Operations Only)	0.1%	0.7%	0.5%	0.5%	0.8%	2.2%	13.9%	18.8%
	Terminal 2 Footprint	5.9%	6.3%	1.1%	0.8%	0.0%	0.0%	0.0%	14.2%

Table 2 Summary of FSC crab fishing area balance.

Parameter	Location	Depth Stratum	
		Optimal Crab Fishing Depth (2–20 m)	Accessible Crab Fishing Depth (2–50 m)
Area Loss (ha)	Terminal 2 Footprint	100.4	100.4
Area Gain (ha)	Proposed Expanded Commercial NCA (Construction Only)	23.8	61.1
	Proposed Expanded Commercial NCA (Operations Only)	21.0	58.3
	Total (Construction Only)	0.24	0.61
Balance (Gain: Loss)	Total (Operations Only)	0.21	0.58