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May 2nd, 1:30 PM - 3:00 PM

Collaborative Efforts to Pinpoint, Quantify and Proactively Manage Risk Through a Comprehensive Vessel Traffic Risk Assessment for Puget Sound

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Collaborative efforts to pinpoint, quantify, and proactively manage risk through a comprehensive vessel traffic risk assessment for Puget Sound

Todd Hass, PhD

**Program Manager: Marine and Nearshore Special Projects
Puget Sound Partnership**

Chad Bowechop, Manager: Office of Marine Affairs, Makah Tribe

Jon Neel, Senior Policy Analyst: Washington Department of Ecology

Outline:

- Roles, oil spill priorities
- VTRA “2010”
 - Background
 - Funding
- VTRA model/tool
 - Collaborative
 - ID potential changes in risks and effects of risk mitigation measures
- VTRA status (early, middle, late)
 - Report findings
 - Future steps

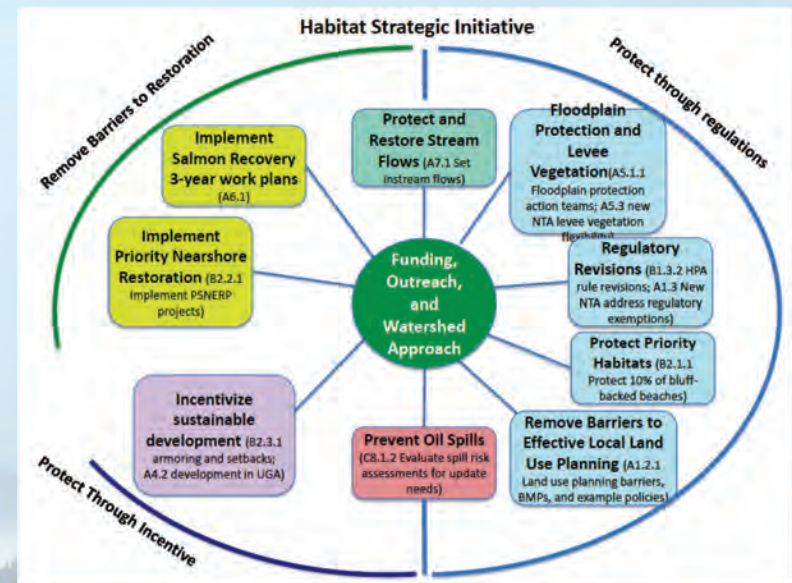
About PSP's role

Since 2009, the Legislature has asked the **Puget Sound Partnership** to:

- “independently assess and advise Washington State’s oil spill programs” through a *special advisory group*
- and...“Because this is a unique statewide program, the Partnership may invite participation from outside the Puget Sound region”

PSP formed an Oil Spill Work Group in 2010, and in the 2012 Action Agenda they recommended:

- the use of “maritime risk assessments and develop/apply risk reduction measures” (NTA C8.1.2)
- ECB ranked the NTA among the top 9 in the “Habitat Strategic Initiative”



VTRA Background...

Puget Sound Harbor Safety Committee (HSC)

mariners contributed expert judgment for the ~\$1M BP-Cherry Point VTRA study completed by GWU et al. in 2008...study released and presented to HSC in April 2012

Makah Tribal Council retained GWU via late-summer grant to researchers; updating the VTRA baseline traffic scenario from 2005 to 2010* and extending offshore

*2010 baseline – b/c last year of common data between US and Canadian vessel traffic services

Primary **funding** for VTRA...

–**US Environmental Protection Agency**

- Approved Makah Tribe's proposal to update with 2010 VTOSS data (US/Canada Vessel Traffic Service)
- \$200K to PSP (via Marine/Nearshore Lead Organization) to advance risk assessment and update VTRA

VTRA Steering Committee formed in fall 2012

- Integrating State and Federal regulatory agencies, Tribes, Industries, NGOs and Stakeholders into a VTRA update **process**
- Agreed that GWU VTRA is common language by which region evaluates relative maritime traffic risk system-wide
- Risk focus: probability not consequence

VTRA SC met every 5 weeks or so...

- PSP and PSHSC co-chair the Steering Committee
- Makah, Ecology and USCG were government leads, guiding the update process

Puget Sound Partnership VTRA 2010 Steering Committee

VTRA SC Co-Chairs

- Todd Hass (Puget Sound Partnership)
- John Veentjer (Puget Sound Harbor Safety Committee)

Governmental Leads

- Chip Boothe, Norm Davis, Jon Neel (Department of Ecology)
- CDR Matt Edwards, CAPT Scott Ferguson, LCDR Meridena Kauffman, CDR Kiley Ross, (US Coast Guard, Sector Seattle)
- R.E. McFarland (US Coast Guard, District 13)
- Chad Bowe chop³, Keith Ledford (Makah Nation, Native American Tribes)

Maritime sectors: Core Committee Members (organization)

- Environmental organizations: Fred Felleman³ (Friends of the Earth), Bruce Wishart (Washington Environmental Council)
- Labor: Lori Province (Washington State Labor Council)
- Local government: Mike Doherty³, Lovel Pratt, (WA Association of Counties)
- Petroleum industry: Frank Holmes³ (Western States Petroleum Industry), Ed Irish (Tesoro)
- Pilots: Del Mackenzie³, Jostein Kalvoy, Jonathan Ward (Puget Sound Pilots)
- Steamship lines: Mike Moore (Pacific Merchant Shipping Association)
- Tank vessels: Jeff Shaw (Polar Tankers)
- Tug and barge: George Clark (American Waterways Operators), Mark Homeyer (Crowley)

About the model:

(1) Collaborative vs adversarial analysis in environmental policy (Busenberg 1999)

- Adversarial (debate) approach led to “distorted communication” and ***stalemate***
- Collaborative approach gave all stakeholders oversight of joint research team—promoting mutually credible results and ***resolution***

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☑ Collaborative: cooperation [Ikert survey score: 4.2/5]

About the model:

(2) Past VTRA (van Dorp and Merrick 2009) quantified contribution of different **interventions** on reducing relative spill risk (oil outflow)

Risk reduction measures

Tug escort = ↓61.7%

Double hull = ↓23.6%

1-way zone = ↓6.3%

In: Annals of Operations Research, published online before print December 12, DOI: 10.1007/s10479-009-0678-1

On a Risk Management Analysis of Oil Spill Risk using Maritime Transportation System Simulation

J. René van Dorp^a, Jason R. W. Merrick^b,

^aDepartment of Engineering Management and Systems Engineering, The George Washington University

^bDepartment of Statistical Sciences & Operations Research, Virginia Commonwealth University

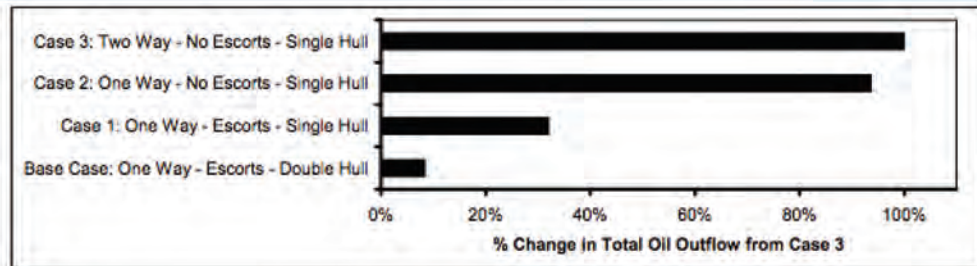
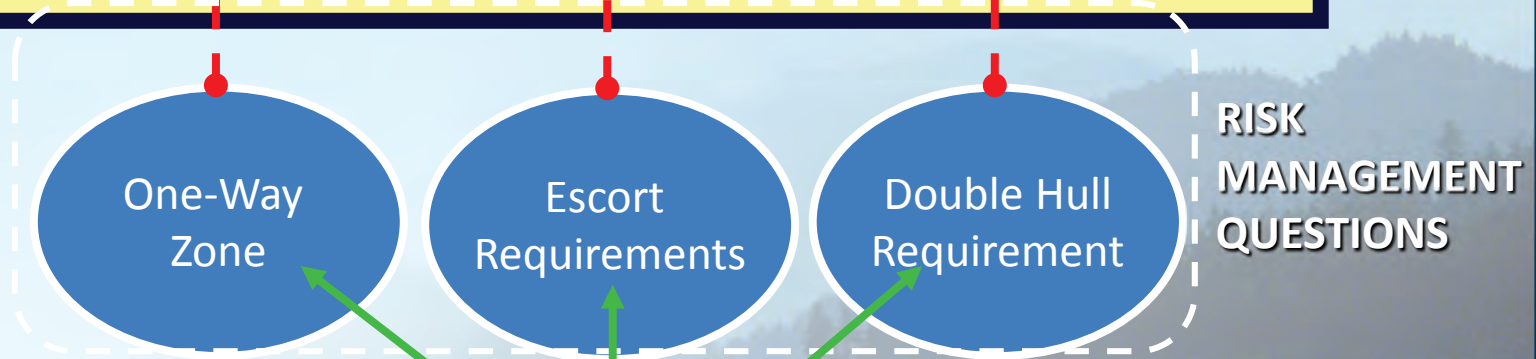
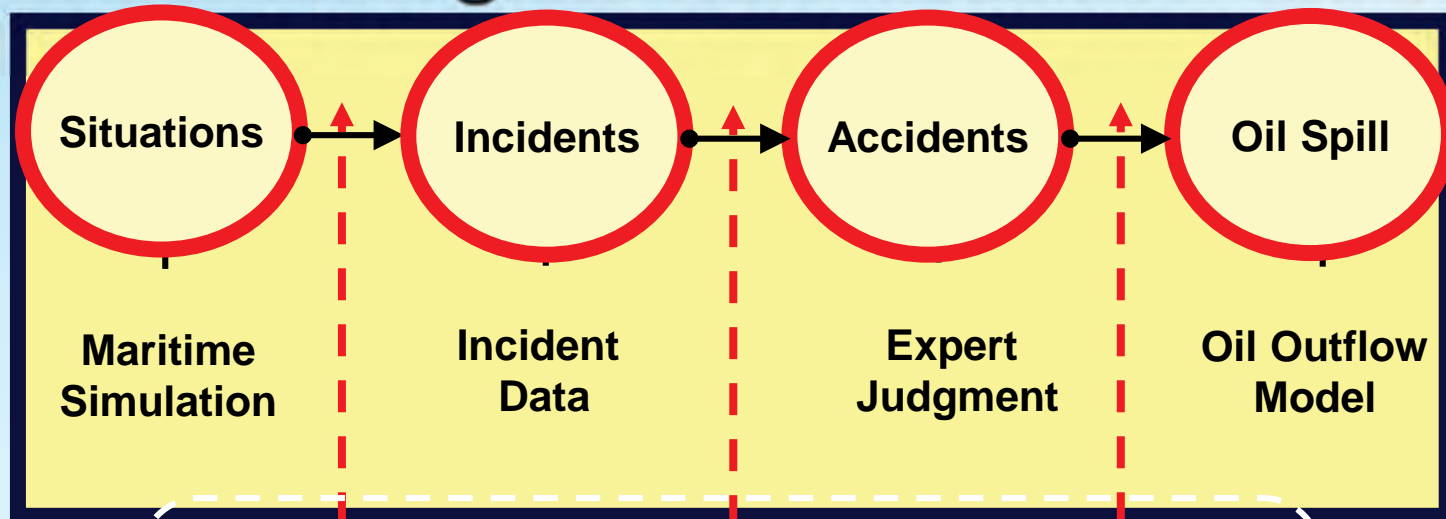


Figure 14. Total overage annual oil outflow (in m^3) separated by persistent oil (PO) and non-persistent oil (NPO) by VOI's, IV's and scenarios.

About the model:
(Slide 11) continued...



Risk Management of a Causal Chain



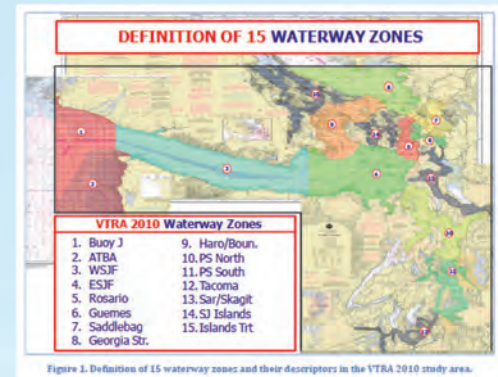
Kaplan's (1997)
Risk Definition

$$R = \{ \langle s_i, l_i, x_i \rangle \}_c$$

VTRA 2010

Winter-spring:

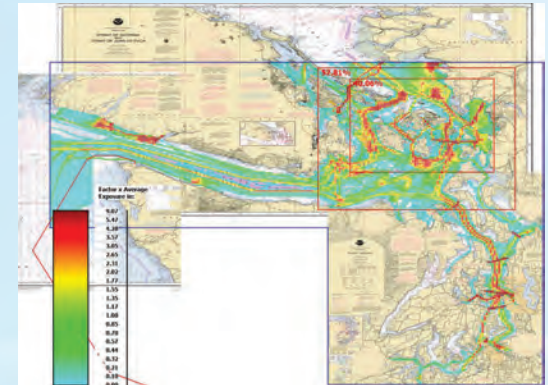
- Researchers expanded classes of Focus Vessels, now includes cargo and bulk carriers (overall: FV= \sim 25%, nonFV= \sim 75% of exposure time)
- 10Ks of actual routes/segments and VTOSS data scrubbed
- VTRA SC obtained/shared the best available data projections on “What If” projects to be simulated



VTRA 2010

Summer-fall:

- Researchers simulated
 - “What If” changes in traffic:
 - Trans Mountain Pipeline Expansion (Kinder Morgan) in B.C.
 - SSA Marine Gateway Pacific Terminal near Cherry Point, WA
 - Delta Port, Neptune, etc. expansion in Port Metro Vancouver, B.C.
 - = 1250 arrivals/year (+ bunkering)
 - Noting changes in potential ship interactions
- VTRA SC proposed mitigation measures to be simulated in model



VTRA 2010 – RMM simulations

- VTRA SC selected several mitigation measures to be simulated in model, e.g.
 - Secondary escorts for BC tankers, bulk carriers
 - Slowing container ships to 17 nmph
 - Reduction of human error for oil barges (to approximate benefit of 2nd watchstander)
 - Exclusion of bunkering operations...

VTRA 2010 – Major findings

SYSTEMWIDE

- Although shipping accidents leading to major spills are decidedly rare in Puget Sound (none >10,000 gallons in past 20 years)—if the 3 projects are built—the potential frequency of accidents, like groundings and collisions, could rise by 18% [from Finding 1]

SPECIFIC WATERWAYS

- Because of the sizeable shift in the mix of high-capacity cargo vessels going to and from Canada, the potential volume of oil that might be spilled *west of the **San Juans*** and in the ***Strait of Juan de Fuca***—could more than **triple, and double** – respectively

...Suggesting that our region should examine new ways to manage traffic and reduce risk *if* the proposed projects are completed [Finding 2]

VTRA 2010 – Geographic Profiles

2010 Base Case



Combined Case for 3
projects:

- oil losses +68%
- new potential losses concentrated west of San Juans

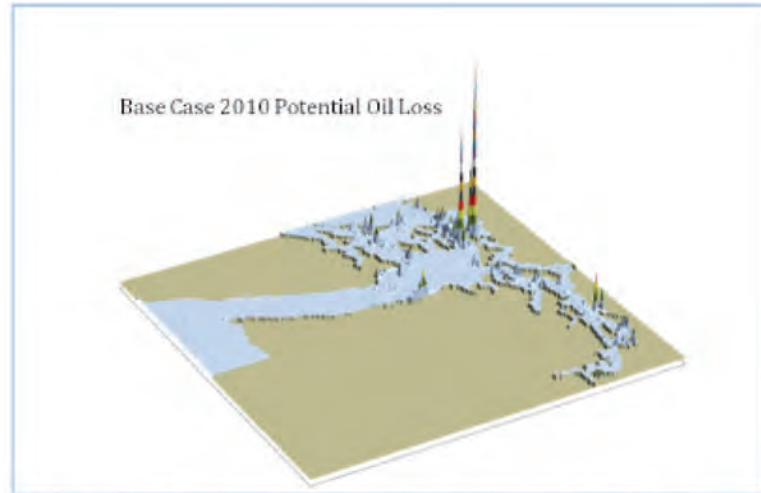
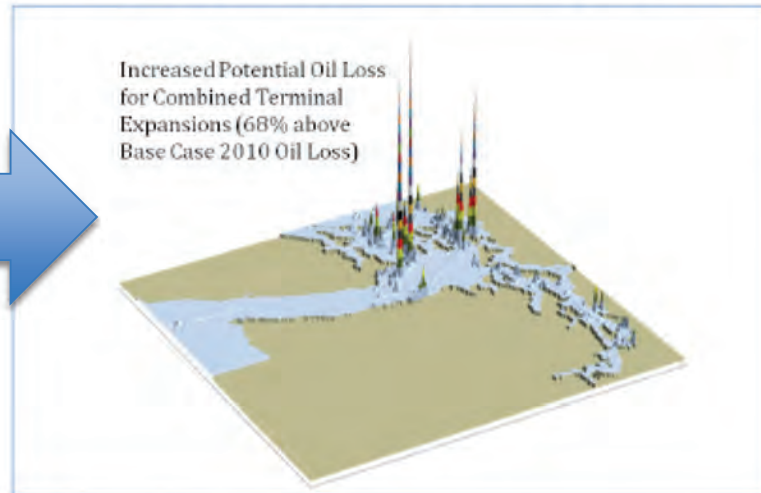


Figure 6. 3D Geographic profile of Base Case 2010 POTENTIAL oil loss (Case P).



VTRA 2010 – Major findings

RISK MITIGATION

- A portfolio of 6 risk mitigation measures—including availability of a supplemental rescue tug, reduced container vessel speeds and reduced human error rates for oil barges—and **the potential accident frequency fell to 11% below today's baseline** [Finding 5]
- In light of the findings, the *region should not ask what single risk mitigation measure should be implemented, but what combination of measures should be applied* [Finding 3]

VTRA Future

- i) Most of VTRA SC members plan to meet quarterly as a work group of Puget Sound Harbor Safety Committee

- ii) Plan to meet with peers in Canada to:
 - Compare report/results with others (like Det Norsk Veritas' risk assessment for TMEP) [June 2014]
 - Convene a transboundary: “Shipping Safety Summit” [2014 or 2015]

- iii) Develop a **Risk Management Strategy** for Puget Sound
 - (Voluntary) changes to Harbor Safety Plan, SOCs, BMPs, etc.
 - Regulatory changes considered by USCG, WA-Ecology
 - Northwest Area Committee extends to its “Emerging Risks Task Force” report & applies findings to contingency planning, Geographic Response Plans, etc.

More info:

- todd.hass@psp.wa.gov; (360) 280 1588
- http://www.seas.gwu.edu/~dorprj/tab4/publications_VTRA_Update.html

EMSE
Engineering Management
and Systems Engineering

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Vessel Traffic Risk Assessment (VTRA) Update :

The update of the VTRA to 2010 VTSS data is funded by the **MAKAH Indian Tribal Council**. A separate grant to conduct future scenario and risk mitigation scenario comparisons is currently funded the **Puget Sound Partnership**.

VTRA 2010 UPDATE REPORTS:

- [Makah final executive summary, contents page, bibliography and glossary; \(PDF 3.4mb\) - released 4/10/13.](#)
- [Makah final report. \(PDF 4.0mb\) - released 4/10/13.](#)
- [Puget Sound Partnership Quality Assurance Project Plan - \(PDF 18.3mb\) - Submitted to the PSP in February '13.](#)

VTRA 2010 UPDATE PRESENTATIONS:

- June '13, Hosted by Puget Sound Harbor Safety Committee at Army Corps Seattle District, Seattle:**
 - [0 - VTRA 2010 - FOCUS TAXONOMY.pdf - \(6.2mb\)](#)
 - [1 - VTRA 2010 - WHAT IF SCENARIO SIMULATIONS.pdf - \(1.2mb\)](#)
 - [2 - VTRA 2010 - RISK MANAGEMENT.pdf - \(0.3mb\)](#)
 - [3 - VTRA 2010 - CARGO-FY TRAFFIC BY LOCATION.pdf - \(1.3mb\)](#)
 - [4 - VTRA 2010 - TANK-FY TRAFFIC BY LOCATION.pdf - \(1.7mb\)](#)
 - [5 - VTRA 2010 - CARGO AND TANK-FY TRAFFIC BY LOCATION.pdf - \(1.3mb\)](#)
 - [6 - VTRA 2010 - ALL TRAFFIC BY LOCATION.pdf - \(1.3mb\)](#)
- MAY '13, Hosted by Puget Sound Harbor Safety Committee at Army Corps Seattle District, Seattle:**
 - [VTRA 2010 - PGHSC MAY - FOCUS VESSEL.pdf - \(5.6mb\)](#) This presentation was not presented during the May meeting. It content is informative for the purpose of defining what-if traffic scenarios.

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