

Port of Prince Rupert: Value of Trade Analysis

InterVISTAS
CONSULTING GROUP

strategic
transportation
& tourism
solutions



Prepared for
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Prepared by
InterVISTAS Consulting Inc.

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Table of Contents

- 1. Introduction..... 1**
 - 1.1 Port of Prince Rupert..... 1
- 2. Methodology 1**
 - 2.1 Data Sources 1
 - 2.1.1 Port of Prince Rupert Performance Statistics..... 1
 - 2.1.2 Port of Prince Rupert, Container Data 1
 - 2.1.3 Commodity Prices..... 2
 - 2.2 Value of Trade Analysis 3
 - 2.2.1 Bulk Traffic 3
 - 2.2.2 Container Traffic 3
 - 2.2.3 Total Traffic..... 4
- 3. Summary of Findings 4**
 - 3.1 Value of Trade Analysis 4
 - 3.2 Recommendation 5
- Appendix A: Sources for Commodity Prices 7**
- Appendix B: Understanding the Summary Tables 11**

1. Introduction

1.1 Port of Prince Rupert

Inter *VISTAS* Consulting Inc. (Inter *VISTAS*) was commissioned by the Prince Rupert Port Authority (PRPA) to provide an analysis of the value of trade at the Port of Prince Rupert. The Port Authority is responsible for the management and operations of the Port in the Prince Rupert Harbour. With five main terminals in operation, handling containers, logs, grain, coal, and cruise passengers, the Port of Prince Rupert has established itself as a significant gateway for international trade, connecting British Columbia, Canada and the North American market to Asia Pacific and the world.

2. Methodology

This section outlines the methodology used in analysing the value of trade at the Port of Prince Rupert.

2.1 Data Sources

2.1.1 Port of Prince Rupert Performance Statistics

The PRPA publishes performance statistics on a monthly basis. The Port's performance statistics from January 2005 to December 2011 were summarised to determine the annual traffic volume of bulk goods exported through the Port of Prince Rupert by the type of product exported. This summary can be found in the tab entitled "Bulk Traffic" in the Value of Trade Analysis Excel spreadsheet provided.

2.1.2 Port of Prince Rupert, Container Data

In addition to the performance statistics, the Port Authority also provided detailed information of containerized goods shipped through the port. Data from 2009 and 2011 was provided to Inter *VISTAS*.

This data was summarised and categorised to determine the volume of container traffic (in twenty-foot equivalent units or TEU) by type of product.¹ In discussion with the Port Authority, it was revealed that there are discrepancies between the detailed container data provided and the performance statistics.² Since the source of this discrepancy is unknown, the total container traffic was scaled to match the total container traffic provided in the performance statistics according to the percentage share of each product type. This summary can be found in the tab entitled "Container Traffic (TEU)" in the Value of Trade Analysis Excel spreadsheet provided.

¹ Containerized goods were categorized into broader product type categories based on descriptions provided in the data. As some descriptions were very general, goods were classified into categories that best fit their description.

² The detailed container data provided by the Port Authority is collected differently from the data recorded in the Port's performance statistics. The detailed container data is collected based on shipping information provided, while the container traffic recorded in the performance statistics is based on an actual count of containers loaded onto a vessel prior to the vessel leaving the Port. Since the performance statistics records the actual container traffic moving through the Port, this data was used as the basis in the value of trade analysis.

2.1.3 Commodity Prices

Given the product categories derived from the summary of annual traffic volumes and the summary of container traffic, research and analysis were conducted to determine average annual prices (in CAD) per tonne for each type of product from 2005-2011.³ A conservative approach was taken that assumes the same average price for bulk and containerized commodities. The sources for the commodity prices used in the analysis are outlined in **Appendix A**. The prices per commodity type are summarised in the tab entitled "Commodity Prices" in the Value of Trade Analysis Excel spreadsheet provided.

To enable a comparison of prices and the value of trade over the years, the commodity prices per tonne were adjusted to 2011 dollars to account for inflation, using consumer price index (CPI) data.⁴ The prices per commodity in 2011 dollars are summarised in the tab entitled "Commodity Prices (2011 \$s)" in the Value of Trade Analysis Excel spreadsheet provided.

WISERTrade Foreign Trade Database

InterVISTAS made use of data from the WISERTrade Foreign Trade Database to determine the average price per tonne for commodities wherein average price data was not available. The WISERTrade Foreign Trade Database includes U.S. trade statistics from the U.S. Census Bureau Foreign Trade Division.

Although Statistics Canada has international trade data available for Canada, it should be noted that the weight data provided by Statistics Canada should be used with extreme caution for various reasons. Firstly, the dataset has incomplete weight information, and weight data is not available for numerous entries. Secondly, the unit of measure associated with the weight data differs across various commodity types, ranging from gigabecquerels to litres to metric tonnes.⁵ As a result of concerns about the accuracy of the volume measure, InterVISTAS used U.S. trade statistics from the WISERTrade Foreign Trade Database to derive the average value per tonne for certain commodities. Since Canada and the U.S. are generally exporting commodities to the same markets, the average value per tonne of U.S. exports is likely similar to that of Canadian exports. Thus, this methodology was used to determine the average price per tonne for commodities wherein average price data was not available online.

³ The annual average exchange rate from the Bank of Canada was used to convert commodity prices obtained in U.S. dollars. (<http://www.bankofcanada.ca/rates/exchange/exchange-rates-in-pdf/>).

⁴ The inflation rate was determined using the Bank of Canada's inflation calculator (<http://www.bankofcanada.ca/rates/related/inflation-calculator/>), based on Statistics Canada's Consumer Price Indexes.

⁵ Previously, Statistics Canada had produced weight files, which determines weight estimates based on specific calculations and analysis. Such data are no longer produced by Statistics Canada.

2.2 Value of Trade Analysis

2.2.1 Bulk Traffic

The total annual value per bulk commodity is estimated given the annual bulk traffic volumes and the average annual commodity prices per tonne from 2005-2011 by multiplying the total annual tonnage by the average annual price per tonne for each product type for each year. Summing the total annual value of each commodity type then generates the total value of bulk goods exported through the Port of Prince Rupert for each of the years analysed.⁶

A summary of the value of trade of bulk traffic at the Port in nominal dollars is provided in the tab entitled "Bulk - Value" in the Value of Trade Analysis Excel spreadsheet provided, while a summary of the value of bulk trade at the Port in 2011 dollars is provided in the tab entitled "Bulk – Value (2011)" in the Value of Trade Analysis Excel spreadsheet provided.

2.2.2 Container Traffic

In analysing the total value of container traffic moving through the Port of Price Rupert, three scenarios (high, middle and low) were analysed to show the range of potential values dependent on the average load per container, i.e. the average tonnes per TEU, as the average load of containers vary. The assumptions used to estimate the average tonnes per TEU for each of the three scenarios are shown in **Figure 2-1**.

Figure 2-1: Assumptions on Average Tonnes per TEU

Scenario	Average tonnes/TEU
High	18 tonnes
Middle	14 tonnes
Low	10 tonnes

Notes: The assumptions on average tonnes per TEU were determined based on the average load per TEU indicated in related literature and data reviewed by InterVISTAS.

The total container traffic in tonnes was estimated for each of the three scenarios by converting the container traffic volume from TEU to tonnes using the assumptions above. The total container traffic in tonnes is shown in the tab entitled the "Container Traffic (Tonnes)" in the Value of Trade Analysis Excel spreadsheet provided.

The total annual value of containerized goods per type of product is then estimated given the annual container traffic volumes in tonnes and the average annual commodity prices per tonne for 2009-2011. This was done by multiplying the total annual tonnage by the average annual price per tonne for each product type for each of the years analysed.

Summaries of the value of trade of container traffic at the Port for each of the three scenarios in nominal dollars and in 2011 dollars are provided in the tabs entitled "Container - Value" and "Container – Value (2011)", respectively, in the Value of Trade Analysis Excel spreadsheet provided.

⁶ A high and low analysis was not conducted for the value of bulk traffic, as it is assumed that market prices for prevail for these commodities.

2.2.3 Total Traffic

The value of trade of both bulk and container goods are summed together for each of the three scenarios to determine the value of trade of the total traffic at the Port of Prince Rupert. The total traffic is provided for each of the three scenarios in the container value analysis, and shown in both nominal and 2011 dollars. The percentage change of the value of trade at the Port year-over-year is also provided for each of the three scenarios to show the level of growth of the Port's value of trade over the years analysed.

The value of trade of total traffic for each scenario is summarised in the "Summary – Scenarios" tab in the Value of Trade Analysis Excel spreadsheet provided.

3. Summary of Findings

3.1 Value of Trade Analysis

The analysis of the value of trade at the Port of Prince Rupert conducted by InterVISTAS reveals that in 2011 the total exports (including bulk and container traffic) moving through the port is estimated to be between \$4.9 billion to \$5.5 billion, given the three scenarios for estimating the value of container traffic. **Figure 3-1** summarises the total value of trade at the Port for each of the three scenarios analysed for 2009-2011 in nominal dollars, while **Figure 3-2** shows a summary of the value of trade in 2011 dollars.

Figure 3-1: Total Value of Trade Summary (Nominal Dollars), 2009-2011

Scenario	Total Value of Trade (Nominal Dollars, Billions)		
	2009	2010	2011
Low	\$2.7	\$3.2	\$4.9
Middle	\$3.0	\$3.5	\$5.2
High	\$3.2	\$3.8	\$5.5

Figure 3-2: Total Value of Trade Summary (2011 Dollars), 2009-2011

Scenario	Total Value of Trade (2011 Dollars, Billions)		
	2009	2010	2011
Low	\$2.8	\$3.3	\$4.9
Middle	\$3.1	\$3.6	\$5.2
High	\$3.3	\$3.9	\$5.5

After adjusting the total value of trade to 2011 dollars, it is seen that the total value of trade is estimated to have increased by approximately 42%-49% from 2010 to 2011. A summary of the percentage growth of the value of trade at the Port of Prince Rupert (in 2011 dollars) is provided in **Figure 3-3**.

Figure 3-3: Total Value of Trade Summary (% Growth), 2009-2011

Scenario	Total Value of Trade (% Growth)	
	2009-2010	2010-2011
Low	16.4%	48.9%
Middle	15.5%	45.0%
High	14.8%	41.6%

3.2 Recommendation

After a review of the value of trade analysis results for each of the three scenarios, InterVISTAS recommends the result from the "Low Scenario" to the Prince Rupert Port Authority, wherein the total value of trade at the Port of Prince Rupert in 2011 is \$4.9 billion.

This recommendation is based on a comparison of the value of trade analysis results to the statistics reported by Port Metro Vancouver (PMV), which exports similar types of commodities to similar markets.

When comparing the traffic of loaded containers that are exported at the two ports, the Port of Prince Rupert (with a total of 100,389 export loaded TEUs in 2011) comprises approximately 10% of the PMV's export volume of loaded containers (equivalent to a total of 999,725 TEUs in 2011).⁷ Similarly, when comparing the total tonnage and the total dollar value of loaded containers exported from the ports, the results from the "Low Scenario" reveal that the Port of Prince Rupert comprises approximately 10% and 13%, respectively, of the total tonnage and the total dollar value of loaded containers exported at PMV.⁸ The results from the other scenarios show a much greater variation in the ratio of the Port of Prince Rupert's and PMV's traffic statistics, as shown in **Figure 3-4**. Thus, the similarities of the ratio of the total value and total TEU of container traffic of the Port of Prince Rupert in comparison to that of Port Metro Vancouver indicates that the results from the "Low Scenario" best estimates the value of trade of container traffic at the Port of Prince Rupert.

⁷ Port of Prince Rupert Performance Statistics, YE Dec 2011 and Port Metro Vancouver Cargo Statistics Report, YE Dec 2011.

⁸ Port Metro Vancouver Cargo Statistics Report YE Dec 2011.

Figure 3-4: Comparison of Port of Prince Rupert with Port Metro Vancouver Container Traffic Statistics, Export Loaded Containers (2011)

Comparator (2011)	Port Metro Vancouver	Port of Prince Rupert			Ratio of Port of Prince Rupert to Port Metro Vancouver		
		High	Middle	Low	High	Middle	Low
Tonne/TEU*	10	18	14	10			
Total Container TEU	999,725	100,389	100,389	100,389	10.0%	10.0%	10.0%
Total Container Tonnage (millions)	9.7	1.8	1.4	1.0	18.6%	14.5%	10.4%
Total Container Value** (billions)	\$5.9	\$1.4	\$1.1	\$0.8	23.2%	18.0%	12.9%

Sources: Port of Prince Rupert Performance Statistics YE Dec 2011, Port Metro Vancouver Cargo Statistics Report YE Dec 2011, InterVISTAS Value of Trade Analysis for Port of Prince Rupert

Notes:

* Port Metro Vancouver (PMV) tonne/TEU ratio is based on the ratio of total container tonnage and total TEUs of loaded containers at PMV, while Port of Prince Rupert tonne/TEU ratio is based on the assumptions used in InterVISTAS' value of trade analysis.

** Port Metro Vancouver (PMV) Total Container Value is calculated using the ratio of the total value of traffic at PMV (\$75 billion, as per PMV's website) and the total tonnage at PMV (122,499,631, as per PMV statistics).

Appendix A: Sources for Commodity Prices

The sources for the commodity prices and key assumptions used in the analysis are provided in **Figure A-1**.

Figure A-1: Sources for Commodity Prices and Key Assumptions Used

Commodity Prices (CAD per Tonne)	Sources/Assumptions
Alfalfa Pellets	WISERTrade Database (US Vessel Exports data) for "Alfalfa (Lucerne) Meal And Pellets"
Animal Skins	WISERTrade Database (US Vessel Exports data) price for "Raw Hides & Skins Of Bovine Or Equine Animals"
Auto/Machine Parts	WISERTrade Database (US Vessel Exports data) average price for auto/machine parts
Barley	Canada Wheat Board Payments: Based on DES BARLEY Select Canada Western 2 Row (Except 2007: Based on Barley Pool B 2 Canada Western) http://www.cwb.ca/public/en/farmers/payments/
Building Materials	WISERTrade Database (US Vessel Exports data) average price for building materials
Canola	Canola Council of Canada, 2005-2010: Used average prices for year, 2011: Used average prices for month of October (latest available) http://www.canolacouncil.org/canolaprices.aspx
Canola (Meal Piece)	Canola Council of Canada, 2005-2010: Used average prices for year, 2011: Used average prices for month of October (latest available) http://www.canolacouncil.org/canolaprices.aspx
Car	WISERTrade Database (US Vessel Exports data) average price for vehicles
Chemical Compounds & Minerals	WISERTrade Database (US Vessel Exports data) average price for chemicals

Commodity Prices (CAD per Tonne)	Sources/Assumptions
Coal	Ministry of Energy, Mines and Petroleum Resources (MEMPR) Statistics (used average of metallurgical coal, thermal coal and PCI) (http://www.em.gov.bc.ca/Mining/MineralStatistics/Market/WeeklyMetalandCoalPrices/Pages/default.aspx#)
Electronics	WISERTrade Database (US Vessel Exports data) average price for electrical equipment
Feed Barley	2005-2011: Canada Wheat Board Payments: Based on FD BARLEY A No. 1 Canada Western (except 2010); 2010: WISERTrade Database (US Vessel Exports data) for "Barley" (http://www.cwb.ca/public/en/farmers/payments/)
General/Other	WISERTrade Database (US Vessel Exports data) for all U.S. exports
Grain Pellets	WISERTrade Database (US Vessel Exports data) for "Pellets Of Wheat And Of Other Cereals"
Grains	Canada Wheat Board Payments: Based on 1 CWRS No. 1 Canada Western Red Spring (12.5) (http://www.cwb.ca/public/en/farmers/payments/)
Household/Personal	WISERTrade Database (US Vessel Exports data) average price for household items
Logs	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for solid wood; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (latest available) (http://www.for.gov.bc.ca/hva/logreports_coast.htm)
Metallurgical Coal	Ministry of Energy, Mines and Petroleum Resources (MEMPR) Statistics (http://www.em.gov.bc.ca/Mining/MineralStatistics/Market/WeeklyMetalandCoalPrices/Pages/default.aspx#)
Machinery	WISERTrade Database (US Vessel Exports data) average price for machinery
Medical Supplies	WISERTrade Database (US Vessel Exports data) for "Medical, Surgical, Dental Or Vet Inst, No Elec, Pt"
Metals	WISERTrade Database (US Vessel Exports data) average price for aluminum, copper, steel
Misc. Food Items	WISERTrade Database (US Vessel Exports data) average price for food items

Commodity Prices (CAD per Tonne)	Sources/Assumptions
Oats	2005-2008: WISERTrade Database (US Vessel Exports data) for "Oats"; 2009-2011: Agriculture and Agri-Food Canada, Chicago Board of Trade Nearby Futures (http://www.agr.gc.ca/pol/mad-dam/index_e.php?s1=pubs&s2=pri)
Office Supplies	WISERTrade Database (US Vessel Exports data) average price for office supplies
Oil	WISERTrade Database (US Vessel Exports data) for "Oil (Not Crude) From Petrol & Bitum Mineral Etc."
Other	WISERTrade Database (US Vessel Exports data) for all U.S. exports
Petroleum Coke	Ministry of Energy, Mines and Petroleum Resources (MEMPR) Statistics **Assume Low Volatile PCI is petroleum coke (http://www.em.gov.bc.ca/Mining/MineralStatistics/Market/WeeklyMetalandCoalPrices/Pages/default.aspx#)
Plastic/Plastic Scraps/Chemical Resin, Polymer, Etc.	WISERTrade Database (US Vessel Exports data) average price for plastics
Pulp/Paper	WISERTrade Database (US Vessel Exports data) average price for pulp and paper
Reach Stackers	Assumed price based on online prices for reach stackers (http://www.machineryzone.eu/used/1/reach-stacker.html)
Shipping Materials	WISERTrade Database (US Vessel Exports data) price for "Containers (Boxes, Bags Etc.), Closures Etc., Plastics"
Soybeans	2005-2008: WISERTrade Database (US Vessel Exports data) for "Soybeans, Whether Or Not Broken"; 2009-2010: Agriculture and Agri-Food Canada, Chicago Board of Trade Nearby Futures: Based on Soybeans No. 1 Yellow (http://www.agr.gc.ca/pol/mad-dam/index_e.php?s1=pubs&s2=pri)
Thermal Coal	Ministry of Energy, Mines and Petroleum Resources (MEMPR) Statistics (http://www.em.gov.bc.ca/Mining/MineralStatistics/Market/WeeklyMetalandCoalPrices/Pages/default.aspx#)
Textiles	WISERTrade Database (US Vessel Exports data) price for "Worn Clothing And Other Worn Textile Articles"

Commodity Prices (CAD per Tonne)	Sources/Assumptions
Wax	WISERTrade Database (US Vessel Exports data) for "Other Mineral Waxes, Nesoi"
Wheat	Canada Wheat Board Payments: Based on 1 CWRS No. 1 Canada Western Red Spring (12.5) (http://www.cwb.ca/public/en/farmers/payments/)
Wood Chips	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for wood chips; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (http://www.for.gov.bc.ca/hva/logreports_coast.htm)
Wood Pellets	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for wood chips; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (latest available) (http://www.for.gov.bc.ca/hva/logreports_coast.htm)
Wood Products - Cut Lumber	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for solid wood; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (latest available) (http://www.for.gov.bc.ca/hva/logreports_coast.htm)
Wood Products - General/Unspecified	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for solid wood; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (latest available) (http://www.for.gov.bc.ca/hva/logreports_coast.htm)
Wood Products - Log	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for solid wood; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (latest available) (http://www.for.gov.bc.ca/hva/logreports_coast.htm)
Wood Products - Processed	Timber Pricing Branch, Ministry of Forests, Lands & Natural Resource Operations: Based on conversion for solid wood; 2005-2007: Used average prices for 12-month ending December, 2010-2008: Used average prices for month of December, 2011: Used average prices for month of October (latest available) (http://www.for.gov.bc.ca/hva/logreports_coast.htm)

Appendix B: Understanding the Summary Tables

The value of trade of total traffic for each scenario is summarised in the “Summary – Scenarios” tab in the Value of Trade Analysis Excel spreadsheet provided. This appendix provides a guide in understanding the summary tables developed in this tab.

Total Tonnage Summary

The first table summarises the total tonnage of traffic moving through the Port of Prince Rupert. Each row represents the total volume in tonnes for bulk traffic and for the estimated cargo traffic for each of the three scenarios (high, middle and low). The volume of traffic is summarised for each of the years wherein data was provided by the Port Authority. This is shown in the first set of columns of the table. The second set of columns of the table provides a summary of the year-over-year percentage change of the volume of trade (in tonnes) for bulk traffic and for the estimated cargo traffic for each of the three scenarios (high, middle and low). This shows the level of growth of the Port's traffic volume over the years analysed.

Total Value of Trade Summary – High, Middle and Low Scenarios

The next three tables summarise the results of the value of trade of both bulk and container goods to determine the value of trade of the total traffic at the Port of Prince Rupert. The total value of bulk traffic at the Port is added to the results of the total value of container traffic derived from each of the individual scenarios (high, middle and low).

The rows of each table represent the total value of bulk traffic and the total value of container traffic for the case specified. The first set of columns summarise the total value of trade in nominal dollars for each of the years analysed, while the second set of columns summarise the total value of trade in 2011 dollars for the years analysed. The third set of columns show the percentage change of the value of trade at the Port year-over-year, based on the value of trade in 2011 dollars (in the second set of columns) to account for inflation. This shows the level of growth of the Port's value of trade over the years analysed.



Prepared by
Inter *VISTAS* Consulting Inc.

Airport Square – Suite 550
1200 West 73rd Avenue
Vancouver, BC
Canada V6P 6G5

Telephone: 604-717-1800
Facsimile: 604-717-1818
www.intervistas.com