

Port Metro Vancouver's Roberts Bank Container Terminal 2 Is Not Sustainable – It Must Never Be Built



**Research Compiled by the Against
Port Expansion Community Group,
and Prepared for Submission to the
Federal Government Environmental
Assessment Review Panel**

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EXECUTIVE SUMMARY

This report discusses Port Metro Vancouver's proposal to add a second container terminal on Roberts Bank (T2) in terms of the sustainability of the proposed project. It has been prepared in readiness for submission to the Environmental Assessment Review Panel under the assessment process that the Federal Minister of Environment has established for the proposed Roberts Bank Terminal 2 Project in Delta, British Columbia.

The three pillars of sustainable development, the interconnections between the economics, the environment, and social well-being of the T2 project are discussed by reviewing the publically available material about this port development.

Port Metro Vancouver (PMV) intends to build a huge man-made island (one third the size of Stanley Park - Vancouver BC), for a second container terminal (T2) on Roberts Bank, next door to the existing three-berth Deltaport Container Terminal. This is slap-bang in the middle of the Fraser Estuary. Roberts Bank is a dynamic estuarine environment, the very fulcrum of one of the top ten "Most Important Bird Areas" in the world and the ecological crucible of the Fraser Estuary.

The Economics: By looking at the commercial and financial considerations the research shows that there are significant issues with the business case for T2. The projections for future growth appear to be highly inflated. The assumptions of effective capacity of existing West Coast container terminals and the potential for their expansion are not correctly portrayed. There are significant rail issues. There are huge potential risks for the financing of the project. If built it would have the dubious distinction of being one of the most expensive port projects in the world.

The Environment: In reviewing the values of the Roberts Bank ecosystem we believe that there is a real danger that T2 will result in irreparable harm to one of the most important areas of wildlife abundance and biodiversity in the whole of North America. The T2 project is likely to cause damage if not outright destruction of bird species, especially the Western Sandpiper. It will cause further disturbance to fish and crab habitat, to areas critical to the very survival of marine mammals, especially the already endangered Orca whale population. The risks are severe; the impacts will be immediate, irreversible and cannot be mitigated.

Social well being: The potential for further disruption to surrounding communities will result in increased air pollution; further traffic congestion; greater pressure on valuable agricultural land; and increased noise and light pollution.

The Against Port Expansion Community Group is not anti-trade, far from it. APE supports responsible trade that respects the environment and communities. It is our view that the T2 project is not sustainable and does not represent responsible trade. As a result in our view, and as demonstrated by the research documented in this report, Port Metro Vancouver's Roberts Bank Terminal Two development is not sustainable and must never be built.

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A. INTRODUCTION

Canada has four major container terminals on the West Coast with enough current capacity, as well as expansion potential, at its current terminals to support Canada's trading needs for many years to come. Canada does not need another West Coast container terminal and especially not T2, which would be hugely damaging to the Roberts Bank environment - recognized in Canada and internationally as one of the most important ecosystems in Canada. The T2 business plan is open to serious question, with the many issues identified in this report needing further clarification and explanation. If built T2 would be one of the most expensive container ports anywhere in the world.

Environmental degradation that would result from T2 would, in our opinion, be immediate, severe and irreversible and could not be mitigated. Roberts Bank supports a wide range of biodiversity and wildlife abundance. It is recognized as the most Important Bird Area (IBA) in Canada and is one of the top ten IBAs in the world. It is a critical stop for hundreds of thousands of migratory birds on the Pacific Flyway. Environment Canada has already stated that further industrial (port) development on Roberts Bank could break the chain of the Pacific Flyway.

This paper analyzes the Port Metro Vancouver (PMV) proposal to build T2 in terms of the three pillars of sustainable development, being economic, environmental and social/community aspects (as adopted by the United Nations). It demonstrates that PMV's Roberts Bank Container Terminal 2 Is not sustainable – it must never be built.

B. ECONOMICS - COMMERCIAL AND FINANCIAL CONSIDERATIONS

1. Market Projections

1.1 PMV Consistently Overestimates Demand to Justify T2

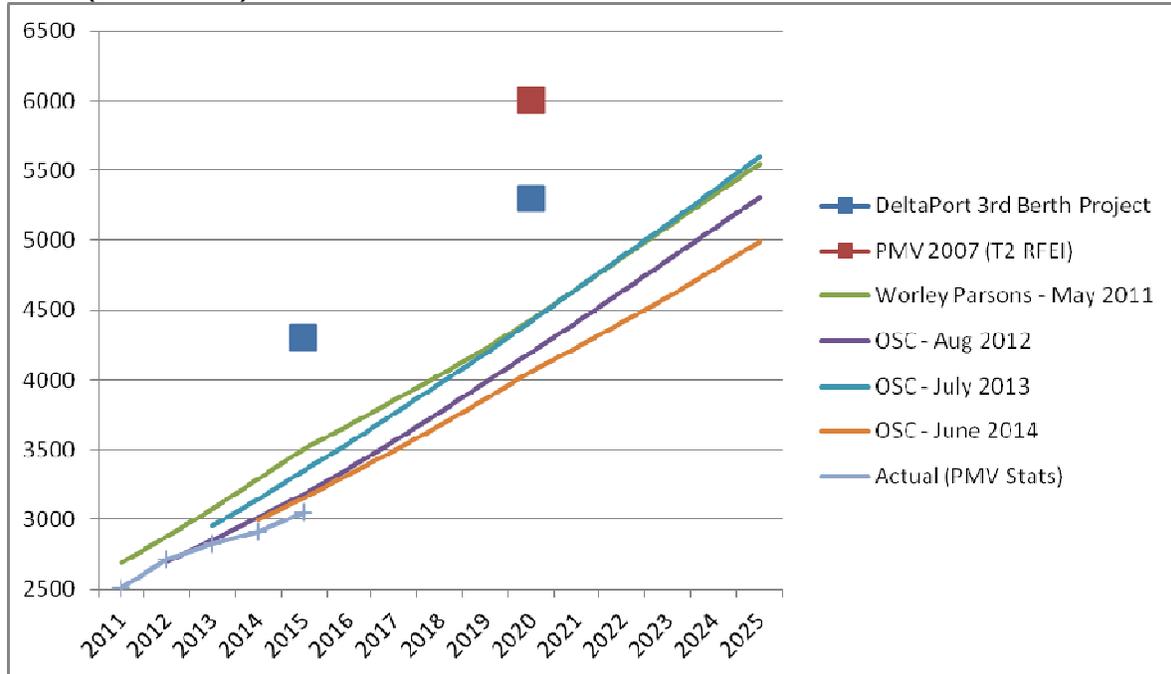
When PMV first contemplated the T2 project back in 2007, they forecast that Vancouver container throughput would hit a massive 6 million TEU (Twenty Foot Equivalent Units) by 2020. However, based on mid 2015 figures¹, the annual handling in the port will only be about 3.05 million TEU (and that is with significant diversions in 2015 of US container traffic to Vancouver area ports due to US labour issues).

This repeated over-estimation of future volume forecasts is not limited to the 2007 bid for T2. When PMV was seeking approval for Deltaport's 3rd Berth Project, they forecast that throughput would reach 4.3 million TEU by 2015, whereas it will likely only just surpass 3 million TEU this year. And since PMV started reconsidering the T2 project, back in 2011, they have issued four separate forecasts each of which has failed to come close to actual throughput development. A 2011 study by Worley Parsons over-estimated 2015 throughputs by almost 500,000 TEU, and even the latest June 2014 study by Ocean Shipping Consultants (OSC) will likely be wrong by over 100,000 TEU just one year later in 2015.

Note 1 – see Appendix A #1 for link to actual volumes

On average, the forecasts prepared on behalf of PMV over the past 4 years will have overestimated 2015 container throughput by a massive 250,000 TEU, or almost 10%.² The chart below clearly shows PMV's repeated pattern of over-estimated demand in Vancouver:

TEUs (thousands)



Why is it then that the container forecasts consistently exceed the actual performance? Issues with the forecast include:

- PMV appears to underestimate the potential of Prince Rupert's port:
 - The 2014 Ocean Shipping Consultants (OSC) study forecast that Pacific Gateway volumes would reach 6 million TEU by 2025 and that Vancouver would handle 5 million TEU of that, leaving Prince Rupert with just 1 million TEU of throughput in 2025²
 - With Prince Rupert³ on track to handle about 800,000 TEU in 2015 (based on May YTD statistics), with its Phase-II North expansion definitely available by 2017, and with the Phase-II South expansion likely complete by about 2021 or 2022, it will have at least a 2 million TEU capacity.
- What appear to be overly optimistic GDP growth figures for Canada are used (+2.51% in 2015, for example, versus 1.1% in the latest Bank of Canada forecast), together with factoring in high Chinese growth assumptions (7.5% in 2015, versus Goldman Sachs recent estimate of 6.8%) that then generate higher container volume forecasts in the short term, which then get compounded in future years growth projections. The GDP / throughput multiplier of 1.7 times GDP is also optimistic given that there is little conversion of break-bulk to containers still to occur.
- PMV focuses on very strong container growth forecasts over the coming 5 years (2015-2020), including "rail additions", in order to increase the base volumes and justify the need for T2. OSC projected growth of over 6% in 2014 (the actual was 3.1%) and growth exceeding 5% every year up to 2020.

Note 2 – see Appendix A #2 for link to forecasts

Note 3 – see Appendix A #3 for link to Prince Rupert data

Although the Vancouver Compound Annual Growth Rate (CAGR) has been about 6.6% since 2000, this included a period of rapid growth in containerization and trade with China, which has now slowed dramatically. For the period 2006-2015 the CAGR has been a much lower 3.7%.

1.2 PMV's Assumptions on Effective Capacity are Questionable

PMV introduces a term described as "effective capacity" (defined as 85% of actual capacity) as a maximum operating basis for terminals. For example, in a market with 5 million TEU of capacity, this assumption of "effective capacity" serves to artificially improve the demand-supply scenario by about 750,000 TEU. Is this a means to demonstrate that T2 is not creating excess capacity?

Current operating conditions in Vancouver, Prince Rupert and many other terminals around the world do not support the assumption of an 85% effective capacity. For example Prince Rupert is operating at close to 95% utilization, despite being in the middle of a major expansion project.

In a real-world environment where terminals are able to achieve virtually 100% capacity utilization (as opposed to the 85% used by PMV and OSC), the 2014 OSC forecast shows that 2023 throughput would be about 4.5 million TEU against capacity of about 7 million TEU (or just 64% capacity utilization). PMV has announced intentions to phase in T2 capacity deployment, which would help reduce this massive over-capacity, but also not considered is that OSC's traffic forecasts appear to be optimistic, so actual throughputs closer to 4.0 million TEU in 2023 are more likely.

1.3 PMV Has Accelerated T2 Timelines Despite Slower Than Projected Growth

In 2007 when PMV first promoted the T2 project, they projected average annual growth of about 7.5% per annum, with a resultant growth of throughput from 2.3 million TEU in 2007 to 6 million TEU in 2020; it was envisaged that T2 would be delivered to the market by about 2018 (9 year development timeframe) in order to meet that projected demand of 6 million TEU in 2020.

In the intervening period between 2008 and 2014, the actual throughput growth rate (CAGR) in Vancouver has been just 2.6%, far below the 7.5% originally envisaged by PMV. Such a low growth rate would naturally suggest that the need for T2 would be deferred for decades, if not forever. And yet, PMV is planning to have T2 delivered to the market by 2023, in spite of the fact that the port's container growth forecasts have been **more than double** the actual container growth since 2007.

And whereas PMV originally envisaged that T2 would commence operations when throughput was reaching 6 million TEU (during the 2007 tender process), PMV now plans to introduce T2 in 2023 when even OSC's optimistic forecasts suggest that volumes will be less than 4.5 million TEU.

There appears to be no explanation as to:

- Why, whereas previously T2 was forecast to be required when volumes approached 6 million TEU, PMV now claims that T2 should be delivered to market when volumes will be only 4.5 million TEU, despite significantly lower observed growth rates.
- Why additional capacity created by Deltaport's Terminal Road and Rail Improvement Project (DTTRIP) and the proposed Centerm expansion (over 1 million TEU additions in total) has not deferred the need for T2, but instead

advanced that requirement to when throughput is projected to be just 4.5 million TEU. Intuitive logic would suggest that the trigger for T2 should actually have increased to closer to 7 million TEU.

- Why the rapid market acceptance, throughput growth, and planned multiple expansion phases of Prince Rupert (that will likely have more than 2 million TEU of capacity before 2023) has not further reduced the need for T2.

Given the questionable economic rationale for the T2 project, why is it then that PMV is continuing to promote the T2 project? Is there a concern that Prince Rupert is capturing a share of container traffic that might otherwise have been handled in Vancouver? Why is PMV continuing to ignore the reality that Prince Rupert, coupled with the Vancouver terminal expansions, provide sufficient capacity to satisfy Canada's trading needs without ever building T2?

2. Rail Issues

2.1 CN / CP Rail Capacity in Southern British Columbia

Recent years have repeatedly demonstrated the constraints facing rail capacity in the Southern BC corridor from Vancouver through the Rockies. In this region, CN and CP already collaborate to run eastbound trains on one railway's line and westbound trains on the other railway's line in order to maximize utilization levels, and yet congestion is a perennial problem. While congestion is often caused by natural factors such as adverse winter weather, at many times this congestion has simply been due to excess demand for rail service.

Until the recent downturn in oil markets, movements of oil by rail had grown exponentially, and resulted in squeezing out of both grain and container movements. While the government intervened in terms of grain movements, little was done to ensure adequate capacity for container handling.

The T2 project, with its projected 2.5 million TEU of additional capacity, would create additional rail demand for about 2 million TEU of additional rail volumes (for cargoes moving both to Eastern Canada and the US), given that a large percentage of the incremental traffic would have to come from US traffic. Ignoring peaking factors and assuming 800 TEU per train, it would imply a need for an additional 7 trains per day (3-4 in each direction) just to accommodate T2. After considering peaking factors and the fact that not all trains will move fully loaded, it is likely that T2 would generate an additional 4-5 trains per day in each direction. Where are the PMV studies to show that there will be sufficient rail capacity to handle this demand without causing the entire rail network to collapse? Can CN and CP railways handle this additional capacity?

2.2 T2 Only Needed for US Rail Movements

2015 will be a milestone year for Canada's west coast ports of Vancouver and Prince Rupert, with US rail volumes expected to surpass 1 million TEU, which equates to over 25% of total West Coast container volumes. While Prince Rupert's exponential growth can be attributed to its high levels of efficiency, uncongested rail line, and strong support from CN, much of this US rail growth in Vancouver has been related to the 2014 / 2015 labour unrest in the main USWC ports of LA / LB, Oakland and Seattle-Tacoma. Seattle-Tacoma handled 3.4 million TEUs in 2014. Their proposed improvements, to be completed by 2020, will increase capacity to 6 million TEUs. Hence there will be more than enough capacity in the Pacific Northwest for years to come and no justification for the T2 project that is almost entirely dependent on poaching more U.S. bound cargo.

Whatever the reasons, a number of things are clear:

- Given that Canada’s economic growth has been stalled for much of the past 12 months, the 2015 YTD growth in PMV’s container handling is virtually all accounted for by US Rail volumes
- At the port’s last AGM, Robin Silvester, President and CEO of PMV, claimed “Canada’s trade is growing ... Our job, as a port authority, is to respond to that growing demand and make sure the port is ready to handle it.”
 - In fact, most of the growth at PMV (and Prince Rupert) has been due to increased share of US rail volumes – 1-2% domestic economic growth will NEVER justify the proposed 2.5 million TEU of new capacity at T2
 - PMV has failed to provide any updated breakdowns of US Rail traffic. Would this show that T2 is purely required to handle US volumes?

Even based on 2015 statistics, Canada’s West Coast gateway ports (Vancouver and Prince Rupert) have about 1.5 million TEU of spare capacity to handle Canada’s trade requirements today (over 1 million TEU of US Rail, plus spare capacity in the existing terminals in Vancouver and Prince Rupert). Prince Rupert Phase-II North will add up to 800,000 TEU of new capacity, while expansion projects in Vancouver will add a further 1 million TEU by 2020 at latest. All told, there will be 3.3 million TEU of available West Coast capacity by 2020 (ignoring growth between now and 2020). T2’s 2.5 million TEU of capacity simply is not required to meet “Canada’s growing trade”. It can only be justified based on funneling US Rail traffic through Vancouver, despite the fact that US West Coast ports are upgrading so that they can handle these US containers.

The demand-supply analysis below clearly demonstrates this point; in 2023, the year that PMV claims that T2 will be required to handle Canada’s growing trade, it is estimated that there will be over 3.2 million TEU of **spare capacity** to handle Canada’s domestic trade (without considering T2) once US Rail volumes are excluded.

WEST COAST CANADA: DEMAND-SUPPLY ANALYSIS FOR CANADIAN TRAFFIC													
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2046	
Demand Estimates													
Vancouver Demand	2,913	3,051											
Prince Rupert Demand	618	782											
Total Demand	3,531	3,833	-	-	-	-	-	-	-	-	-	-	
Less: Estimated US Rail	900	1,050											
Canada Demand *	2,631	2,783	2,867	2,953	3,041	3,133	3,227	3,323	3,423	3,526		6,959	
* Assumed 3% future growth													
Supply Estimates													
Vancouver Capacity													
Centerm	800	800	800	800	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	
Vanterm	750	750	750	750	750	750	750	750	750	750	750	750	
Deltaport	1,800	1,800	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	
FSD	400	400	-	-	-	-	-	-	-	-	-	-	
Prince Rupert Capacity													
Fairview	850	850	850	1,600	1,600	1,600	2,400	2,400	2,400	2,400	2,400	2,400	
Total Supply	4,600	4,600	4,800	5,550	6,000	6,000	6,800	6,800	6,800	6,800	6,800	6,800	
Excess Canadian Port Capacity													
to Handle Canadian Volumes	1,969	1,817	1,933	2,597	2,959	2,867	3,573	3,477	3,377	3,274		(159)	

Extrapolating demand for Canadian container handling at 3% (a reasonable growth estimate), the same analysis clearly demonstrates that T2 would not be required until 2046 (a full 30 years from now). In that intervening period, a host of structural or market changes (increased productivity of existing terminals, other expansion projects, new ports in Northern BC etc.) could further delay or negate the requirement for T2.

PMV claims on their website that “Our mandate is to facilitate Canada’s trade objectives, ensuring goods are moved safely, while protecting the environment and

considering local communities.” It would appear that the T2 project fails to meet any of the key points of their own mandate:

- T2 is clearly not required to “facilitate Canada’s trade objectives”, unless Canada’s objective is to be a major gateway for US containers;
- T2 not only doesn’t protect the environment, but may wreak significant environmental damage on Roberts Bank; and
- T2 is opposed by the local communities, due to environmental concerns and the intrusive increase in road and rail congestion, as well as the light, noise and air pollution effects.

The catastrophic environmental damage that T2 may wreak on the fragile Roberts Bank environment is unjustifiable even to handle Canadian trade growth given the capacity alternatives that exist at Prince Rupert. However, when considering that the Pacific Gateway would need to handle 2-3 million TEU of US Rail traffic in order for T2 to even possibly be commercially viable (virtually the same capacity as T2), inflicting this type of environmental harm on Roberts Bank simply to handle more US Rail cargo would be an absolute travesty.

2.3 PMV Admits 0% Growth in Canadian Traffic Through Vancouver

In a recent media statement by Robin Silvester, President and CEO of PMV, he admitted that in 2015, 25% of total Vancouver container movements will be for US Rail traffic. (see <http://business.financialpost.com/news/port-metro-vancouver-expects-to-retain-business-following-u-s-ports-labour-dispute>)

Based on annualized volume (Jul YTD) of 3.06M TEU, this would imply US Rail volumes of 765,000 TEU and Canadian volumes of 2.295M TEU. By comparison, the 2014 OSC Market Study⁴ prepared for PMV indicates that Vancouver handled 2.344M TEU of Canadian traffic back in 2008. Between 2008 and 2015, there has been ZERO GROWTH in Canadian container traffic through Vancouver (that growth has gone to Prince Rupert), and yet Mr. Silvester claims that 2.5 million TEU of new capacity is needed to handle Canadian container growth at Vancouver.

(TEU)	2007	2008	2009	2010	2011	2012	2013	2014	2015
Canada Traffic	2,163,800	2,344,400	2,028,700	2,322,800	2,288,000	2,372,900	2,399,100	N/A	2,295,445
US Traffic	143,500	147,700	123,800	191,500	219,000	340,300	426,400	N/A	765,148
Total Traffic	2,307,300	2,492,100	2,152,500	2,514,300	2,507,000	2,713,200	2,825,500	N/A	3,060,593
US Share	6.2%	5.9%	5.8%	7.6%	8.7%	12.5%	15.1%	N/A	25%
Sources:									
	OSC 2014 Report, Table B.1 (2007-2013 data)								
	Robin Silvester, "Port's stats indicate solid growth, Delta Optimist, Aug 26 (2015 US share)								
	PMV July 2015 Container statistics, annualized (2015 Total Traffic)								

In the same statement, Mr. Silvester claimed that Canadian container volumes through Vancouver have been growing at 4%, but has failed to provide any other statistics to prove this. While Vancouver may have achieved 4% (or greater) growth in Canadian traffic prior to 2008, the combined effects of i) lower economic growth levels post-crisis, ii) limited additional conversion of break-bulk to containers, and iii) strong market acceptance for Prince Rupert have all conspired to drive the growth rate for Canadian containerized cargo (through Vancouver) down to ZERO PERCENT over the past seven years. In conclusion, there is simply no business case to require T2 to handle Canadian container traffic in Vancouver, particularly when the existing Vancouver terminals already have over 2 million TEU of spare capacity (between current spare capacity, planned expansions, and current US Rail movements).

Note 4 – see Appendix A #2 for link to forecasts

3. Alternative Capacity Creation

3.1 Existing PMV Terminals Have Cheaper Capacity Expansion Opportunities

When Deltaport added its third berth it increased its capacity to 2.1 million TEUs, according to Transport Canada's *Pacific Coast Container Terminal Competitiveness Study, 2008*. Now Global Container Terminals' (GCT) DTTRIP project at Deltaport, to be completed imminently, will add about 600,000 TEU of capacity at an estimated cost of C\$250 million, or \$417 per TEU of capacity created. This will increase Deltaport's total capacity to between 2.4 and 2.7 million TEU. The project is being achieved without any land reclamation or berth extensions, and together with the currently ongoing expansion at Prince Rupert, will handle market growth for many years to come.

GCT's other terminal in Vancouver, Vanterm, also has medium-term expansion capability. Although today it is constrained on both sides by other terminals, there are plans over the medium term (i.e. mid 2020s) to expand this facility, although details have not yet been released to the market.

Finally, PMV has announced plans to expand DP World's Centerm facility in cooperation with the operator. The expansion would potentially increase capacity to about 1.3 million TEU, again at a much lower cost per TEU than the proposed T2 facility (similar to the DTTRIP cost). Furthermore, if Centerm can replicate Vanterm's high (92%+) utilization level, Centerm could add about 150,000 TEU of effective capacity to the market without any additional investment.

These projects and efficiency improvements will add combined capacity of about 1.25 million TEU of capacity in Vancouver alone over the next 3-5 years, with an average cost of far less than \$500 per TEU.

3.2 Prince Rupert P-II South is Cheaper, Quicker to Market and Not Locally Opposed

In addition to the 750,000 TEU Phase-II North expansion already underway, Prince Rupert's Fairview Terminal has the capability to add a 3rd berth at significantly lower cost and in a much quicker timeframe than PMV's T2 project. This 3rd berth, which would increase Prince Rupert's capacity to about 2.5 million TEU, has already been environmentally permitted, and the new operator is likely to start the planning process within the next 3-6 months.

With a construction period of just 2-3 years, and a cost (on a per TEU of capacity basis) that is a fraction of PMV's T2 project, this further capacity will be delivered to the market well before T2 could ever be built, will be able to compete for market share much more effectively (given the much lower development costs), and is strongly supported by the local community because it does not have the same potential negative environmental impacts as T2.

3.3 Prince Rupert has Even More Cheap Capacity for the Future

Prince Rupert Port Authority (PRPA) has announced plans to develop another terminal at Kaien Island for handling break-bulk traffic expected to be generated by large-scale projects in the energy sector in BC and Alberta over the next 5-10 years. The site would have over 1,000 meters of berth and 95 hectares of storage area, with drafts alongside of at least 20 meters.

While it is not clear whether this terminal will be developed in the short term, its long-term development plan (15-20 years) would inevitably involve converting some or all of it to handle containers once the major demand for energy-sector project cargo has been satisfied. A terminal of this size could add a further approximate 2.5 million TEU of capacity to the West Coast Canada market. While the cost of developing this terminal is not yet known, it will inevitably cost less (both in dollar terms and environmental impact) than the T2 project proposed by PMV.

3.4 Cheaper, Long-Term Potential Capacity In Vancouver

Whilst in no way supporting more container terminal facilities on the Fraser River, should there ever be a requirement in the long term future, (if demand were ever to materialize over the next 30-50 years), then there are better and much less destructive alternatives than T2, which has the potential for damaging the fragile ecological systems at Roberts Bank. For example PMV themselves have identified potential plans to develop the Fraser Richmond site that is currently used for non-marine container activities. This site has on-dock rail connectivity, nearby highway, about 1,300 meters of waterfront for berth development, and over 100 acres of land area. A facility of this size could probably handle close to 2 million TEU and would almost certainly cost less than \$1 billion to develop (less than \$500 per TEU of capacity).

Whilst we also strongly believe there is no business case to require the construction of another terminal on the Fraser River, in order to meet long-term Canadian demand for container handling, the presence of this potential terminal clearly demonstrates that there are other alternatives.

4. Project Structure and Risks

4.1 Questionable Concession Fees for T2

Assuming over \$2 billion to be spent between PMV (approx. \$300 million for approvals) and the Infrastructure Developer (ID) on the project, the concession fees that the Terminal Operator will have to pay to PMV would appear to be questionable from a financial perspective.

If we assume, conservatively, a \$1.5 billion investment by the ID at a simple return of 7%, this would require annual payments to the ID of \$105 million. PMV requires a minimum return of 10% on any investments they make, which would imply that PMV would seek further payments (either concession fees or a share of wharfage) amounting to about \$30 million per annum, for total annual concession fees of about \$135 million. These fees will almost certainly have to be structured as a fixed fee, particularly in respect of amounts to satisfy the ID's payments. Fees would obviously be subject to inflation escalation.

With initial start-up volumes of about 1 million TEUs, that would equate to a fee of at least \$135 per TEU, against current revenue levels of about \$250 to \$300 per TEU in the market. The Terminal Operator (TO), who would separately be making an investment of about \$500 million to \$1 billion in the facility, would be required to share close to 50% of gross revenues with PMV as concession fees. These levels of concession fees are questionable in any business environment, perhaps more so with one with high investment and operating costs.

Even at full utilization, and ignoring inflation in fees, the TO would be paying close to \$60 per TEU (over \$100 per box) in concession fees to PMV, or about 25% of revenues. Of course, these calculations assume that the sudden influx of new capacity into the market would not have an adverse impact on revenue levels.

4.2 Labour Market Disruptions

T2, if ever developed, would likely be the first partially or fully automated container terminal in Canada, and would cause a massive disruption in what has been (for the past years) a very calm labour environment on the Canadian West Coast, free of the type of disputes that have plagued the US West Coast ports.

Given that in the early stages, most of T2's volume might simply be cannibalization from existing PMV terminals, the introduction of T2 would effectively result in a transfer of container handling from more labour intensive, non-automated terminals, with resultant job losses.

When containerization first appeared on the Canadian waterfront over a half century ago, the unions demanded (and secured) increased pension contributions to compensate for the job losses on the waterfront that would inevitably result from the conversion from break-bulk to container handling of cargoes. Today, the terminal operators are still burdened with those extra costs. Will the Terminal Operator at T2 have to face similar demands from the unions as a cost of implementing an automated system at T2?

4.3 Risky Project Structure with an Unreliable Intermediary

The proposed structure, with the Terminal Operator paying significant fixed concession fees to PMV (of over \$100 million per annum) and then PMV paying a portion of those fees to the Infrastructure Developer as a lease for availability of the infrastructure appears to introduce substantial risks, including:

- The ID will be required to commit to investing well over \$1 billion in an infrastructure project without any certainty that the Terminal Operator will actually perform:
 - Is there a risk that the successful bidder will withdraw from the project after being selected as the preferred bidder? In the previous attempt to tender this project, the successful bidder withdrew from the project after being selected as the preferred bidder.
 - The list of global operators that have withdrawn from projects after successfully bidding / winning a project is extensive, and includes projects in Greece (Thessaloniki), Ecuador (Manta and Posorja), India (JNPT), United States (Virginia and Port Everglades), Netherlands (Amsterdam), and the UK (Port Yarmouth). Could this happen at T2?
 - No amount of performance bonds, etc. can protect the ID from this risk. Can PMV back-stop the risk by guaranteeing payments to the ID?
- The annual payments from PMV to the ID will approximately equal or exceed PMV's entire annual profitability. Can PMV guarantee payments to the ID?
- If demand for container traffic does not meet PMV's projections and the TO abandons the project, there are virtually no other possible uses for the terminal (and certainly none that would justify the massive investment made in the site).

4.4 Inadequate Environmental Permitting

In their filings before the CEAA in 2015, PMV has sought to limit the scope of the Environmental Assessment to the areas directly under the “care and control of Port Metro Vancouver”. In seeking this limitation, PMV would be excused from evaluating the environmental impacts of the project on i) waterways used by ships to approach T2, ii) impacts on the Fraser Delta outside of the actual project site, iii) road traffic in the surrounding communities, or iv) rail movements throughout the lower BC mainland.

This limitation that PMV has sought from CEAA appears to be unprecedented in terms of Environmental Assessments in Canada. For example, when the Northern Gateway project went through the same process, the review area extended from the proposed port facilities in Kitimat about 150 kilometers out to open water beyond the outer islands. Even if the CEAA ignores their own precedent and exempts PMV from the norms for these types of reviews, it is almost certain that such an environmental permitting process would fail to meet the requirements of the Equator Principles for financing a project that may well inflict such significant environmental damage on the area.

5. Investment Costs

5.1 T2 – The Most Expensive Port Project in the World?

PMV’s T2 project looks to have the dubious distinction of being one of the most expensive port projects ever contemplated in the world.

The T2 project is forecast to cost C\$2.5 to C\$3 billion (this estimate was prepared before the C\$ declined precipitously in the past year), and would create about 2.5 million TEU of capacity. This massive greenfield investment would be spread over a period of 5-6 years, thereby introducing significant Interest During Construction costs during a period with no revenues. Even ignoring these factors plus the inevitable cost over-runs with a project of this magnitude, the gross cost could be over C\$1,000 per TEU of capacity created.

Some recent indicative greenfield and brownfield (expansion) transactions include:

- APM Terminals
 - \$1.5 billion in a 3.5 million TEU facility in Tema, Ghana (\$428 per TEU of capacity)
 - \$40 million in a 125,000 TEU expansion in Mobile, Alabama (\$320 per TEU)
 - \$1.3 billion in a 2.1 million TEU facility in Abidjan, Ivory Coast (\$620 per TEU)
- DP World
 - \$200 million in a 800,000 TEU facility in Mumbai, India (\$250 per TEU)
 - \$850 million in a 4 million TEU facility in Jebel Ali, Dubai (\$212 per TEU)
- ICTSI
 - \$600 million in a 1.2 million TEU expansion in Puerto Cortes, Honduras (\$500 per TEU)

The question has to be asked – why would experienced global port operators / investors, that deploy their capital around the world based on the relative attractiveness of competing port investment opportunities, choose to invest in the T2 project?

5.2 T2 Investment Cost is Mis-Aligned with Recent Canadian & Australian Market Transactions

The DP World/Maher transaction for the Fairview Terminal has established a clear valuation benchmark for port projects in Western Canada. Under that transaction, DP World acquired the existing 800,000 TEU facility (plus the Phase-II works already underway that will expand capacity to about 1.6 million TEU) for consideration of C\$580 million. Assuming about \$200 million for the P-II expansion, the effective purchase price was \$780 million to acquire about 1.6 million TEU of brownfield container capacity in Canada, or \$488 per TEU of capacity.

At over \$1,000 per TEU, T2 is more than double the cost that DP World paid for its investment in Prince Rupert, and with the added disadvantage of being a greenfield project with no revenues for the first 5-6 years. How will T2 be able to compete with existing Pacific Gateway terminals given this cost differential?

Another relevant market transaction is the Brookfield acquisition of Asciano in Australia. The Ports & Logistics business represented 19% of Asciano's EBITDA, which would imply a valuation for that business line of about C\$2.2 billion (19% of the \$11.6 billion purchase price). Even ignoring the value of the logistics business, this \$2.2 billion valuation for a business with 3.9 million TEU of *existing* capacity would imply a valuation of C\$564 per TEU of capacity. If possible to account for the value of Asciano's logistics business, the core container terminals would have been valued at less than C\$500 per TEU, yet again less than half the cost of the proposed *greenfield* T2 project. Would an astute investor such as Brookfield then turn around and invest in a greenfield project such as T2 at double the cost of their recent Asciano purchase?

It is incomprehensible how any rational investor contemplating an entry into the Canadian container port market would have foregone the opportunity to outbid DP World in its offer for Prince Rupert that equated to about \$500 per TEU for a low-risk brownfield project, and then instead pursue a greenfield T2 project in Vancouver at double the cost. Likewise, Brookfield's recent Asciano transaction reconfirms this benchmark valuation of less than \$500 per TEU for brownfield (not greenfield) capacity in developed markets.

Given that PMV is committing tens (if not hundreds) of millions of dollars to seek approvals for a project whose economic feasibility is questionable and whose prospects for success are doubtful at best, one has to wonder why PMV senior management continues to push T2. What is their rationale?

B. ENVIRONMENTAL CONSIDERATIONS

1. Roberts Bank

The T2 development is likely to cause significant environmental issues and the degradation of Roberts Bank.

Roberts Bank continues to gain recognition, within Canada and internationally, for its natural abundance and wildlife diversity. This recognition stems from its importance to a wide range of wildlife including: bird species, marine mammals, fish, crustaceans, and shellfish. Regrettably it is also now classified by Birdlife International as an Important Bird Area in Danger, as a result of the industrial development that has already taken place as well as projects in the planning stage.

The largest and most damaging of these projects is Port Metro Vancouver (PMV) plans to build a huge man-made island in the Georgia Strait covering almost 300 acres (one third the size of Stanley Park - Vancouver BC), for a second container terminal (T2) on Roberts Bank, next door to the existing three-berth Deltaport Container Terminal. This is slap-bang in the middle of the Fraser Estuary. Roberts Bank is a dynamic estuarine environment, the very fulcrum of one of the top ten "Most Important Bird Areas" in the world and the ecological crucible of the Fraser Estuary.

The environmental issues are extensive and include: negative impacts to migratory birds and shorebirds; population level declines or outright destruction of the Western Sandpiper species; impacts to salmon, especially juveniles, as well as herring and other fish; elimination of areas important to crabs and reduction of crab harvesting; impacts to marine mammals – southern resident killer whales in particular which are listed as an endangered species.

Here are the facts about Roberts Bank and its importance:

- Recognized both in Canada and internationally as a critical ecosystem and one of the richest and most important areas in terms of biodiversity and abundant wildlife on the West Coast.
- Identified by Bird Life International as one of the top sites under the Global Important Bird Area designation.
- Recognized internationally under the Western Hemisphere Shorebird Reserve Network as a site of hemispheric importance. Only eight of these sites exist in the whole of North, Central and South America.
- Designated by the British Columbia Government as a Wildlife Management Area (WMA), wherein they state: "Roberts Bank WMA provides crucial wintering grounds for the highest number of waterfowl and shorebirds found anywhere in Canada".
- Immediately adjacent to the recently designated Fraser Estuary Ramsar site under the **Ramsar Convention**, an international treaty for the conservation and sustainable utilization of wetlands. In fact there are proposals to expand the designation to include Roberts Bank.
- A vital stop on the Pacific Flyway (extending from Panama to Alaska) for Migratory Birds. There are only six stop over sites and this one is of major importance.
- Provides a nursery environment for five species of juvenile salmon during their seaward migration.
- Critical habitat for the Southern Resident Killer Whales (Orcas) which are listed as an endangered species under Canada's *Species at Risk Act* (SARA) whose purpose is to prevent wildlife species in Canada from disappearing. The Southern Resident Killer Whale (Orca) population consists of three pods that are in real danger of extinction unless their habitat is protected.

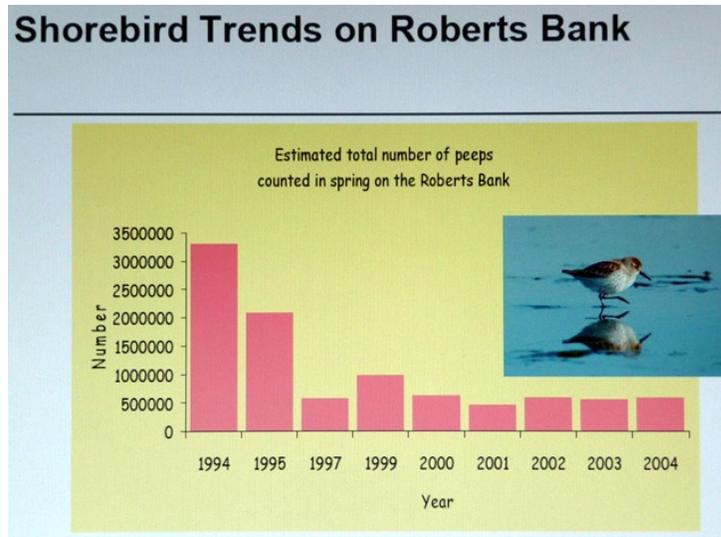
Previous studies and Panel Reviews have concluded that the whole area of Roberts Bank is an incredibly important ecosystem and must be protected. The 1979 Panel review for port development concluded that: *"From the point of view of estuarine ecology, the Panel has concluded that the potential impacts on the Fraser River estuary, of which Roberts Bank is part, are too great to recommend that the port expansion be approved as proposed. The extent and ecological significance of the Fraser River estuary, particularly its use by fish and wildlife, make it unique in North America. A major salmon fishery depends on its preservation as do hundreds of thousands of migratory birds."*

The same panel discussed mitigation and concluded that: *"Mitigation measures such as eelgrass transplants and provisions of new habitat have not been proven in practice on a large scale and, therefore, cannot be accepted as compensation for existing fisheries habitat."*

These recommendations are as relevant today as they were when first made – perhaps even more so given that much more is now known about the importance of Roberts Bank. Yet Port Metro Vancouver chooses to ignore these important Panel conclusions, preferring instead to put Roberts Bank, one of the richest and most important ecosystems for migrant and wintering waterbirds in Canada, at risk from its push for container terminal expansion whose economics are questionable.

Damage to the Roberts Bank ecosystem has been ongoing since the original construction of the pods for the Westshore Coal Terminal, Deltaport Container Terminal and the associated port causeway.

Originally the rich ecosystem that supported millions of shorebirds extended all the way along the foreshore. But when the original causeway and pods were built it essentially created a "dead zone" between the port causeway and the BC Ferries causeway (known as the intercauseway). Construction of that port causeway and original terminal had unforeseen habitat impacts that were not identified at the time of construction. Because the causeway did not have culverts it prevented tidal flushing of the intercauseway. As a result there has been a rapid expansion of tidal channels in the intercauseway area and it is therefore unstable, with shifting dendritic channels. Equally there was some diversion of the Fraser Plume and it reduced the wave action, interrupted longshore drift and diverted the Fraser plume resulting in increased salinity. On more than one occasion there have been algae blooms.



The end result is that the productive shoreline and intertidal areas for wildlife have shrunk and become concentrated north of the port causeway in a much smaller area than originally existed. One result of this can be seen in the reductions of bird populations, for example Western Sandpipers (Peeps). The population of Peeps has declined significantly and if T2 goes ahead further decline will be severe, perhaps leading to outright destruction of the species.

T2 becomes the tipping point, because:

- It is located well out into Georgia Strait and therefore impacts tidal flows across the intertidal area closer to shore that is so important to wildlife
- It will impact on the Fraser River Plume and result in changes in the mudflats supporting biofilm
- The expanded port causeway covers over a significant area of biofilm
- The man-made island covers crab habitat
- It has the potential to turn the area north of the causeway into something similar to what the intercauseway (between the port causeway and the BC Ferries causeway) has become – an area of lesser abundance, not much used by shorebirds, prone to algae blooms, with dendritic channels that are constantly changing thus moving the flats and sediment around.

The negative impacts from T2 range across shorebirds, migratory birds, marine mammals, fish and other species.

2. Shorebirds (including Migratory Birds)

Scientists have established the crucial nature of biofilm on Roberts Bank⁵ as a food source for Western Sandpipers, as noted on the BC Government's websites and backed by the published, peer-reviewed scientific literature. What we now know - from academic and government biologists - is that T2 presents significant risks to, and could destroy, the biofilm on Roberts Bank. The nightmare scenario is that **No biofilm Equals No Shorebirds.**

Here is what we know about Roberts Bank and its unique importance to the Western Sandpiper:

- The entire world population of Western Sandpipers (the most numerous shorebird on the Pacific Coast of North America) numbers in the millions and migrates along the coast of North America through the Fraser River Delta, enroute to their Arctic breeding grounds. The Fraser River Delta and Roberts Bank is one of only six major stopover sites for refuelling during this breeding migration.
- On Roberts Bank a small area of the mud surface contains biofilm, produced by diatoms and bacteria that settle out of the seawater and binds to the mud, providing extraordinary amounts of nutrient rich forage for huge flocks of migrating sandpipers.
- The "Science and the Environment Bulletin, April/May 2001" revealed that Western Sandpipers are dependent on the unique conditions of the mudflats at Roberts Bank. Due to tidal currents and nutrients flushing out of the Fraser River, the mudflats at Roberts Bank are unusually rich in a biofilm coating which the sandpipers suck up with specialized beaks. The migratory stopover at Roberts Bank is crucial to the survival and sustainability of this tiny shorebird.
- Most of the entire Western Sandpiper species (80-85 percent of the species) stop to feed on Roberts Bank during their spring and fall migrations with as many as 500,000 appearing on a single day. The majority of their diet is biofilm and they feed on little else during their migration.
- Published research⁶ shows that Roberts Bank provides a superior type of biofilm for shorebirds that is not found in Boundary Bay, Sturgeon Bank or Sidney Spit, areas, hence the reason that there are more shorebirds on Roberts Bank than at the other sites.

Note 5 – see Appendix A #4 for link to biofilm papers

Note 6 – see Appendix A #7 for link to research paper

There is no other alternative food source for the Western Sandpiper. Roberts Bank is a critical stop on the Pacific flyway. Destroy or reduce the biofilm and we may well see population level declines in the Western Sandpiper as well as severe negative impact on other shorebirds.

Roberts Bank hosts a wide range of shorebirds. Species of note occurring in the Roberts Bank area, in addition to Western Sandpipers, include Brant Geese (both Black Brant and the more vulnerable Western High Arctic (WHA) or grey-bellied subspecies), about 10% of the world population of the coastal subspecies of Great Blue Heron, a few hundred Caspian Terns, Whimbrel, Dunlin, Black-bellied Plovers, Dowichers, Red Knots, Brant, Harlequin Ducks, American Wigeon, Northern Pintail, Marbled Murrelets, Green-winged Teal, Trumpeter Swans, Snow Geese, Western and Red-necked Grebes, Glaucous-winged Gulls, Ross's Gull, American Bitterns, Soras, Virginia Rails, Northern Harriers, Swallows, Bald Eagles, Peregrine Falcons, Short-eared Owls, Red-tailed Hawks, Rough-legged Hawks, Coopers Hawks. Many of these species are of high conservation concern because of either small or declining populations.

Additionally these species tend to have different patterns of habitat use as well as requirements for food and energy. It is essential to recognize the important differences in bird behaviour, such as differences in foraging strategies and roosting requirements, yet PMV has failed to properly study the impacts on all the different species and gives the appearance of not recognizing the environmental importance of Roberts Bank and its significance to millions of Western Sandpipers and other shorebird species. If T2 were to go ahead then millions of shorebirds will be impacted and populations will be destroyed or severely compromised. No amount of mitigation is possible; the negative impacts will be immediate and irreversible.

2.1 Why is the Roberts Bank Biofilm so Important?

One of the many failures in Port Metro Vancouver's Environmental Impact Statement for Roberts Bank Terminal 2 is its incomplete and flawed analysis of the potential impacts on the unique biofilm that is present on Roberts Bank.

It appears from the work that Port Metro Vancouver (PMV) carried out in this area that they identified the outcome that they wanted to portray and then built a series of hypotheses to support that outcome.

The many PMV failures in carrying out a robust assessment of the importance of the Roberts Bank biofilm are becoming all too clear. Notably a number of submissions to the Canadian Environmental Assessment Agency (CEAA) on the RBT2 environmental assessment identify and document a flawed and incomplete environmental assessment. Perhaps one of the more important submissions (June 15 2015) comes from Environment Canada: (<http://www.ceaa.gc.ca/050/documents/p80054/101866E.pdf>) who state: *"... that recent work on Roberts Bank by international scientists has provided new information on the nature of the intertidal diatom community at the time of the spring breeding migration of Western Sandpipers. The global population of Western Sandpipers, a migratory bird, is dependent on the habitat found in the Roberts Bank area. This new information may better explain why these shorebirds (and likely other migratory bird species) concentrate at this site, as opposed to other sites in the Fraser River delta. Further, the occurrence, abundance and nutritional value of these diatoms may have broader implications across trophic levels in relation to ecosystem productivity of the Fraser River Estuary. This new information casts reasonable doubt on some of the Proponent's key conclusions with respect to biofilm and migratory birds as presented in the EIS."*

Furthermore Environment Canada notes that: *"It is unclear how changes in coastal geomorphological processes relating to tidal currents and sedimentation rates over the upper intertidal of Roberts Bank will affect biofilm productivity including in relation to the recently identified diatom"*.

Not only that but in reviewing the PMV-created Environmental Impact Statement the Port appears to have lumped diatoms into "marine" and "freshwater", which based on other research papers that are available seems to greatly oversimplify the complexities of the Roberts Bank system and is a further indication that their analysis is incomplete.

From the published material of the Port Metro Vancouver Technical Advisory Groups (TAG) reports and presentations it would appear that Port Metro Vancouver set out to "prove" that no damage will be done to critical feeding areas on Roberts Bank. The messaging and content of these TAG reports are controlled by Port Metro Vancouver. This is not independent and credible science. Their reports indicate that they are not tackling the key issues and the impact of the T2 man-made island, specifically:

- How is the Roberts Bank biofilm maintained and what changes will result from the T2 man-made island?
- Will T2 alter the predominant tidal current in Georgia Strait, causing it to move closer inshore and impact the biofilm that is unique to Roberts Bank?
- What are the impacts of destroying a significant portion of that biofilm altogether by widening the causeway?
- What are the impacts on the Fraser River plume – a major contributor to the biofilm?
- What negative impacts will occur as a result of footprint scour, and channel formation?
- What about indirect impacts such as sediment distribution and sediment grain size?

Port Metro Vancouver knows about these impacts, but appears to downplay them. Many of these issues were identified by the Port's own working groups but then brushed aside. One of their technical working groups, commenting on assessment of potential impacts on shorebird populations, went as far as to state that it was not feasible to carry out such an assessment. They have been told that their approach is not a satisfactory method of understanding the potential for biofilm destruction. Studies which Port Metro Vancouver conducted in the early 2000s, when T2 was first advanced (and then withdrawn), showed that changes in tidal currents and flows could indeed have a negative impact on the Roberts Bank biofilm.

Port Metro Vancouver appears to be trying to downplay the importance of Roberts Bank. In its research reports the importance of biofilm is minimized, implying that it is peripheral and that there are other food sources. They also state that the Sandpipers can go elsewhere to alternate feeding areas and alternative food sources. The Roberts Bank biofilm is a different composition from other biofilm found in lesser abundance nearby; it is scientifically preposterous to suggest that the Sandpipers could switch to alternative food sources.

Their reports suggest that the environmental focus should be on the overall productivity of Roberts Bank. This is a false assumption. Biofilm makes up only 10 percent of the area on Roberts Bank; therefore looking at overall productivity is an invalid approach. The biofilm is close in to shore. On a falling tide the Western Sandpipers feed out to the edge of the biofilm – about 300 metres – but no further. They do not feed on the invertebrates that exist further out and this is proven by the fact that 80 percent of their stomach content is made up of biofilm. The Port Metro

Vancouver experts state that " ... Biofilm can be compared to the salad that accompanies the meat and potatoes". This is untrue. **For Western Sandpipers biofilm is the whole meal.**

Recent research papers⁷ support these concerns. In one: "*Intertidal biofilm distribution underpins differential tide-following behaviour of two sandpiper species during northward migration*"

<http://www.sfu.ca/biology/wildberg/NewCWEPPage/papers/JimenezetalECSS2015.pdf>

published in the "*Estuarine, Coastal and Shelf Science Journal*" – an international multidisciplinary journal - the research shows the critical importance of Roberts Bank in supporting internationally significant populations of migratory shorebirds and Western Sandpipers in particular.

Key points in the paper include:

- Western sandpipers and dunlin follow ebbing tides while foraging on stopovers.
- Tide following foraging behaviour is stronger for dunlin than western sandpipers.
- Western sandpiper foraging distribution matched biofilm availability. (meaning that this is their preferred food despite other options being available)
- Biofilm, an energy source for shorebirds, merits conservation consideration.

As the paper documents, shorebird species rely on habitats like Roberts Bank, yet these species are becoming increasingly threatened by industrial development, such as the massive Port Metro Vancouver Terminal 2 development.

In another: "*Biofilm Consumption and Variable Diet Composition of Western Sandpipers (Calidris mauri) during Migratory Stopover*"

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4397082/> it notes that major estuarine stopover locations supporting biofilm are often strategic places for transport and other industrial developments (as of course is the case for Roberts Bank). The paper goes on to note that there are a number of important factors to be considered where biofilm is known to exist, because biofilm is such an important food source at key stopover and feeding sites. It is therefore critical to identify the impacts on these important feeding sites in terms of what further industrial development means and indeed whether it should even be allowed.

According to the Western Hemisphere Shorebird Reserve Network the number one cause of shorebird decline is habitat loss and degradation – hence the reason T2 is the tipping point. This is one of the reasons that Birdlife International lists this as an Important Bird Area in Danger. Advances in understanding biofilm and its importance to shorebird feeding have progressed significantly in recent times and the longer term impacts relating to the status and availability of biofilm were simply not known. Neither – until very recently – were the unique nature of the biofilm on Roberts Bank, its properties and importance to shorebirds. Therefore any changes resulting from the existing port complex - facilities built before anyone recognized the global ecological significance of the area and its biofilm - were simply not known, only that Western Sandpipers and certain other species were in decline.

We also know that the Western Sandpiper population has been in decline. It is ranked as 'High Concern' in the U.S. Shorebird Conservation Plan and of 'Moderate Concern' in the Canadian Shorebird Conservation Plan. We simply cannot afford to risk the destruction of migratory and shorebird feeding grounds on Roberts Bank by development of a second container port.

Note 7 – see Appendix A #4 for link to research papers

3. Marine Mammals

Six marine mammal species (southern resident killer whales - orcas, transient killer whales, harbour porpoise, humpback whales, fin whales and grey whales) are frequent users of the waters surrounding Roberts Bank as well as the shipping channels used by vessels calling at terminals on Roberts Bank (as well as other PMV terminals).

These mammals use the deeper waters off the banks and river channels to feed on herring, salmon and eulachon during spawning migration runs. Orcas reside in the area year round and are listed as an endangered species. PMV admits in their Environmental Impact Statement that the orcas are likely to be further endangered by T2, but then preposterously suggests that T2 impacts are of no consequence since the orcas are already listed as endangered.

Not only will T2 impact marine mammals' abilities to access food sources (especially orcas that depend on Chinook and chum salmon), but in addition they are increasingly impacted by both physical disturbance and noise from port vessels that both transit the precise area where they tend to reside as well as when they are at dock. T2 will increase the number of vessel transits - 520 additional transits per year - and thus the noise will be much worse. The noise has been shown to impact the whales' ability to both communicate and navigate.

The Centre for Whale Research found an **increase in the population of Southern Residents** over last year **to 81 from 79** in its most recent census of killer whales. Whilst this is a small amount of good news, underlying trends are a cause for concern:

- Between 1998 and 2015, the Southern Resident Orca population has declined by about 20% (from almost 100 down to 81).
- During the same period, there have been 40 births and 61 deaths or disappearances.
(http://www.orcanetwork.org/Main/index.php?categories_file=Births%20and%20Deaths)
- Threats to the Orcas include lower reproduction; general pollution and contaminants; depleted food sources and vessel traffic scaring off their food sources; contact with vessels; acoustic disturbance from vessels and construction noise. See <https://georgiastrait.org/orca-our-endangered-killer-whales/>

4. The Fraser River Estuary and its importance for Fish and other Species

The Estuary is British Columbia's greatest estuary; the Fraser River is the largest stream in British Columbia. It has global recognition as a wetland of international significance. It is the largest on the Pacific coast of North America (21,703 hectares) and the intertidal wetlands, alone, cover roughly 17,000 hectares. The freshwater flows from the river are so great that, technically the entire southern Strait of Georgia is an estuary. ⁸

There are about 80 species of fish and shellfish that spend at least part of their life cycles in the estuary along with 300 species of invertebrates. Juvenile salmon spend days, weeks or months in the estuary before going to the ocean.

Note 8 – see Appendix A #10 for link to FREMP Reports

4.1 Salmon

Key to the productivity of salmon utilizing the Fraser estuary is the large, shallow tidal flats that are abundant in the estuary but especially at Roberts Bank —fish production is reduced when the young salmon are partially or completely restricted from these rich feeding grounds. Juvenile salmon in particular use the area around the current Deltaport for feeding and refuge. Port Metro Vancouver refused to install culverts in the port causeway, thus causing the juvenile salmon to have to swim around the terminal. This situation would become even worse if T2 were to be built as the salmon would then have to also swim around the T2 man-made island.

T2 will make a bad situation for salmon rearing even worse, not only because of the obstruction of the terminal but also with the destruction of eelgrass beds that are used by the salmon when feeding and to hide from predators. T2 will increase the loss of shallow-water areas for feeding of juvenile salmon and further block access of fishes to feeding grounds to the south. T2 and its expanded causeway is effectively a dam across the estuary. That coupled with the T2 man made island will force the juvenile salmon out into the deeper waters of Georgia Strait.

4.2 Herring

Forage fish, such as herring and sand lance, have declined in the Georgia Strait and around Roberts Bank in recent years. They are an important prey for many seabirds. A corresponding decrease in diving birds that predate on forage fish has also been noted. This decline is as a result of industrial development and T2 will only make matters worse. Herring are important as a food source for many species and their decline is likely to have cumulative impacts on a number of bird, fish and mammal species that rely on them for food.

4.3 Crabs

The area around Roberts Bank used to be one of the best for crab habitat and crab harvesting. Previous port development on Roberts Bank has negatively impacted the crab habitat. However the T2 development will destroy and further displace crab habitat by paving over part of the remaining habitat, with little likelihood that the crabs will be able to sustain this level of damage to their habitat.

Crab harvesting in the immediate vicinity is important to both First Nations as well as to commercial operators. The changes that result from T2, both in construction as well as in operation are likely to cause significant disruptions. Of equal concern is the likelihood of increased vessel traffic causing sediment disturbance that contains coal dust. It is known that considerable quantities of coal dust sit on the ocean floor adjacent to the Westshore Coal Terminal. If this sediment is disturbed it will further impact the crab habitat and their potential to breed.

4.4 Eelgrass, Sandflats, Mudflats, and Marshes

The habitat types that make up Roberts Bank are all inter-connected by the fluvial processes originating in the Fraser River and the marine processes that are brought onto Roberts Bank with each tide change.

Eelgrass is prevalent in the lower sandflats and mudflats and is a highly productive habitat that traps sediment and provides direct feeding for waterfowl and invertebrates as well as providing large inputs into the detritus based food web. The eelgrass beds

also provide refuge and nursery areas and physical attributes that protect the shoreline.

Sandflats are washed by marine waters from the Georgia Strait during flooding tides, bringing in marine plankton, fishes and fresh water from the Fraser that are rich in nutrients. Whilst submerged at high tide these sandflats provide feeding and resting areas for water birds such as ducks, diving birds and gulls.

Mudflats occur from the middle to upper tidal zone and are less exposed to wave action. Exposed to longer periods of sunlight they are productive and support a diverse range of food sources for invertebrates fish and water birds. They are also important feeding areas for shorebirds, especially the Western Sandpiper due to the presence of nutrient rich biofilm.

Marshes provide shoreline protection from storms and are sources of nutrients to other habitats. They also provide direct grazing areas for ducks, geese and swans.

If the T2 man-made island is ever built it will have huge negative impacts on the interconnectivity of these various habitats. Such a massive construction will alter tidal flows, change the Fraser River plume and alter the whole area thus reducing its overall productivity. It is also likely that the area on the north side of the causeway will develop attributes similar to those now found in the intercauseway, which has much lower environmental values.

C. SOCIAL/COMMUNITY CONSIDERATIONS

PMV continues to ignore the communities and municipal councils who are concerned about the negative impacts of the Terminal 2 development.

Local councils, community and environmental organizations and residents have repeatedly raised concerns with PMV including:

- Increased air pollution from more truck and train traffic and their health impacts.
- Traffic congestion and gridlock caused by increases in port truck traffic and resulting in increased travel times and costs for residents.
- Port expansion puts increased pressure on valuable agricultural lands.
- The far reaching impacts of the Terminal 2 project on land use, transportation and the environment in the region.
- Increased noise pollution, light pollution and light spill.
- Property values threatened by loss of natural areas and impacts of industrial development.
- Increased tax dollars spent on port-related infrastructure and services.
- Need for a comprehensive cumulative impacts assessment that addresses the effects of all projects in the region.
- Effects of increased marine shipping on wildlife and residents of the islands along shipping routes.
- Fuel burning and pollution from increased number of vessels in ports and along shipping routes
- Failure to consider the 2008 Federal Government study that recommended developing container capacity in Prince Rupert before making further investments in port infrastructure in Vancouver.

PMV has repeatedly taken the position that it is not responsible for any impacts beyond the immediate port footprint and thus refuses to even discuss many of these issues.

D. CONCLUSION

The weak to non-existent business case, the potential for damage to Roberts Bank and the surrounding ecosystems that are too severe to contemplate and the negative impacts on communities all demonstrate that the Port Metro Vancouver container terminal two development is not sustainable. Cost analyses, credible forecasts, and more economical alternatives indicate sustainable port development and thriving container trade can be achieved in B.C. without destroying valued ecosystem components and social values in the Fraser River Delta.

Sustainability is all about maintaining a balance between economic, environmental and social considerations. We simply cannot afford to further congest the Lower Mainland with polluting trucks, trains and container storage. We cannot afford to cram too many ships along narrow shipping routes that are traveled by endangered Orcas. We cannot risk the degradation or outright destruction of:

- Canada's number one Important Bird Area
- Migratory and shorebird feeding grounds on Roberts Bank
- Marine mammal populations, some listed as endangered species
- Salmon, fish and other species
- Fraser River Estuarine ecosystems

Mitigation has proven to be ineffective and the impacts will be immediate and irreversible. The T2 development is not sustainable and must be stopped – now.

Appendix A Reference Material:

1. Port Metro Vancouver 2015 Container Statistics

<http://www.portmetrovancover.com/about-us/statistics/>

2. Port Metro Vancouver Container Traffic Forecasts – Previous and Current

<http://www.robertsbankterminal2.com/news-information/project-documents-reports/>

3. Port of Prince Rupert Container Terminal

Current performance:

<http://www.rupertport.com/shipping/performance?year=2015&month=9>

Future growth plans: <http://www.rupertport.com/future>

4. Biofilm

“Variable and complex food web structures revealed by exploring missing trophic links between birds and biofilm”

<http://www.sfu.ca/biology/wildberg/papers/KuwaetaalEcolLet12.pdf>

“Intertidal biofilm distribution underpins differential tide-following behaviour of two sandpiper species (*Calidris mauri* and *Calidris alpina*) during northward migration”

<http://www.sciencedirect.com/science/article/pii/S027277141400417X>

“Biofilm Consumption and Variable Diet Composition of Western Sandpipers (*Calidris mauri*) during Migratory Stopover”

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4397082/>

5. Pacific Wetlands

<http://wetlandslive.pwnet.org/wetlands/pacific.php>

6. Western Sandpiper

<http://birds.audubon.org/species/wessan>

7. Roberts Bank

“Roberts Bank: Ecological crucible of the Fraser River estuary”

Terri F. Sutherland, Robert W. Elner, Jennifer D. O’Neill

<http://www.sciencedirect.com/science/article/pii/S0079661113000608>

8. Marine Bird Declines

“Assessing Ecological Correlates of Marine Bird Declines to Inform Marine Conservation”

<http://onlinelibrary.wiley.com/doi/10.1111/cobi.12378/pdf>

9. Shoreline Sensitivity

BC Shoreline Sensitivity Model

http://a100.gov.bc.ca/appsdata/acat/documents/r42825/BCPark_SS_user_guide_1403632673820_3629261453.pdf

10. FREMP Roberts Bank and Sturgeon Bank Reach Overview Backgrounder

http://a100.gov.bc.ca/appsdata/acat/documents/r40700/RSBRO_backgrounder_1388528167670_8527899426.pdf

http://a100.gov.bc.ca/appsdata/acat/documents/r40699/RSBRO_1403632753971_3622590185.pdf

11. Sockeye Salmon

http://www.sfu.ca/cstudies/science/resources/adaptingtochange/25.Birtwell_et_al.1987.pdf