

## Conclusion

The 2015 VTRA final report provides an information source to help government, tribes, and stakeholders answer complex and location-specific risk management questions. The report offers valuable insight into relative changes in risk, and potential benefits that could be realized by a portfolio approach to risk reduction. Ecology continues to work collaboratively with federal and state government agencies, tribes, stakeholders and the public to prevent oil spills to Washington waters.



*Bulk cargo ship on Puget Sound  
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# 2015 Vessel Traffic Risk Assessment (2015 VTRA) Final Report Summary



*Container ship in Puget Sound*

## FACTS, CONTACTS, AND OTHER INFORMATION

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## Background

Ecology sponsored the 2015 VTRA, which provides updated information about the risks of oil spills from commercial vessel traffic currently operating on the Salish Sea. It also models potential impacts from planned future developments as well as potential benefits from a variety of spill prevention measures. The assessment was conducted by principal investigators from George Washington University and Virginia Commonwealth University. A workgroup with representatives from government, tribal, industry, and environmental organizations provided input and guidance to Ecology and the principal investigators. This updated assessment is based on 2015 vessel traffic data, and builds upon previous assessments that incorporated vessel traffic data from 2005 and 2010.

## Context

The Salish Sea, including the marine waters east of the entrance to the Strait of Juan de Fuca, and extending from Olympia, Washington in the south to Desolation Sound, BC in the north, is internationally regarded for its ecological, economic, and cultural significance. We are proud to recognize there has not been a major oil spill in the Salish Sea from collisions or groundings for over 20 years.

This impressive record is a result of a comprehensive safety regime that includes international, federal, and state standards, and regional collaborative efforts by government, tribes, and stakeholders through forums such as the Puget Sound Harbor Safety Committee. At the same time, the unique ecosystem and resources of the Salish Sea are vulnerable to the damage an oil spill could cause. The high consequences demand continuing efforts to prevent an oil spill from occurring.

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### Role of the 2015 VTRA Workgroup

The workgroup's role in this project was to provide input and guidance to Ecology by assisting with development of what-if cases and risk mitigation measure inputs to the model, reviewing analysis results, and providing feedback on the draft and final reports.

#### Chair:

- Captain Stephan Moreno,\* Puget Sound Pilots

#### Federal advisors:

- US Coast Guard District 13
- US Coast Guard Sector Puget Sound

#### State and tribal leads:

- Makah Tribal Council
- Washington State Department of Ecology

#### Core workgroup members:

- American Waterways Operators
- BP
- Marine Exchange of Puget Sound
- Mulno Cove Consulting/Friends of the San Juans
- Pacific Merchant Shipping Association
- Puget Sound Partnership
- Puget Sound Pilots
- Puget Soundkeeper
- Tesoro
- Washington Association of Counties
- Washington Public Ports Association
- Wave/Friends of the Earth
- Western States Petroleum Association

\* through August 2016

### Process

The 2015 VTRA followed a collaborative analysis approach, using a quantitative risk analysis model developed by the principal investigators over the previous twelve years and two studies. The process included:

- Updating the Puget Sound VTRA model with 2015 vessel traffic data to create an understanding of the movements of commercial vessels in the Salish Sea, referred to as the "base case";
- Defining "what-if" cases that added potential vessel traffic to the base case to reflect marine terminal projects that could become operational by 2025;
- Identifying and modeling risk mitigation measures to provide information about their potential to reduce accidents and oil spill risks; and
- Providing estimates for the likelihood of accidents during one-, ten-, and 25-year periods, for different spill sizes.

The base case results serve as the basis for understanding existing conditions and comparing the effects of potential future changes. The primary what-if case added 1,600 cargo and tank vessels to 2015 traffic, to include 177 bunkering/fueling operations, representing potential projects in Washington and British Columbia. The 1,600 vessel what-if case represents approximately a 40% increase in the number of focus vessels (excluding oil barge counts) entering/leaving the Strait of Juan de Fuca at its western entrance.

After reviewing the what-if case model results, the workgroup, Ecology, and the principal investigators defined potential risk mitigation measures, which were organized into portfolios, or combinations of multiple measures. These include:

- Improvements to international and federal standards and practices for vessel safety and vessel traffic management that are in the process of being implemented;
- Rescue tug(s) for Haro Strait and Boundary Pass, stationed in Sidney, BC;
- Tug escort for articulated tug barges (ATBs) and towed oil barges in Puget Sound;
- Removal of the current size restriction (125,000 deadweight tons) on oil tankers in Puget Sound; and
- Escort of outbound tankers from Kinder Morgan's Westridge Marine Terminal to the Pacific Ocean.

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### Key points to consider:

- Results should be considered in the context of the assumptions used in the model, which are documented throughout the report.
- The 2015 VTRA process focused on prevention of accidents and oil spills. Oil spill trajectory and fate and effect modeling to show the environmental, economic, and cultural impacts of spills were not within the scope of this study.
- Oil spills from commercial vessels are "low probability/high consequence events."
  - Ninety-eight percent of accidents did not result in oil loss for both the base case and the 1,600 vessel what-if case. All of the potential oil loss evaluated in the model was the result of less than two percent of potential accidents.
  - Large spills are less likely than smaller spills. For the base case, the potential chances of one or more spills occurring in ten years are 0.5% for the largest spill size (average spill size of 1.8M gallons), 0.6% for a spill with an average size of 430,000 gallons, and 54% for a spill with an average size of 12,000 gallons.
  - The 1,600 what-if case showed an increase in potential accident frequency of 11% and an increase in potential oil loss of 85% compared to the base case. For this what-if case, the potential chances of one or more spills occurring in ten years are 1.4% for a spill with an average size of 1.4M gallons, 0.95% for a spill with an average size of 447,000 gallons, and 57.3% for a spill with an average size of 18,000 gallons.
  - These results are not predictions of how many or what size oil spills will occur. Rather, the model results show potential accident frequency and potential oil loss. The results provide a tool for tribes and stakeholders to compare potential differences between the base case, what-if cases, and risk mitigation measures.
- Risk varies by geographic area. For the 1,600 vessel what-if case, the largest increases in potential oil loss and potential accident frequency were at the entrance to the Strait of Juan de Fuca and in the Haro Strait/Boundary Pass waterway zone. The largest increase in potential oil loss by volume was in the Haro Strait/Boundary Pass waterway zone.
- Risk in a complex system is best managed systemically. While the effectiveness of risk mitigation measures varied across the geographic areas, the greatest overall reductions in potential oil loss came from a combined portfolio of five risk mitigation measures (listed under "Process"), rather than any single action.
  - Within the portfolio of five risk mitigation measures, the measure intended to approximate current and pending improvements to vessel traffic management and vessel safety had the greatest effect. However, regulatory changes are difficult to model quantitatively. The model makes "maximum benefit" assumptions about the potential effect of these pending changes. This assumption was not used in other risk mitigation measures.
  - Removing the 125,000 deadweight ton restriction on oil tankers in the Puget Sound was shown to increase potential oil loss.
  - Tug escorts for articulated tug barges and towed oil barges reduced potential accidents by 15% and potential oil loss by 3%, compared to the 1,600 vessel what-if case.
- Although a rescue tug stationed in Sidney, BC showed limited effectiveness as modeled in the study, the graphical representations of approximate escort coverage in the report could inform future discussions of rescue tugs.

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