



An Evidence-Based Framework and Analysis of the Canadian Transportation System

Transport Canada
Presentation to Transportation Research Board)
Denver, June 1, 2015





Purpose

Context :

- Seizing Global Economic Opportunities
- Policy Context and Issues

Transportation Demand Outlook: An Overview

- Key Drivers
- Major Flows and Key Commodities : Pressures

Transportation Supply Analysis: An Overview

- Key Drivers
- Multimodal Transportation Performance and Capacity Analysis
- Data
- Early Results

Overview of Key Transportation Challenges

Next Steps



Context

Seizing Global Economic Opportunities Through a Better Alignment of Economic Needs with Transportation Infrastructure

- ❑ **Globalization – Changing poles of global economic growth greater efficiency and complexity of global supply chains**
 - Asian countries are expected to act as a key pole for global growth in medium term.
 - The economic recovery in the United States will act as another pole for growth.
- ❑ **Direct/Indirect access (connectivity) to global supply chains is critical – ongoing redefinition of competitive advantage and transportation requirements**
 - Creation of new commercial opportunities.
 - Need for ongoing redefinition of competitive advantage.
- ❑ **Adaptation – need to align economic needs with transportation infrastructure**
 - Broader access to market (trade agreements) or deeper scope of non-tariff factors in agreements (e.g. phytosanitary, intellectual property, procurement, foreign investment, trade in service).
 - Adaptation/Resilience of Canadian transportation System to ensure direct/indirect access to market.

Policy Context

❑ Commitments at the 2014 North American Leaders Summit:

- To promote trilateral exchanges on logistics corridors.

❑ The Commodity Supply Chain Table (CSCT) Launched by Minister Raitt on June, 2014 :

- Establish a national forum for shippers, railways, ports, terminals and other supply chain partners to work together to improve the reliability and efficiency of the supply chain for all commodities.

❑ Objectives:

- promote strategic exchanges on logistical and/or capacity issues affecting supply chain efficiency for commodities shipped through Canada's gateways;
- provide a forum to assess evolving domestic and international trade and market trends for commodities, including anticipated future demand and system needs;
- explore, assess, and identify potential solutions to system inefficiencies through enhanced collaboration across the supply chain; and
- discuss the development and implementation of evidence-based performance metrics to increase the visibility of the supply chain and improve performance.



Policy Issues

- What is the **capacity utilization** of the transportation system?
- To what extent **transportation infrastructure** allow Canada to capitalize or limit our export opportunities?
- To what extent transportation infrastructure allow Canada to capitalize or limit our export opportunities **in the North**?
- What is the **rail performance** in support of the fluidity of key commodities in a multimodal supply chain context?
- Has the **performance of Canada's supply chains** improved or deteriorated over time? If performance has deteriorated, can it be improved through increased operational efficiency or are infrastructure investments required?
- What critical **transportation bottlenecks** may be impeding Canada's competitiveness?



Transportation Demand Key Drivers

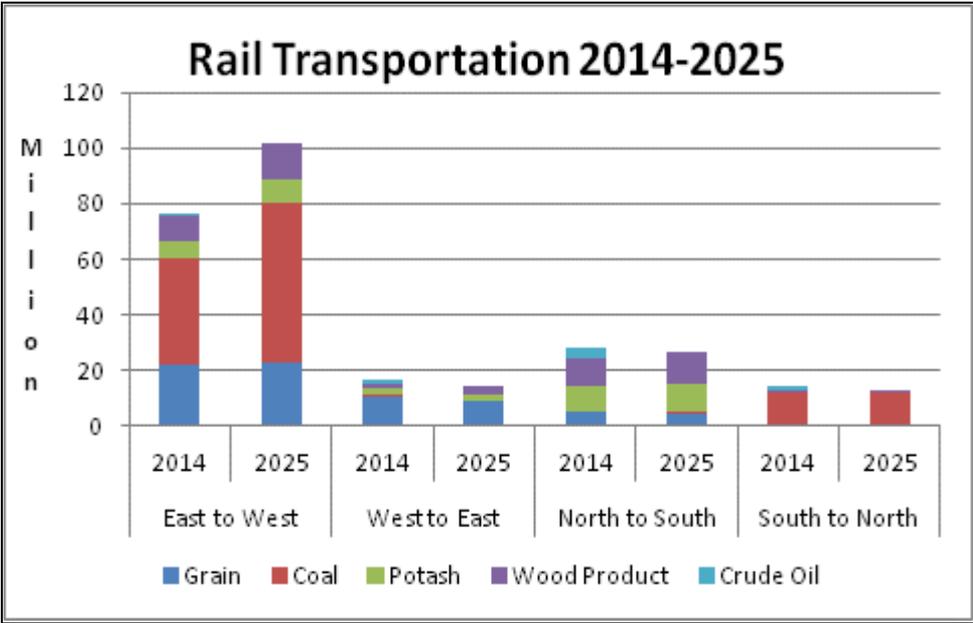
- Demand for Canadian transportation system is expected to be largely affected by:
 - Changing global poles of growth (e.g. Asia, U.S., BRIC).
 - Canadian direct and indirect access to global supply chains and markets (e.g. new trade agreements and Canadian comparative advantages).
 - Demand for key Canadian commodities
 - Demographic and environmental factors



Significant Pressure on Rail Demand...

Key Rail corridors :

- The most important corridor is East to West and expected to grow by 35% from 2014 to 2025.
- The second important corridor is North to South (exports to U.S.)



Source: Transport Canada, March 2014

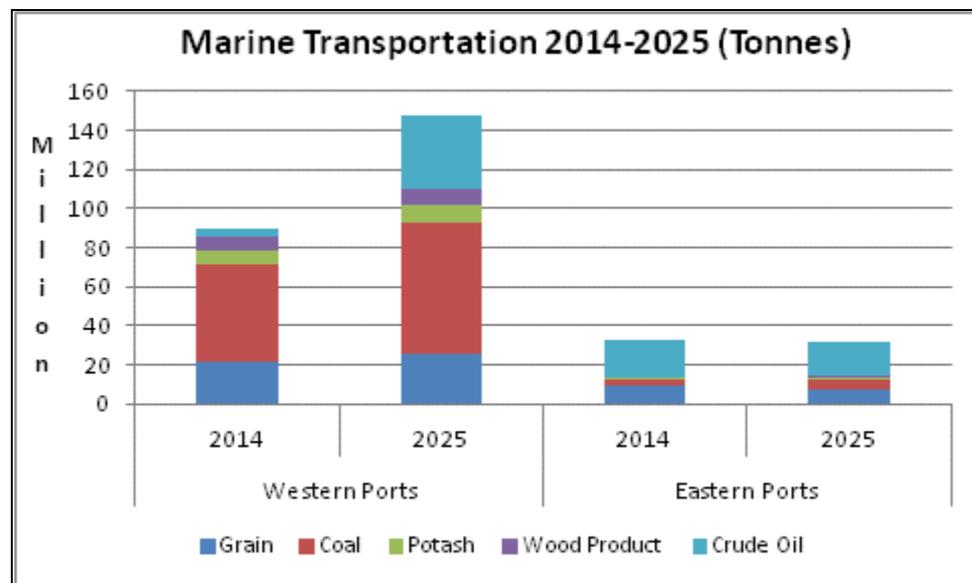
Risks in the System

- Congestion at West Coast ports.
- If none of the pipelines are built, by 2025, the rail system will have to carry 2.15 mb/d of crude (about 35% of the Canadian production).



West Coast Ports will continue to face capacity pressures

- Overall, the Western ports handled about 75% of the tonnage and it is expected to increase around 80% in the future.
- In 2014, coal represented about 45% of all tonnage shipped.



Source: Transport Canada, November 2014

☐ Risks in the System

- Congestion at ports (Vancouver and Prince Rupert).
- Environmental pressures and social license issues.



Transportation Supply Analysis

Key Drivers

- ❑ **Support evidence-based discussions on key pressures/challenges facing national transportation system**
 - Five key commodities (grains, forest, crude oil, coal and potash).
 - Containerized traffic.
 - Key transportation corridors.
 - Adopt multimodal transportation system-based approach

- ❑ **Guide/support allocation of resources/investment**
 - Launch national initiative to identify, measure, validate and engage on key factors and pressures facing Canadian transportation system (2015-2035).
 - Coordinate with U.S. Review.

- ❑ **Support better planning of Canadian transportation system**



Transportation Supply Analysis

Capacity and Performance

- ❑ Capacity of commodity supply chains
 - No clear definition of the capacity of supply chains in a policy context .
 - Transport Canada is assessing the connectivity of the multi-modal transportation capacity in a global supply chains context.

- ❑ Performance of the Canadian transportation system
 - Identification of bottlenecks
 - First mile/last mile.
 - Optimization of the Canadian multi-modal transportation system.
 - Direct/indirect access to global supply chains.



Capacity/Performance Current Analysis

- ❑ Access capacity of the Canadian transportation system
 - Asia-Pacific corridor
 - East/Atlantic corridor
 - Canada-U.S.-Mexico auto supply chain corridor

- ❑ Monitoring/Understanding the performance of Canadian commodity supply chains
 - Grain, coal, potash, forest products, crude oil
 - Containers

- ❑ Monitoring border crossings performance – 13 border crossings points

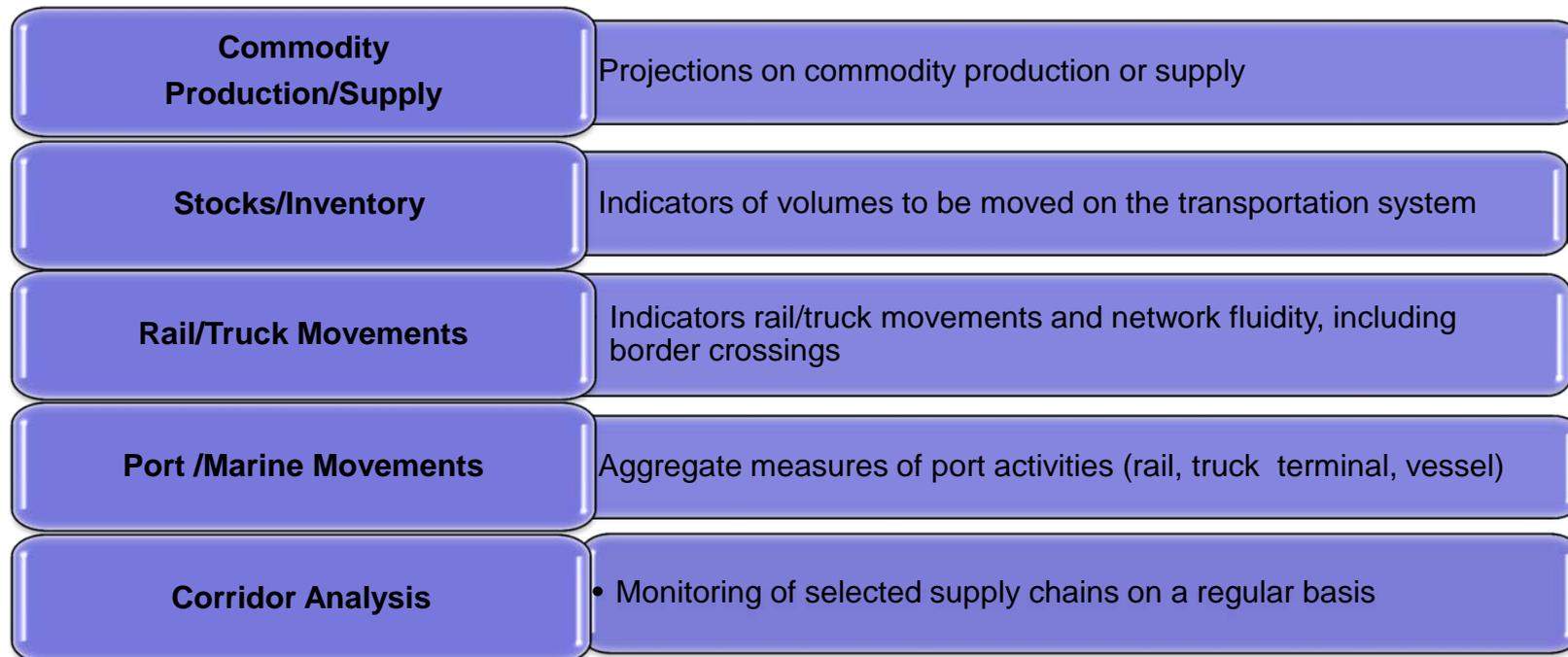


Data

- Ocean transit
 - 98% of vessel movements covered (various data sources)
- **Port dwell**
 - 100% of universe covered (terminal operators / port authorities)
- **Rail transit and terminal dwell**
 - 100% of universe covered (CN Rail and CP Rail)
- **Trucking (GPS tracking)**
 - Cooperation with Provincial Governments
 - Major Inter-urban O-D pairs
 - Port drayage
- **Transload Centers for break-bulk commodities**

Commodity Supply Chain Analysis: Framework

- ❑ Canada is a major producer and exporter of five key commodities: grain, coal, potash, forest products and crude oil, as well as containers.
- ❑ These commodities represent more than 40% of the rail tonnage carried in Canada and most of the products are exported, representing about 30% of the value of our total exports.
- ❑ Transport Canada's supply chain analysis for key export commodities is based on five pillars.

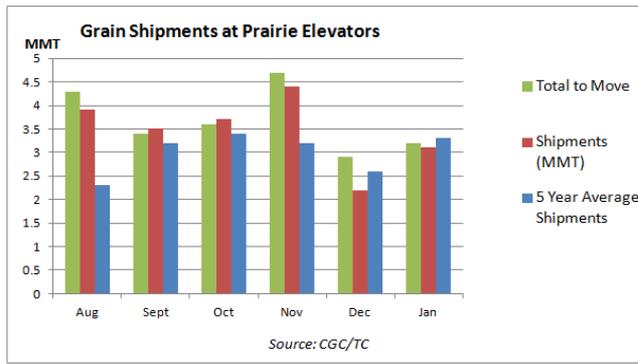
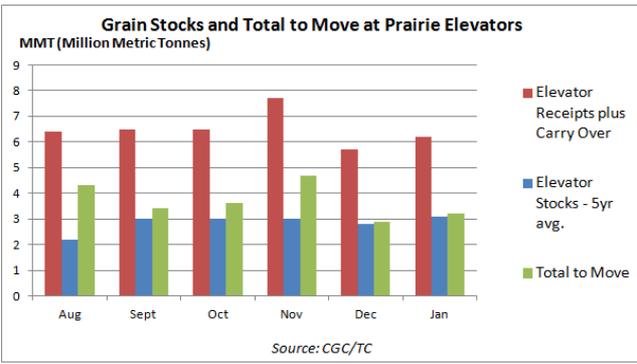




GRAIN SUPPLY CHAIN

Monthly

Grain (wheat, barley, oilseeds, pulses) – Western Canada

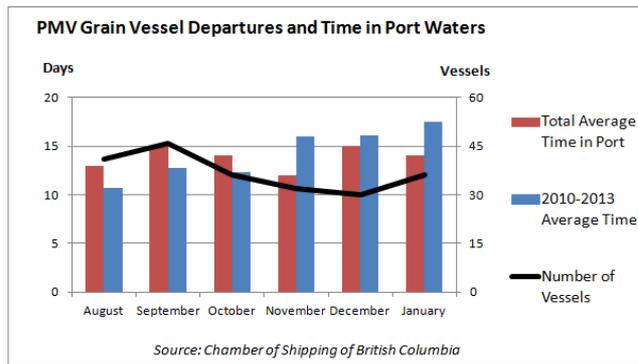
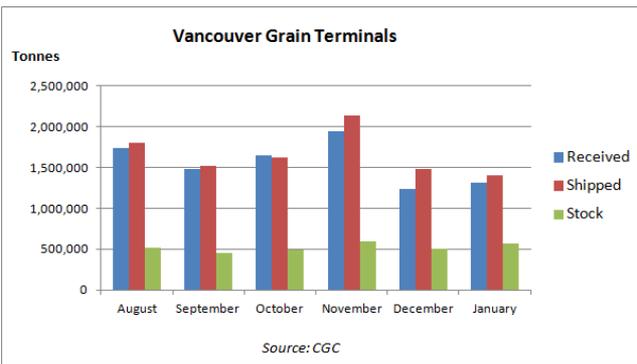
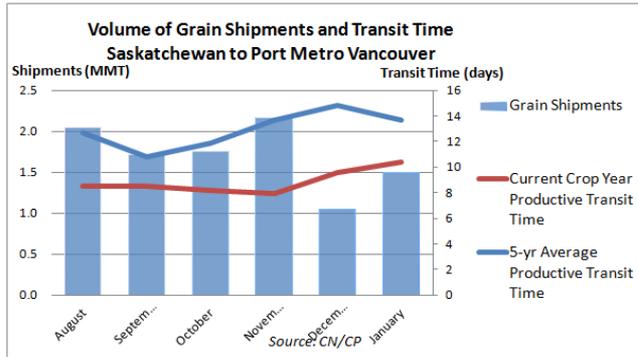
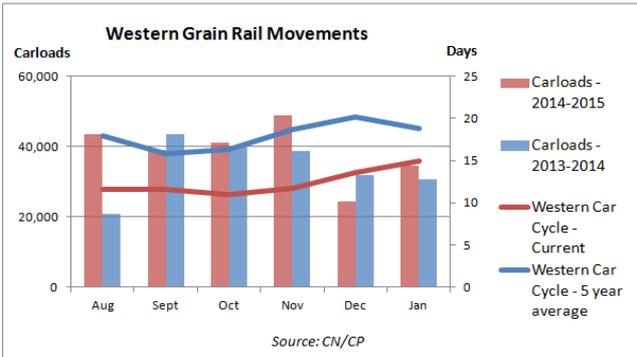


➤ Although 2014-15 crop production is 25% less than in 2013-14, the large carry-out stocks from last crop year is pushing the total supply above the 5 year average.

➤ Transport Canada is calculating the total grain to be moved from Prairie elevators based on the Prairie elevators' receipts and average stocks. In January, the total grain to move was around 3 MMT, slightly higher than in December. Grain rail shipments in January were close to the total grain to be moved from the Prairie elevators but lower than the 5 year average.

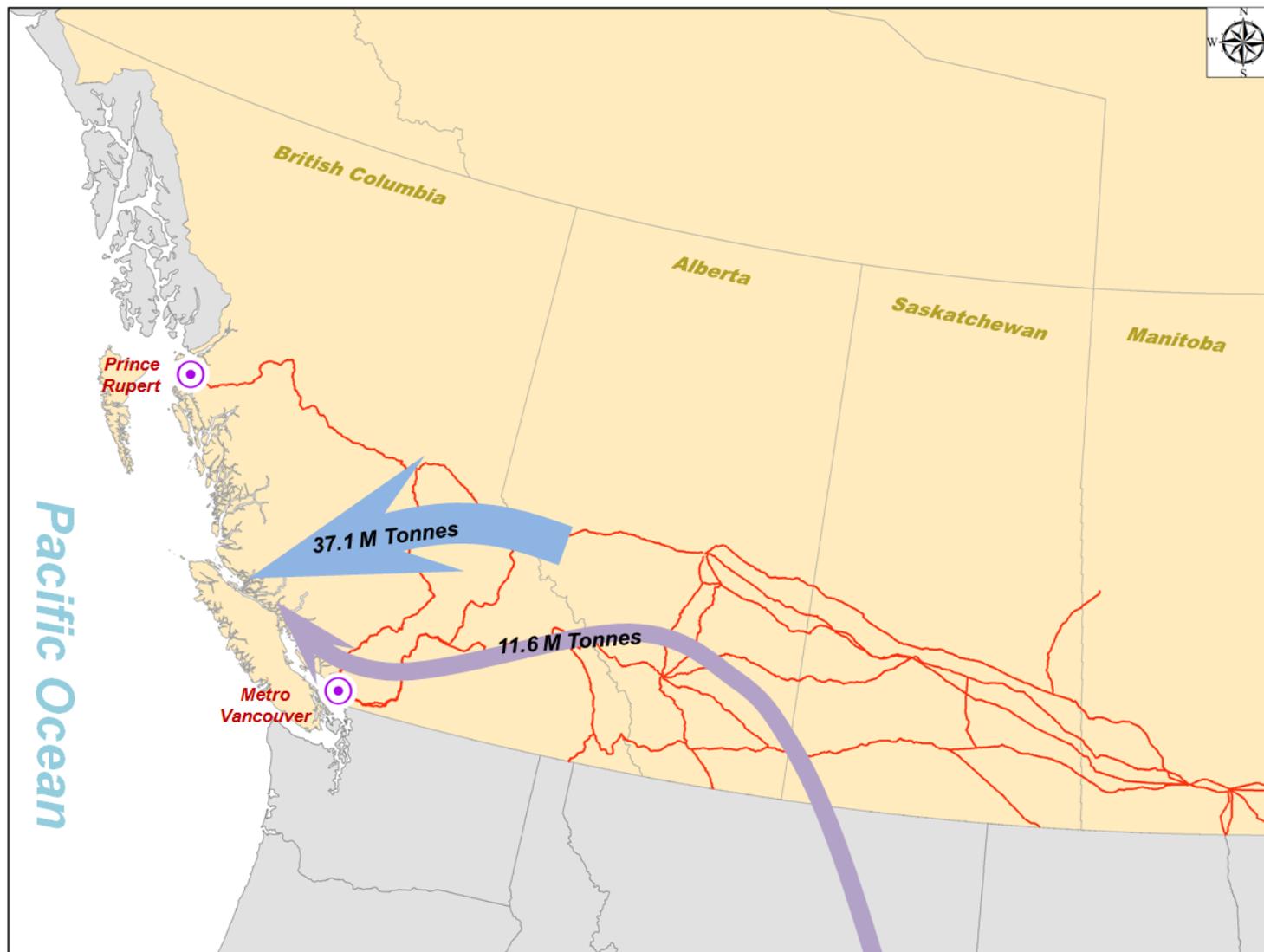
➤ The rail system is so far fluid. The corridor analysis of Western grain movements also confirms that the rail system is responding well to the current grain volume.

➤ Activities at Port Metro Vancouver are also fluid. The total average time for grain vessels in port waters is under 15 days (considered as a threshold) and forward view of vessel capacity calling at Port Metro Vancouver is comparable to the average for the month.





O/D Rail Flows 2013: Coal





Commodity Supply Chain Analysis: Key Metrics - The Case of Coal and Potash

Rail based:	Unit of Measurement:	To be Provided By:
Demand – forward looking	(tonnes – Taken from public source e.g. Federal Government Departments)	Railways
Train set loading time	(hrs)	Railways
Train set transit time to terminal (loaded)	(hrs)	Railways
Train set port time	(hrs)	Railways
# of trains and # of cars unloaded	(# per day)	Railways
Train set transit time to mine (empty)	(hrs)	Railways
Marine Terminal based:	Unit of Measurement:	To be Provided By:
Number of railcars unloaded	(railcars)	Terminals
# of days / hrs worked at port unloading rail cars, loading vessels	(# per year, by commodity)	Terminals
Proportion of shipments direct to vessel	(%)	Terminals
Throughput capacity, working capacity	(TBD)	Terminals
Port based:	Unit of Measurement:	To be Provided By:
# of vessels in port waters	# (TC has this)	Ports
Time at berth and at anchor	(hrs / NOR – notice of readiness)	Ports



Early Results: Fluidity Concept and Examples

- ❑ Emergence of global freight supply chains requires an understanding of the reliability, variability and resiliency of geographically dispersed transportation and logistics systems.

- ❑ Fluidity indicators are a suite of multi-modal, integrated supply chain tools that measure in near-real time the performance of individual segments of the supply chains as well as end-to-end transit time of freight flows. Also, it builds on historical flows to provide a predictor of the same flow in a multimodal context.

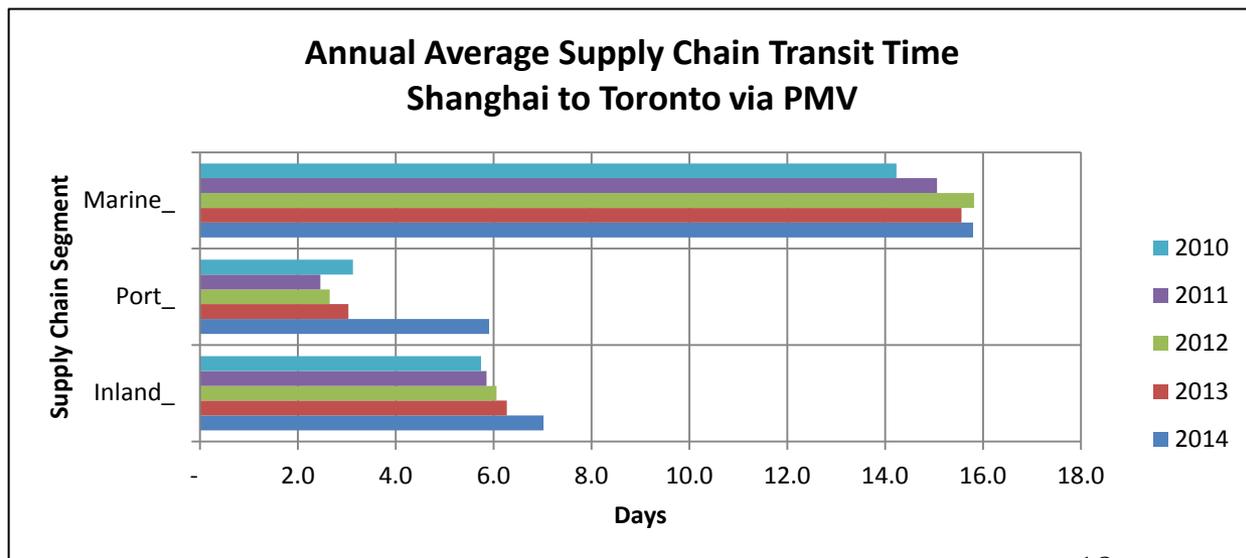
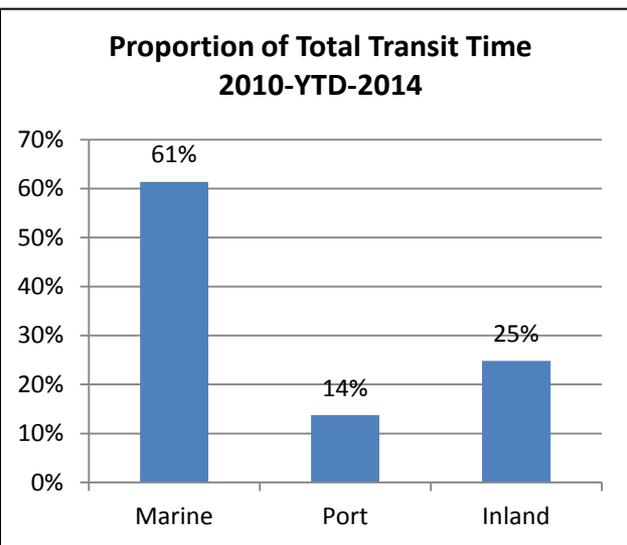
- ❑ Examples of fluidity analysis
 - ✓ Reliability and variability in transit times
 - ✓ Identification of bottlenecks/impediments
 - ✓ Immediate and residual impacts of disruptions to the transportation network
 - ✓ Effect of routing on marine transit times and vessel reliability
 - ✓ Estimating border wait times
 - ✓ Measuring carbon footprint
 - ✓ Benchmarking: comparing push versus pull inventory model



Import Containers: Total Transit Time from Shanghai to Toronto via Port Metro Vancouver 2010- 2014

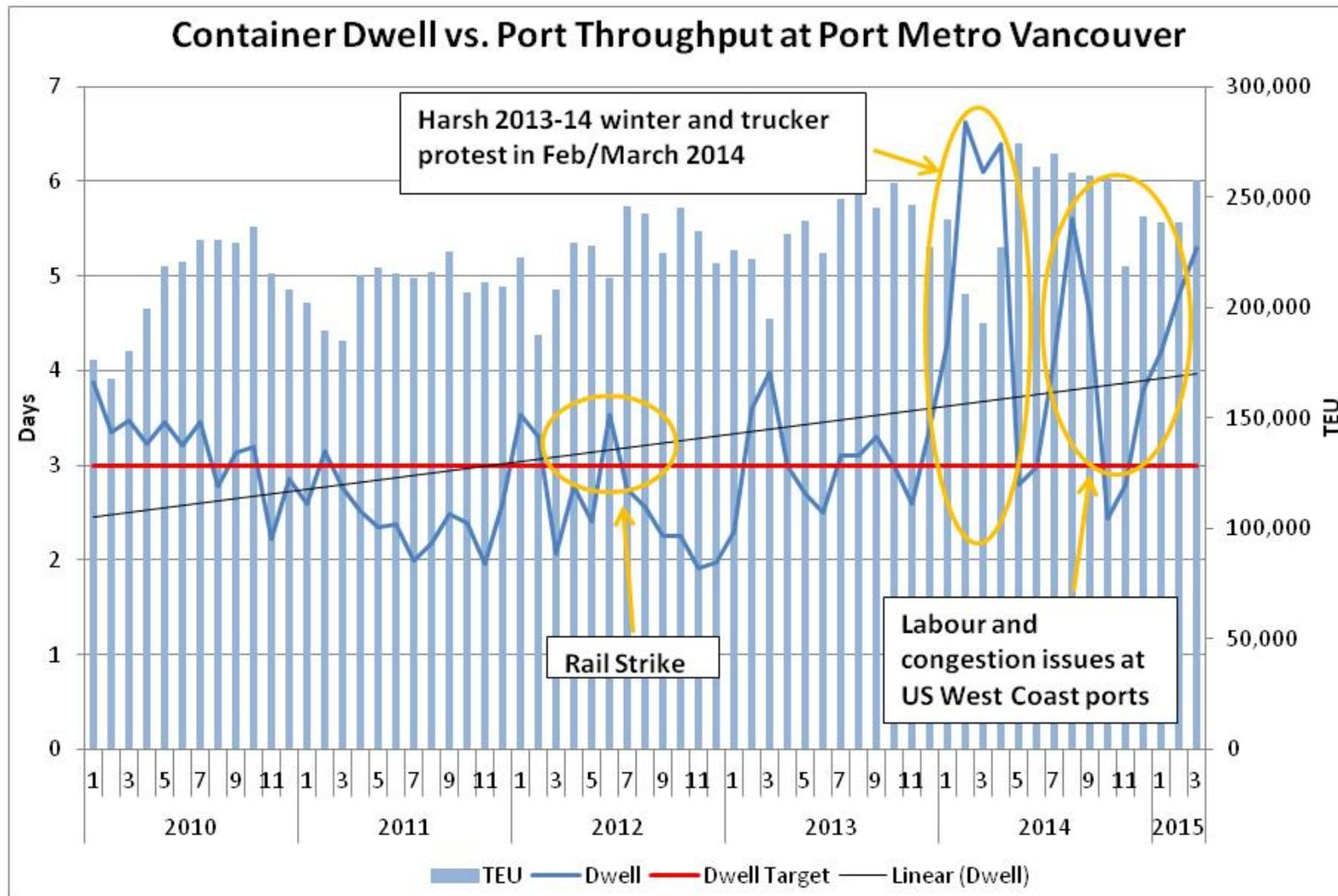
Year	Marine	% Change	Port	% Change	Inland	% Change	Total	% Change
2010	14.23	N.A.	3.12	N.A.	5.74	N.A.	23.09	N.A.
2011	15.06	5.8%	2.46	-21.3%	5.86	2.0%	23.38	1.3%
2012	15.82	5.0%	2.65	7.7%	6.06	3.4%	24.53	4.9%
2013	15.56	-1.6%	3.03	14.4%	6.27	3.5%	24.87	1.4%
2014	15.80	1.5%	5.91	94.9%	7.02	11.9%	28.73	15.5%

*Transit Time in Days



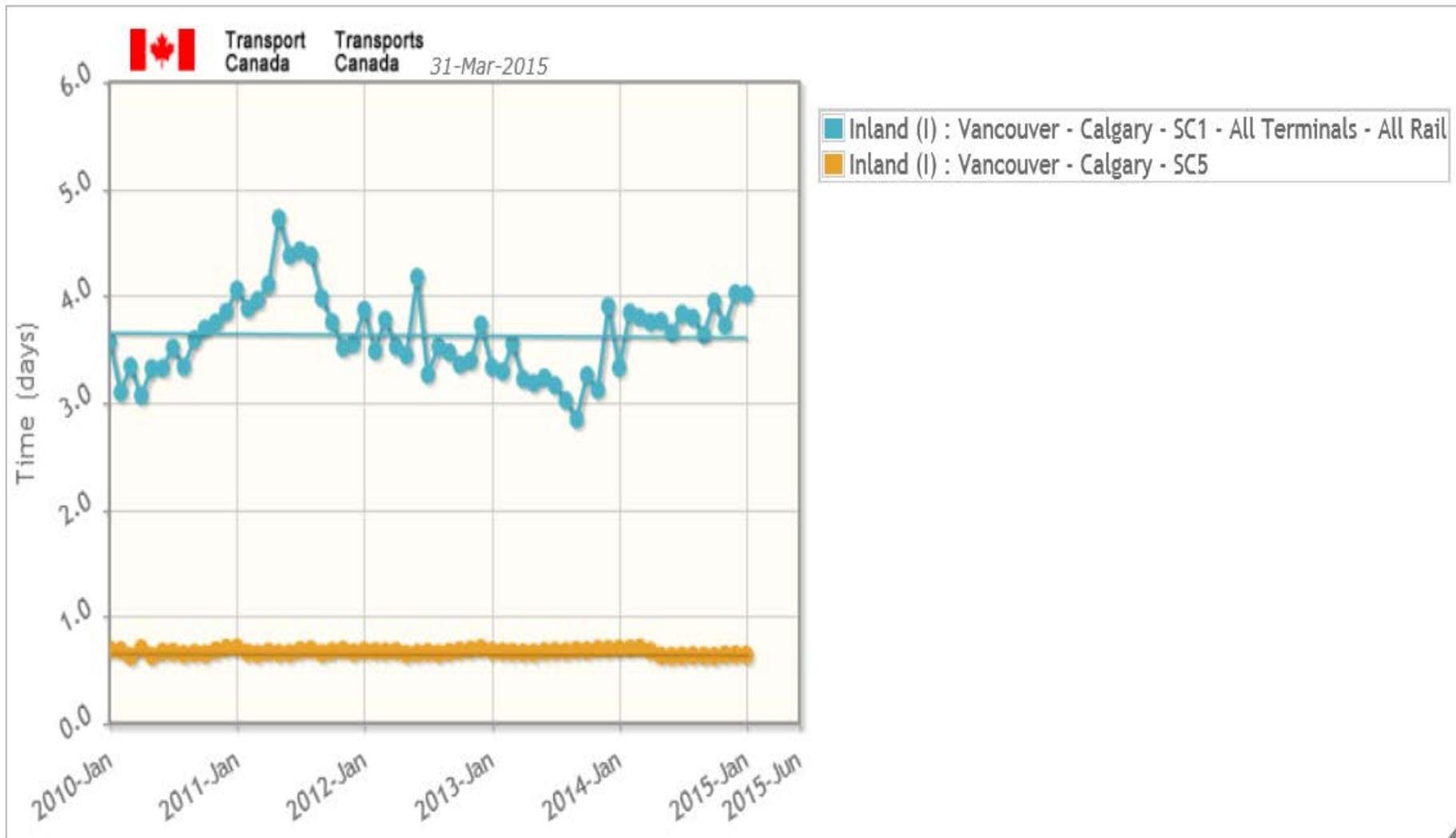
*Totals may not add due to rounding

Fluidity Import Containers: Disruptions and their Impacts



Source: Transport Canada Fluidity database. Please note the data presented is an aggregate of both class 1 rail carriers.

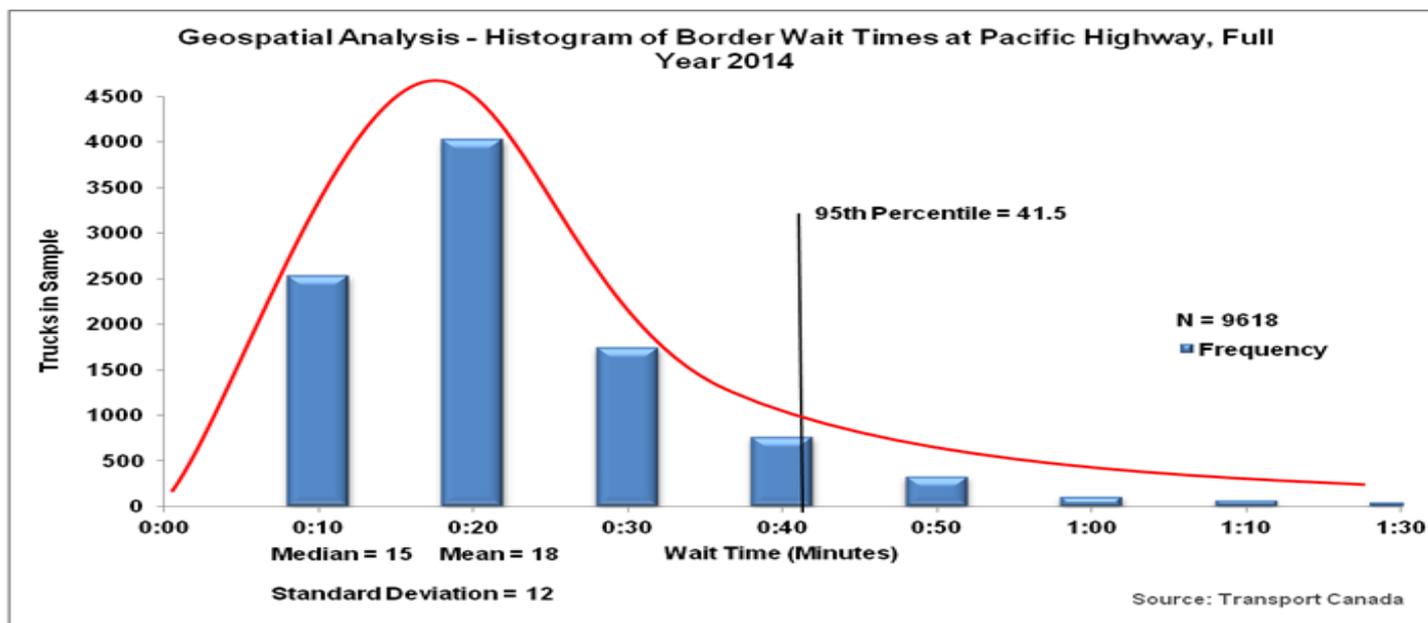
Fluidity Import Containers: Options for Inland Transportation



Source: Transport Canada Fluidity database. Please note the data presented is an aggregate of both class 1 rail carriers.

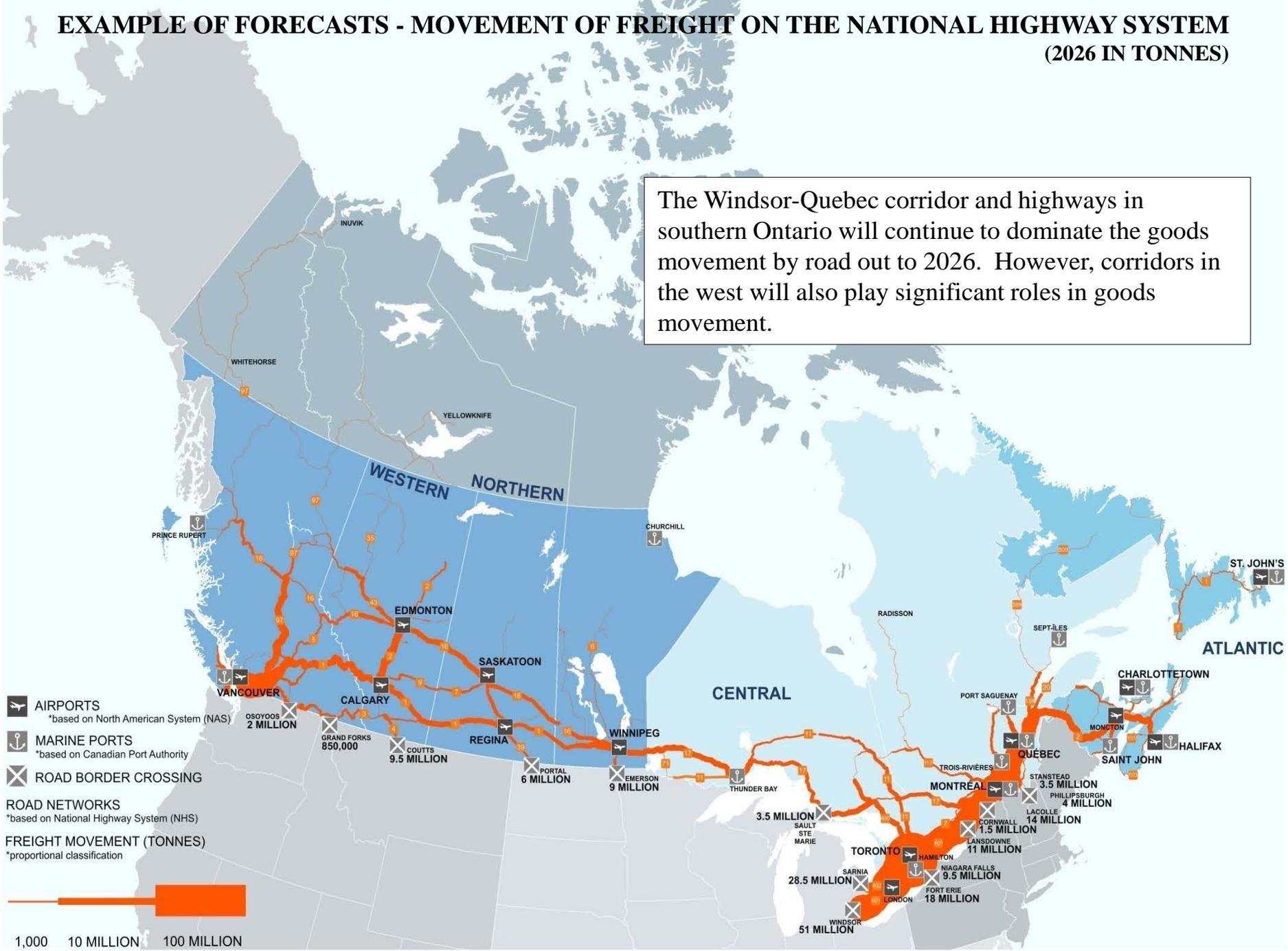
Canadian Borders

- ❑ Transport Canada is currently monitoring 13 border points: British Columbia (2), Alberta (1), Saskatchewan (1), Manitoba (1), Ontario (5), Quebec (2) and New Brunswick (1).
- ❑ Traffic increase at major Western Canada border crossings in 2014 was 3-6 %.
 - Currently, the border wait times are stable and traffic increase in that range is not expected to increase border wait times significantly.
- ❑ Further expansion of border traffic could exert pressures on border crossings with land or infrastructure constraints (such as the Pacific Highway).



EXAMPLE OF FORECASTS - MOVEMENT OF FREIGHT ON THE NATIONAL HIGHWAY SYSTEM (2026 IN TONNES)

The Windsor-Quebec corridor and highways in southern Ontario will continue to dominate the goods movement by road out to 2026. However, corridors in the west will also play significant roles in goods movement.





Transportation Sector: Challenges

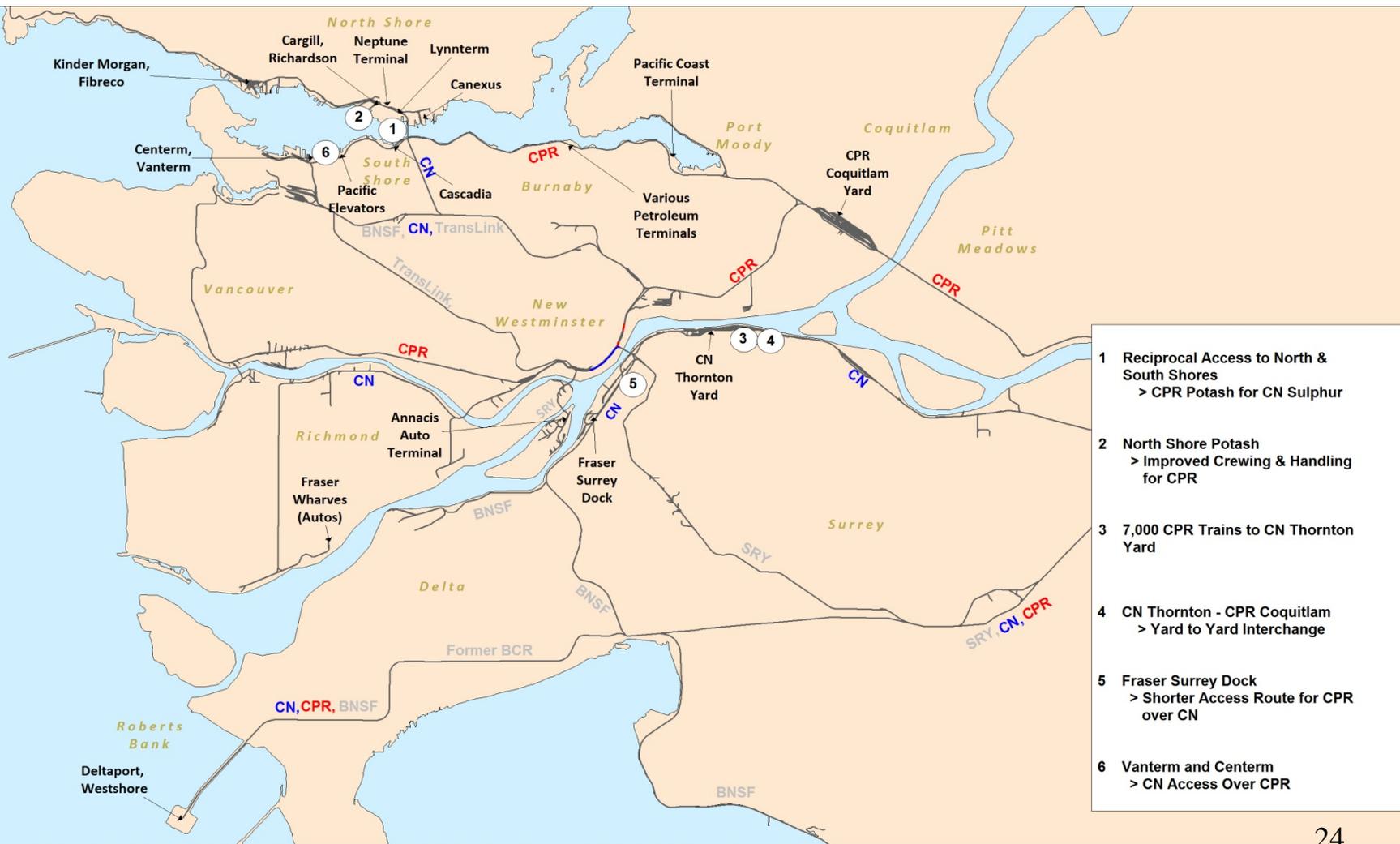
- ❑ **Accessibility to market: Trade**
 - Key commodities – domestic/international
 - Energy – domestic/international

- ❑ **Supply chain performance/resilience/connectivity**
 - Growing complexity of global supply chains
 - Direct/Indirect access to global supply chains
 - Vulnerability of supply chains to unexpected events

- ❑ **Coordination/Planning of transportation capacity**

- ❑ **Some specific transportation sector challenges**
 - Port Metro Vancouver and multi-modal functions in the Lower Mainland
 - Pressures on the East-West rail corridor due to expected commodity growth
 - Market access issue for energy
 - Increased congestion in urban areas
 - Domestic road system and the National Highway System

A Multimodal System Approach to define Capacity





Next Steps

- ❑ Quantify the Capacity of the Transportation System in a Policy Context
- ❑ Quantify the Performance of Supply Chain Commodities to meet expected needs
- ❑ Forecast demand for transportation and assess the impact of that forecast on the capacity and performance of the system against evidence-based historical