



Trans Mountain Expansion Project

Salish Sea Workshop - January 7, 2015
Risk Analysis and Intended Methods of Reducing Risk



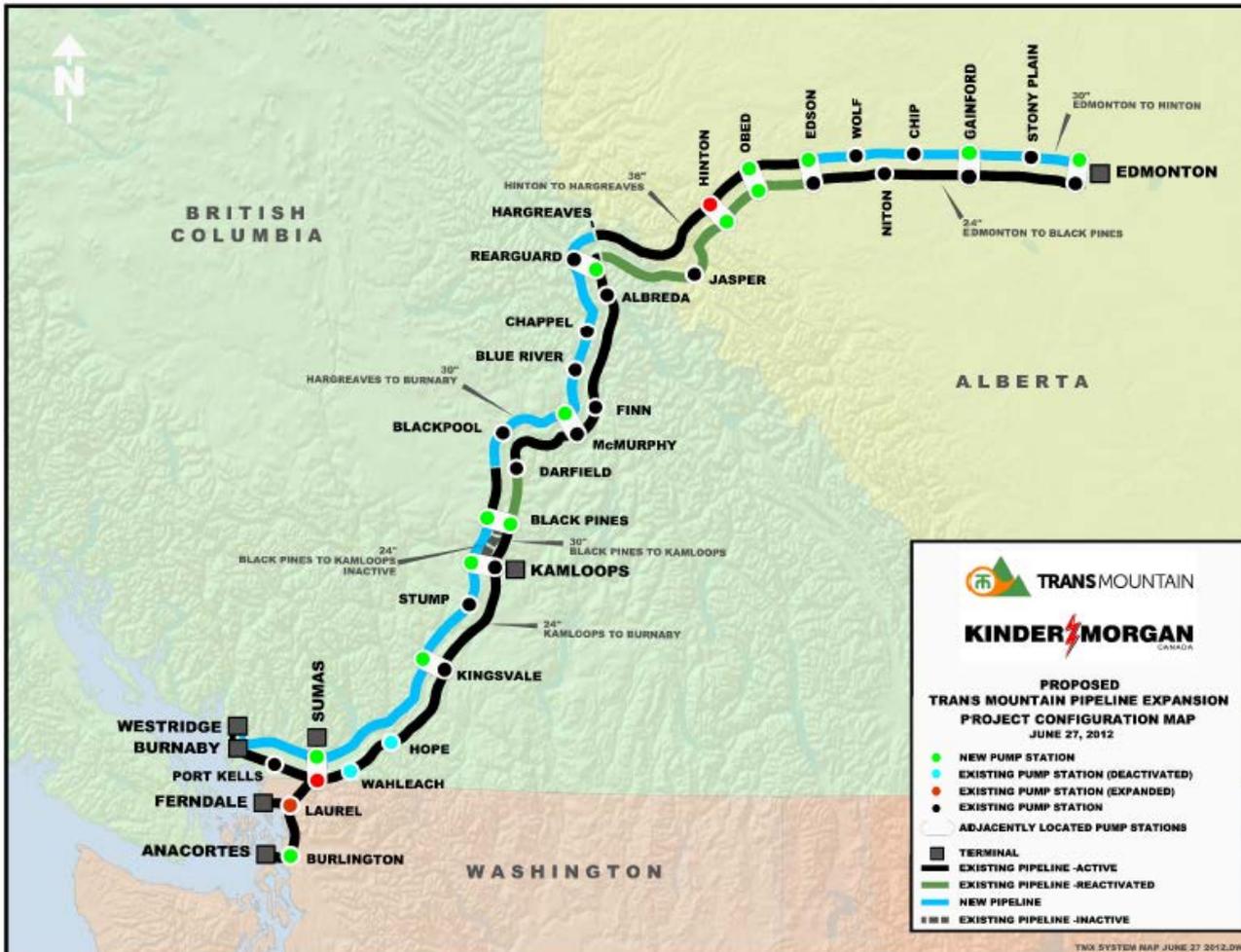
Agenda



- Project Overview
- TERMPOL
- Marine Risk Assessment
- Q & A

“Information provided in this presentation is not meant to prejudice or modify material contained in the facilities application submitted by Trans Mountain to the National Energy Board. For details on any of the items discussed here please refer to the application, including Termpol submission material.”

Trans Mountain Pipeline



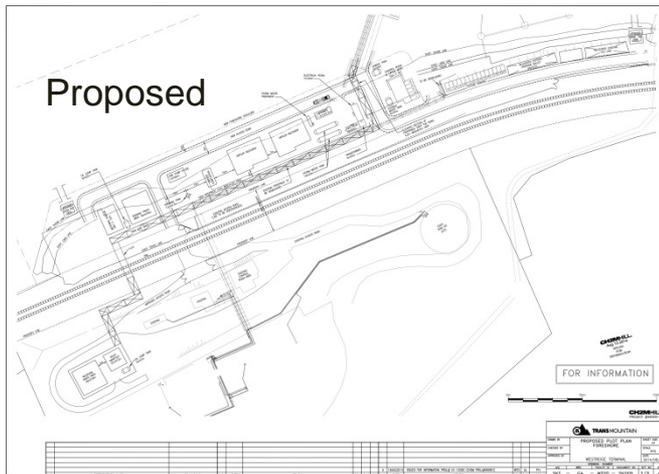
Proposed Expansion

- Expand capacity to 890,000 bpd
- Customer contracts for ~ 700,000 bpd on 15 and 20 year terms
- Increased demand from US west coast and Asia
- Twin remaining 987 Km of pipeline
- Increase pumping capability
- Increase storage capacity
- Increase in tanker traffic - not tanker size

Current Operations

- Operating since 1953
- Capacity: 300,000 bpd
- 1150 Km between Edmonton and Burnaby
- Ferndale and Anacortes
- Transports refined products, heavy and light crude oils including dilbit
- Last expanded in 2008

Westridge Marine Terminal



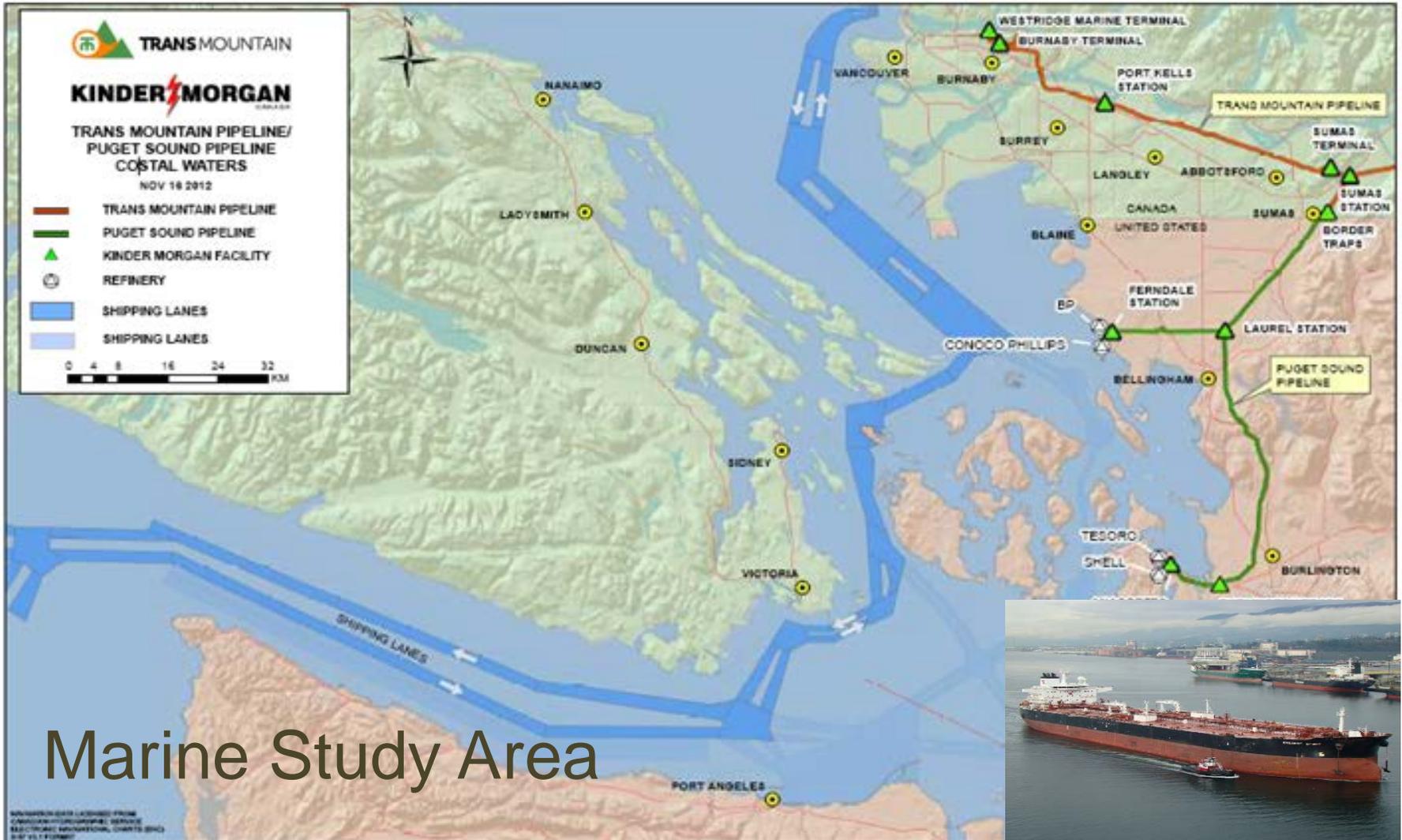
Project Timeline



PROPOSED TRANS MOUNTAIN EXPANSION PROJECT AND THE NEB TIMELINE



Marine Transportation



Marine Study Area

Current Operations
 About 5 tankers /month

Future Operations
 Up to 34 partially laden Aframax /month

Same
 Route, Products, Vessel Size

Regulatory Review



TMEP is undergoing a review by the National Energy Board; the scope of which includes the marine effects of the Project:

- *The potential environmental and socio-economic effects of marine shipping activities that would result from the proposed project, including the potential effects of accidents or malfunctions that may occur.*
- *Potential impacts of the project on Aboriginal interests.*
- *Contingency planning for spills, accidents or malfunctions, during construction and operation of the project.*

TMEP requested a TERMPOL review and submitted these studies as part of its NEB application:

- **TERMPOL** – *Technical Review Process of Marine Terminal Systems and Transshipment Sites;*
- A voluntary review that focuses on the marine transportation components;
- Suite of studies submitted includes a Quantitative Risk Assessment by Det Norske Veritas;
- Transport Canada chairs a committee of federal agencies to review and report on the submission;
- Termpol Review Committee report was submitted to NEB in December 2014;
- Termpol Studies and the Review Committee form part of the record for the NEB hearing.

Marine Risk Assessment

Key components:

- Review global and regional casualty data;
- Review existing marine network;
- Identify Hazards within network (two HazID sessions);
- Quantify network traffic;
- Consider current safety measures;
- Forecast marine traffic (2018, 2028);
- Quantify current and future marine incident frequency;
- Quantify current and future cargo oil spill frequency;
- Determine hypothetical spill volumes – identify credible worst case;
- Research into fate and behaviour of oil cargo (Diluted Bitumen);
- Undertake spill modeling;
- Consider consequences of CWC oil spill;
- Propose additional precautionary measures to mitigate risk.

TERMPOL Review



TERMPOL Review Committee for TMEP:

- Transport Canada;
- Fisheries and Oceans Canada;
- Canadian Coast Guard;
- Environment Canada;
- Canadian Hydrographic Service;
- Pacific Pilotage Authority Canada;
- British Columbia Coast Pilots; and
- Port Metro Vancouver.

TERMPOL Report was issued in December, 2014:

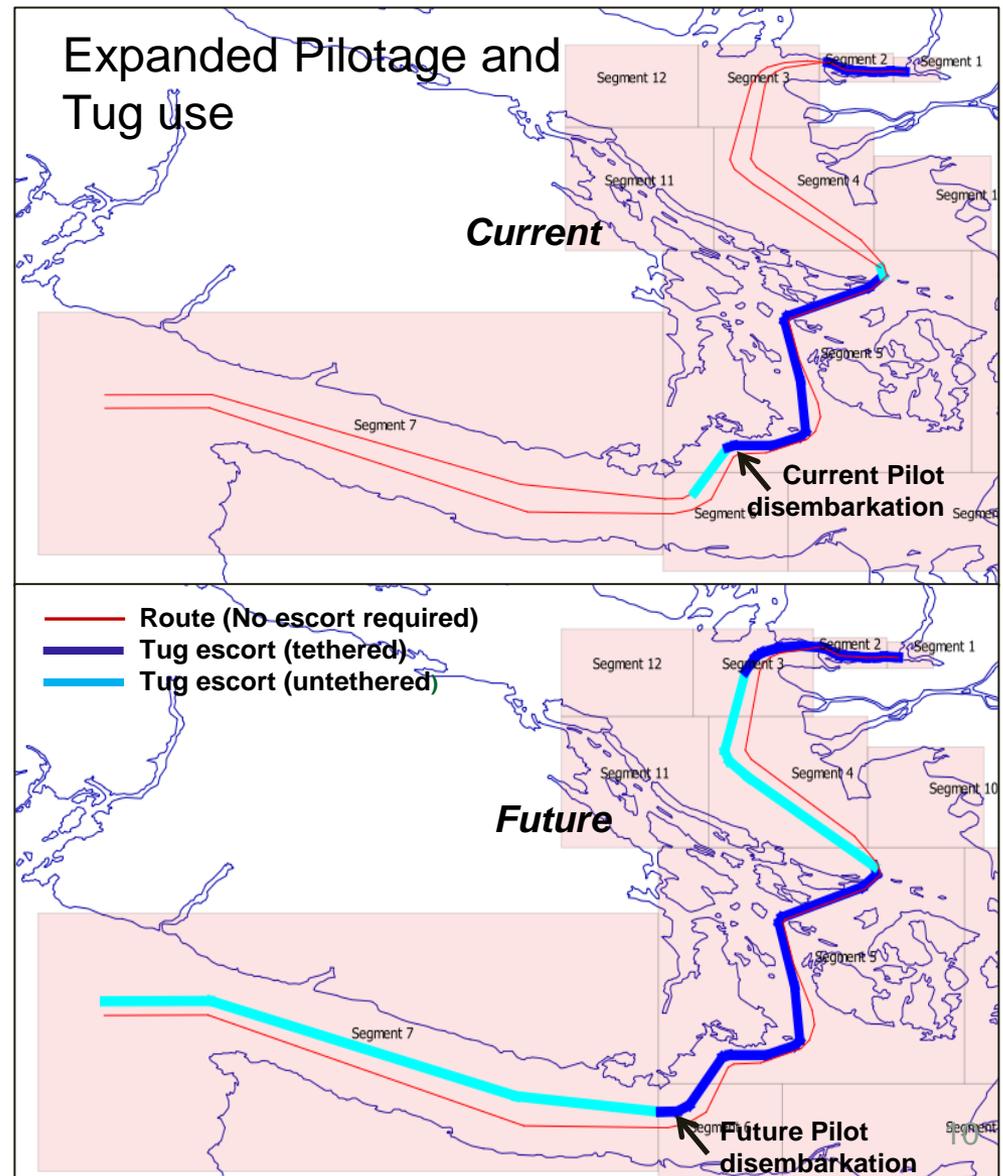
The TRC does not consider the overall increase in marine traffic levels to be an issue; however, it does support additional measures to promote shared safe use of the Project's preferred shipping route. Many of the measures go beyond regulatory requirements, and include:

- *Extended use of tethered and untethered tug escort;*
- *Extension of the pilot disembarkation zone;*
- *Safety calls by laden tankers when in transit ...*

TERMPOL Report



- Recommendations – 17
- Findings – 31
- Endorses expanded use of tethered and untethered tug escort;
- Endorses extension of pilot disembarkation zone;
- Recommends enhanced situational awareness (ESA);
 - Safety calls by laden tankers;
 - Notices to industry;
 - Engagement and awareness strategy led by PPA;
 - More use of AIS and radar reflector by smaller vessels.
- Does not endorse introduction of Moving Exclusion Zone.



Trans Mountain Tankers

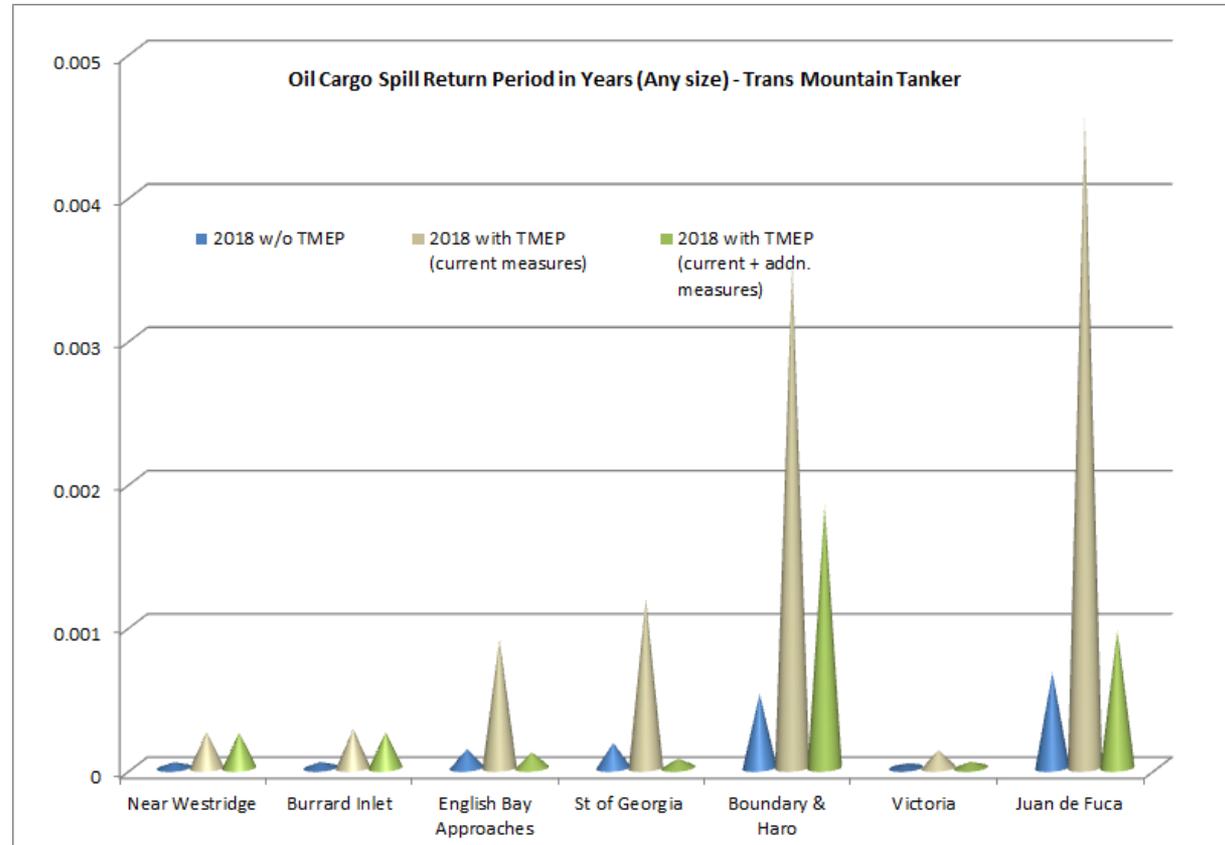


Refined Quantitative Risk Assessment

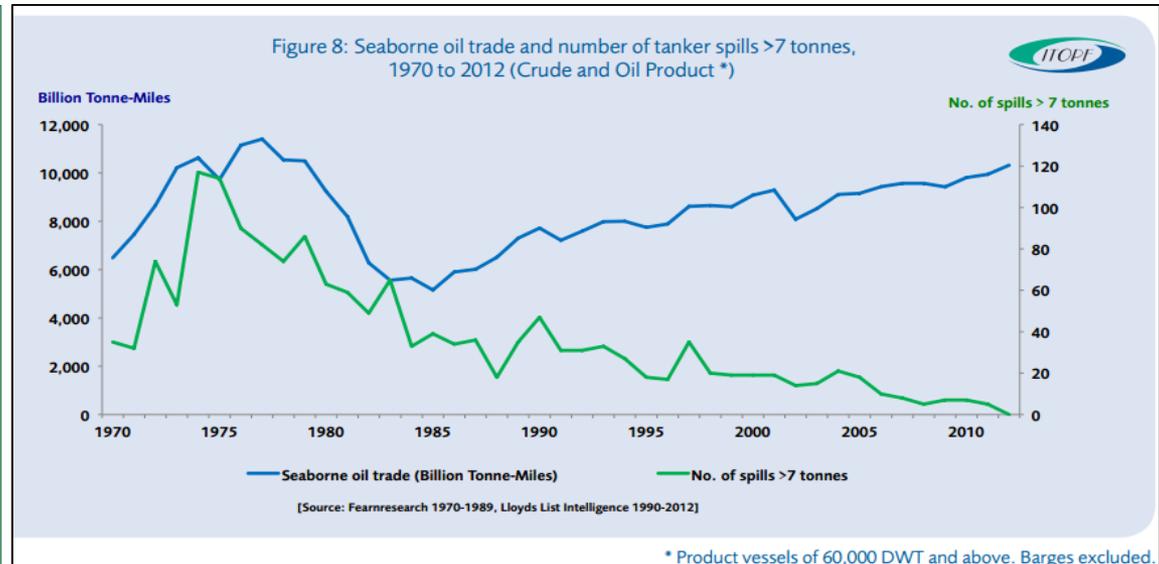
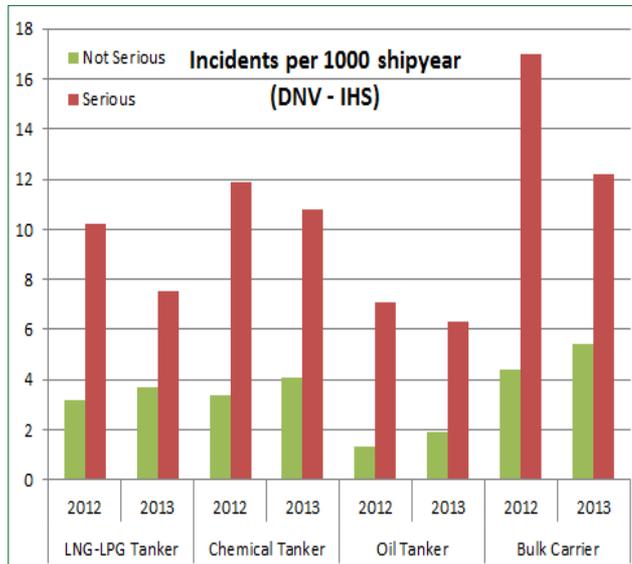
- Refined modelling conducted in response to Round 1 Information Responses
- Termpol endorsement of ESA instead of MEZ
- Results filed with NEB on January 2, 2015

Oil Cargo Spill frequency (Any size) estimated as 1 in 284 years;

16,500 m³ Oil Cargo Spill frequency (CWC) estimated as 1 in 2841 years.



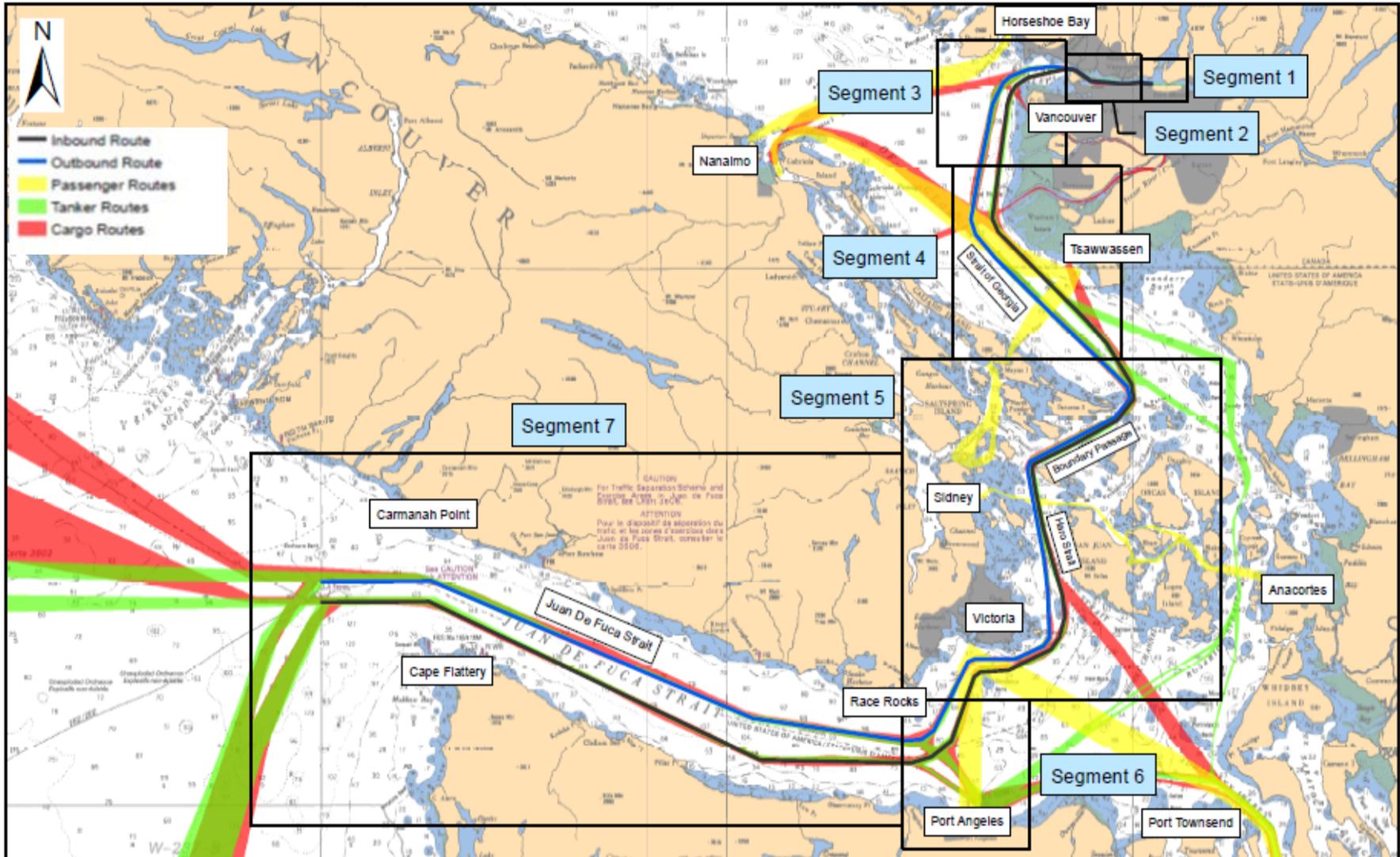
Global Tanker Safety Record



- Strong safety record
- Continuous improvement

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Western region										
Shipping accidents	125	125	124	102	109	114	89	90	77	90
Accidents aboard ship	15	14	15	20	15	21	13	10	16	20
Vessels involved in shipping accidents	135	145	142	116	131	127	97	104	88	107
Cargo	3	2	9	3	3	9	5	4	10	6
Bulk carrier/Ore-bulk-oil (OBO) carrier	7	3	3	2	4	5	0	2	4	1
Tanker	0	0	0	0	0	1	0	0	0	0
Ferry/Passenger	19	26	24	12	15	15	9	13	9	10
Tug/Barge	31	34	38	42	48	24	23	28	20	29
Fishing	65	71	52	43	54	49	48	39	34	36
Other	10	9	16	14	7	24	12	18	11	24
Vessels lost	6	8	15	11	10	8	5	3	6	4
Fatalities	8	7	6	8	9	6	6	6	4	2
Incidents	98	87	84	68	146	111	117	119	127	164

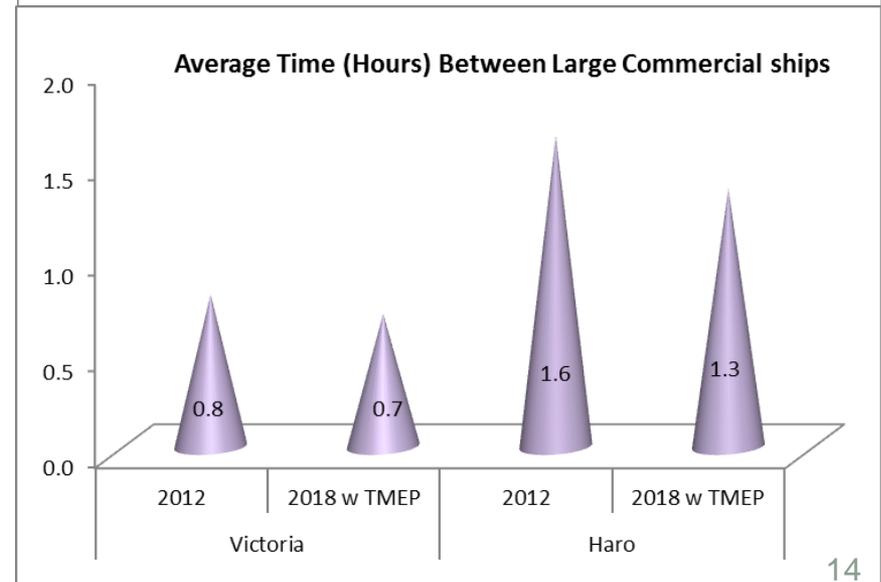
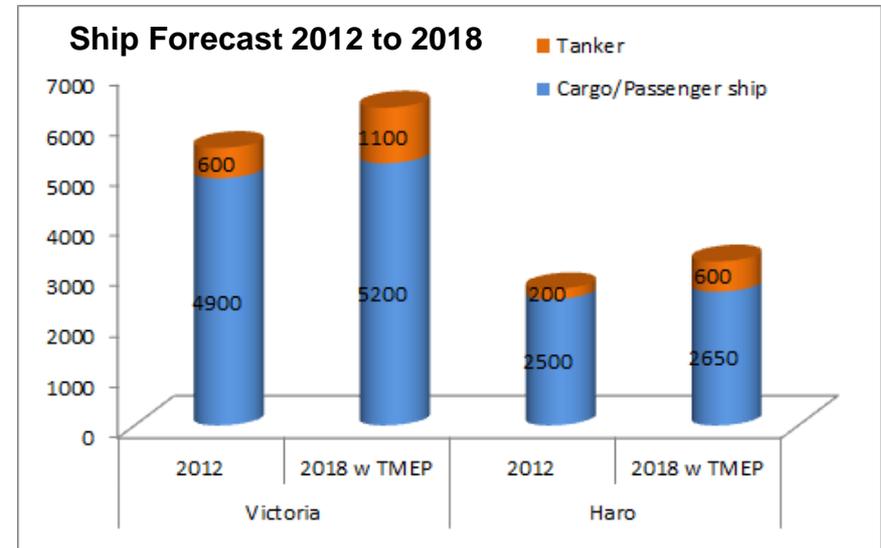
Regional Marine Network



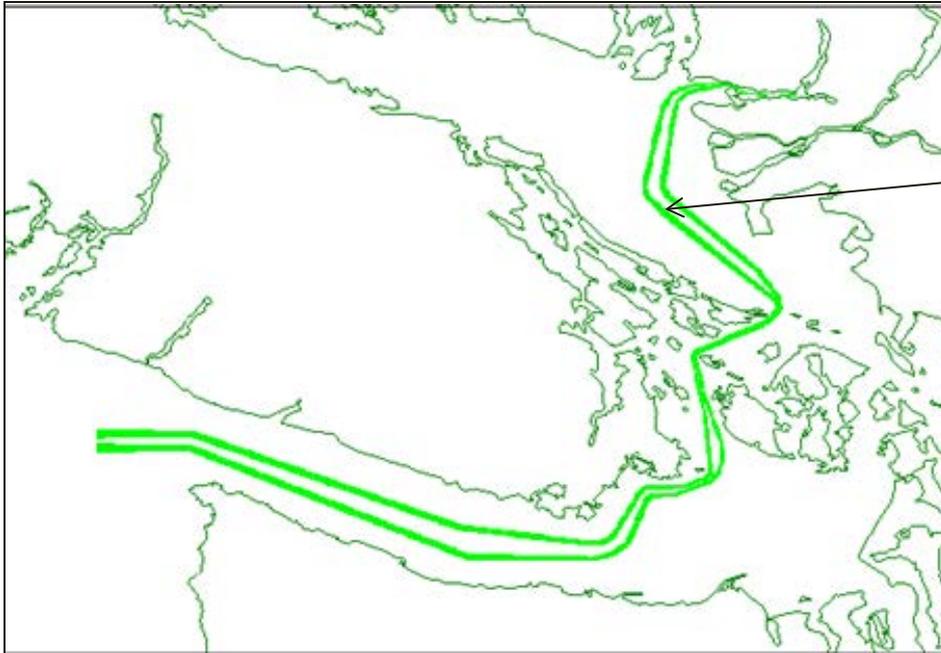
Regional Marine Network



- Aframax tankers and larger vessels safely operate in the established network;
- 15 – 20% increase in ships between 2012 and 2018 (post TMEP)
- Currently ~ 600 tankers per year;
- Post 2018 ~1100 per year (all tankers);
- Increase of ~ 85%;
- Large commercial vessels currently transit Boundary Pass / Haro Strait on average about once every 96 minutes;
- With TMEP, in 2018, average transit frequency will be about once every 78 minutes

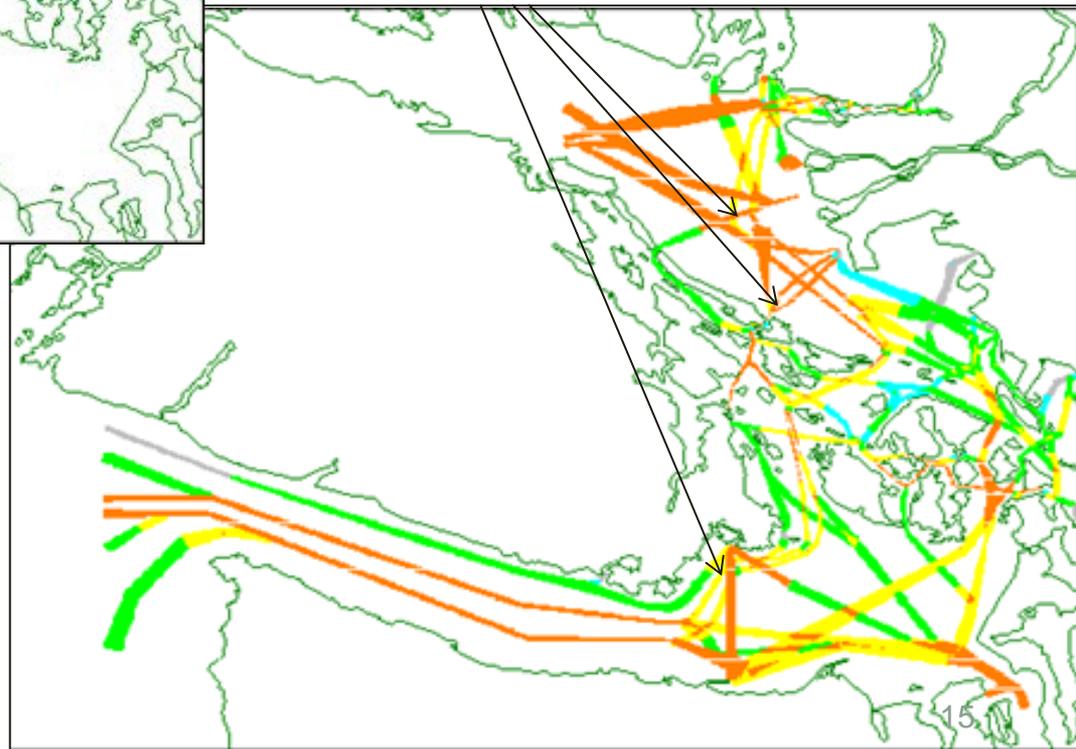


Shipping Route Review



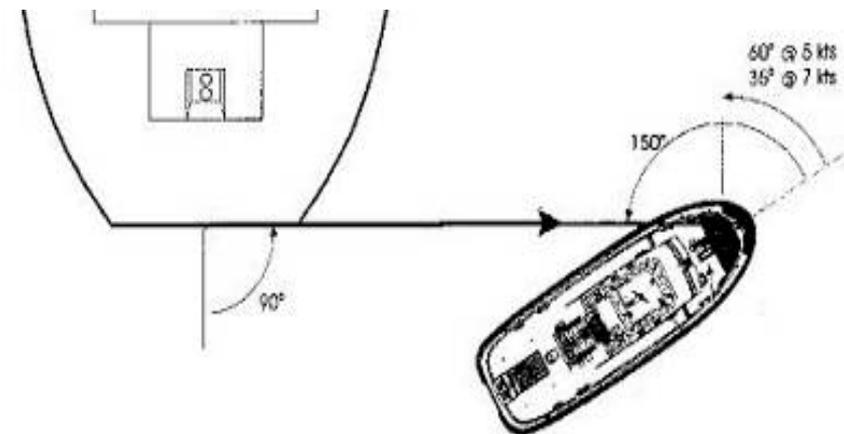
- Highly effective CVTS;
- TSS separates opposing traffic;
- All vessels must follow CollRegs.;
- Tankers form a small percentage;
- Many small vessels (e.g. fishers);
- Several Traffic Crossing Locations;

- All vessels must remain situationally aware



Robust Marine Safety Measures Exist

- Must meet TM Tanker Acceptance;
- Must be Double Hulled;
- Must enroll to SiRe Program;
- Must comply with ALL International and Local laws/regulations (IMO, Transport Canada, PMV);
- Must have WCMRC agreement;
- Must advise CG prior/upon arrival;
- Must follow CVTS, use TSS;
- Must take licensed pilot
 - > 7 years experience, PPU
 - 2 pilots for laden tankers
- Must take tug escort (PPA/PMV);
- Must have ECDIS/Radar
- Must follow Best Practices (ISGOTT)
- Must be instructed by Loading Master



Conclusions



- Existing navigation route is well established with robust traffic management system in place;
- Route choke points are identified and well managed;
- Current risk reduction measures for TMEP tankers already of global standards - enhancements will further improve the regime;
- TMEP Termopol Report issued by Transport Canada:
“The TRC does not consider the overall increase in marine traffic levels to be an issue; however, it does support additional measures to promote shared safe use of the Project’s preferred shipping route.”

“The existing Canadian marine laws and regulations, including international frameworks, complemented by the enhanced safety measures Trans Mountain has in place or is committed to implementing and the recommendations contained within this report will provide for safer shipping in support of the proposed Project.”



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For details on any of the items discussed here please refer to the studies and information submitted by Trans Mountain to the Termpol Review Committee.