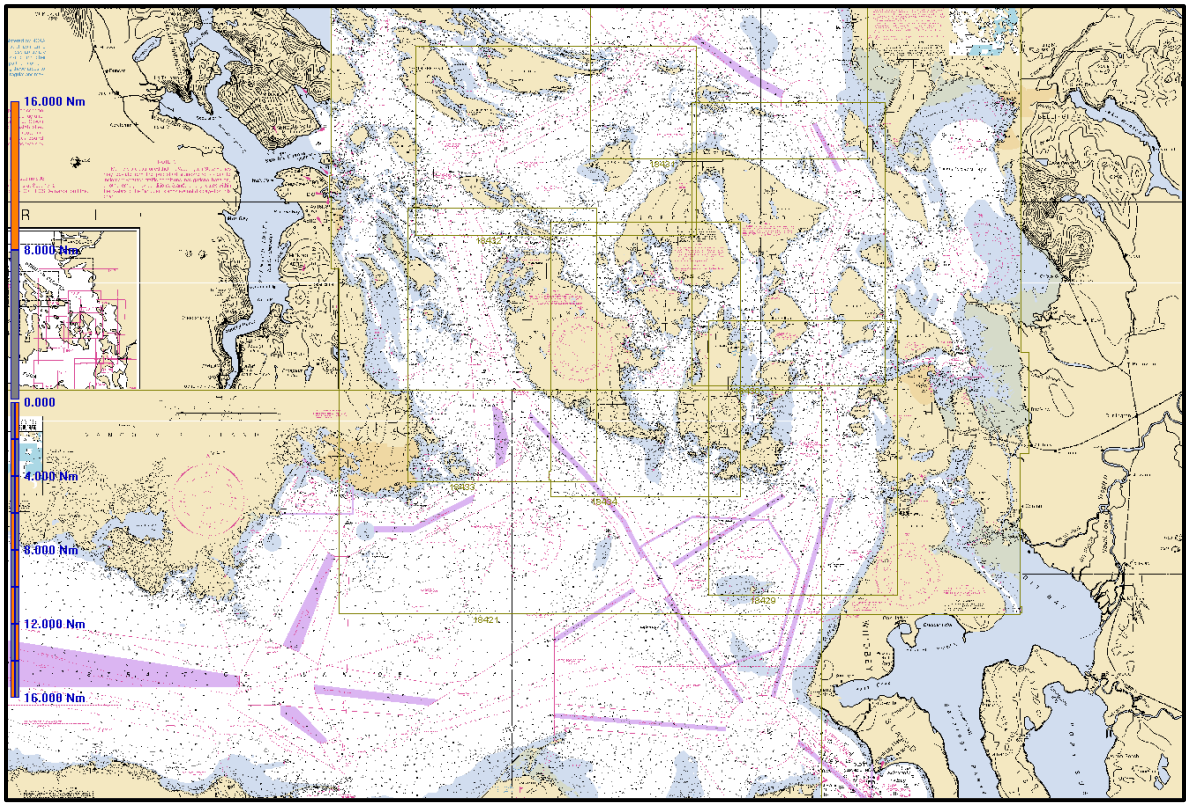
Ports and Waterways Safety Assessment

Workshop Report

Puget Sound, Washington



United States Coast Guard
Marine Transportation Systems Directorate

Providing Navigation Safety Information
for America's Waterways Users

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Background and Purpose

The United States Coast Guard (USCG), Marine Transportation System Directorate, is responsible for developing and implementing policies and procedures that facilitate commerce, improve safety and efficiency, and inspire dialogue with port and waterways users to make regional waterways as safe, efficient, and commercially viable as possible.

Through the 1997 Coast Guard Appropriations Act, the Coast Guard was directed to establish a process to "identify minimum user requirements for new Vessel Traffic Service (VTS) systems in consultation with local officials, waterways users and port authorities, and also to review private/public partnership opportunities in VTS operations." The Coast Guard convened a National Dialogue Group (NDG) comprised of maritime and waterway community stakeholders to identify the needs of waterway users with respect to Vessel Traffic Management (VTM) and VTS systems. The NDG was intended to provide the foundation for the development of an approach to VTM that would meet the shared government, industry, and public objective of ensuring the safety of vessel traffic in U.S. ports and waterways, in a technologically sound and cost-effective way.

From the NDG came the development of the ***Ports and Waterways Safety Assessment (PAWSA) Waterways Risk Model,*** and the ***PAWSA workshop process***. PAWSA is a disciplined approach designed to identify major waterway safety hazards, estimate risk levels, evaluate potential mitigation measures, and set the stage for the implementation of selected risk reduction strategies. The process involves convening a select group of waterway users and stakeholders and facilitating a structured workshop agenda to meet the risk assessment objectives. A successful workshop requires the participation of professional waterway users with local expertise in navigation, waterway conditions, and port safety. In addition, stakeholders are included in the process to ensure that important environmental, public safety, and economic consequences are given appropriate attention as risk interventions are identified and evaluated.

The long-term goals of the PAWSA process are to:

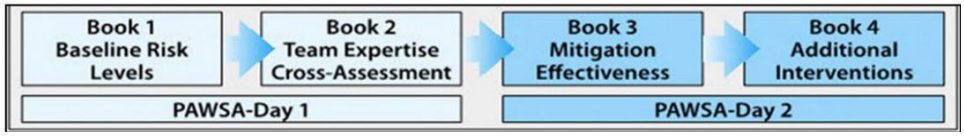
1) Provide input when planning for projects to improve the safety of navigation,
2) Further the Marine Transportation System (MTS) goals of improved coordination and cooperation between government and the private sector, and involving stakeholders in decisions affecting them,
3) Foster development and/or strengthen the roles of Harbor Safety Committees within each port, and
4) Support and reinforce the role of Coast Guard Sector Commanders/Captains of the Port (COTP) in promoting waterway and vessel traffic management activities within their geographic areas of responsibility.

Fifty-six ports/waterways have been assessed using the PAWSA process. The risk assessment process represents a significant part of joint public-private sector planning for mitigating risk in waterways. When applied consistently and uniformly in a number of waterways, the process is expected to provide a basis for making best value decisions for risk mitigation investments, both on the local and national level. The goal is to find solutions that are cost-effective and meet the needs of waterway users and stakeholders.

PAWSA Waterway Risk Model and Workshop process

The PAWSA Waterway Risk Model includes variables dealing with both the causes of waterway casualties and their consequences. In the Waterway Risk Model, risk is defined as a function of the probability of a casualty and its consequences. The diagram below shows the six general risk categories, and corresponding risk factors, that make up the Waterway Risk Model.

Waterway Risk Model					
Vessel Conditions	**Traffic Conditions**	**Navigational Conditions**	**Waterway Conditions**	**Immediate Consequences**	**Subsequent Consequences**
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic



- ***Vessel Conditions*** – The quality of vessels and their crews that operate on a waterway.
- ***Traffic Conditions*** – The number of vessels that use a waterway and how they interact with each other.
- ***Navigational Conditions*** – The environmental conditions that vessels must deal with in a waterway.
- ***Waterway Conditions –*** The physical properties of the waterway that affects vessel maneuverability.
- ***Immediate Consequences*** – The instantaneous impacts to the port as a result of a vessel casualty.
- ***Subsequent Consequences*** – The longer-term impacts felt days, months, and even years afterwards.

Workshop activities include a series of discussions about the port/waterway attributes and the vessels that use the waterway, followed by completion of workbooks to establish baseline risk levels, evaluate the effectiveness of existing risk mitigations, and identify additional risk intervention strategies to further reduce risk in the port / waterway. Workbook 1 is used to numerically evaluate the baseline risk levels using pre-defined qualitative risk descriptions for pre-defined risk factors. Workbook 2 is used to assess the expertise of participants with respect to the risk categories in the model. Those expertise assessments are used to weight inputs obtained during the other steps in the workshop process. Workbook 3 is used to evaluate how effective the existing mitigation strategies are at reducing risks, and to determine if the risks are well balanced or not. For those risk factors where risk is judged to be not well balanced by existing mitigations, participants use workbook 4 to identify additional risk intervention strategies and then evaluate how effective those new strategies could reduce risks.

Puget Sound PAWSA Workshop

A PAWSA workshop for the eastern portion of Puget Sound including the Port Angeles precautionary area, Haro Strait, Rosario Strait and Boundary Pass was held in Bellingham, Washington on 25-26 October, 2017. The area assessed is an extremely diverse waterway that included both U.S. and Canadian waterways. Sponsors of the workshop were Coast Guard Sector Puget Sound, represented by Captain Linda Sturgis, Sector Commander Puget Sound; Transport Canada, represented by Ms. Yvette Meyers, Regional Director, Marine Safety and Security Pacific; and the Puget Sound Harbor Safety Committee, represented by John Veentjer, Committee Chairman.

Captain Sturgis utilized the opportunity to discuss the Coast Guard's responsibilities as a Federal Trustee, and explained that the approach to mitigating risks may require an approach not reflected in the current PAWSA formula. Captain Sturgis explained that subsequent work would be needed to factor in Tribal interest input in order to ensure an accurate characterization of baseline risk levels and whether those can be mitigated, from the perspective of sovereign Tribal governments. A slightly different approach for the Puget Sound PAWSA was taken by only completing the baseline, team-expertise cross-assessment and existing mitigations evaluations. In addition, to better evaluate the risks associated with tank vessel and tank barge traffic, Articulate Tug Barges (ATB) were evaluated as a separate vessel class, and the Commercial Fishing Vessel Quality risk factor was combined with the Small Craft Quality risk factor. Within the Immediate Consequences risk factor category the Petroleum Discharge risk factor was combined with Hazardous Material Discharge risk factor which provided time for Federal Trustee and Tribal/Industry discussions.

The workshop was attended by a diverse cross section of participants representing Canadian and United States waterways users, stakeholders, environmental interest groups, and Tribal Nation observers from the Makah Tribe, Lummi Nation, Tulalip Tribe, Swinomish Tribe, Suquamish Tribe, and First Nations of Canada Ditidaht and Pauquachin. The workshop provided the opportunity for collaborative discussions between waterways users, stakeholders, Tribal Nations, State and local regulatory authorities, and Canadian and U.S. Government Federal Officials regarding the quality of vessels and their crews that operate on the waterway; the amount of commercial, non-commercial and recreational small craft vessel traffic using the waterway, and the ability of the waterway to handle current and future increases in traffic volume levels.

For each of the 23 risk factors evaluated, participants discussed and then numerically evaluated the baseline risk levels using pre-defined qualitative risk descriptions for each risk factor. Participants then discussed existing risk mitigation strategies, evaluated how effective the mitigation strategies were at reducing risk, and then determined if the risks were well balanced.

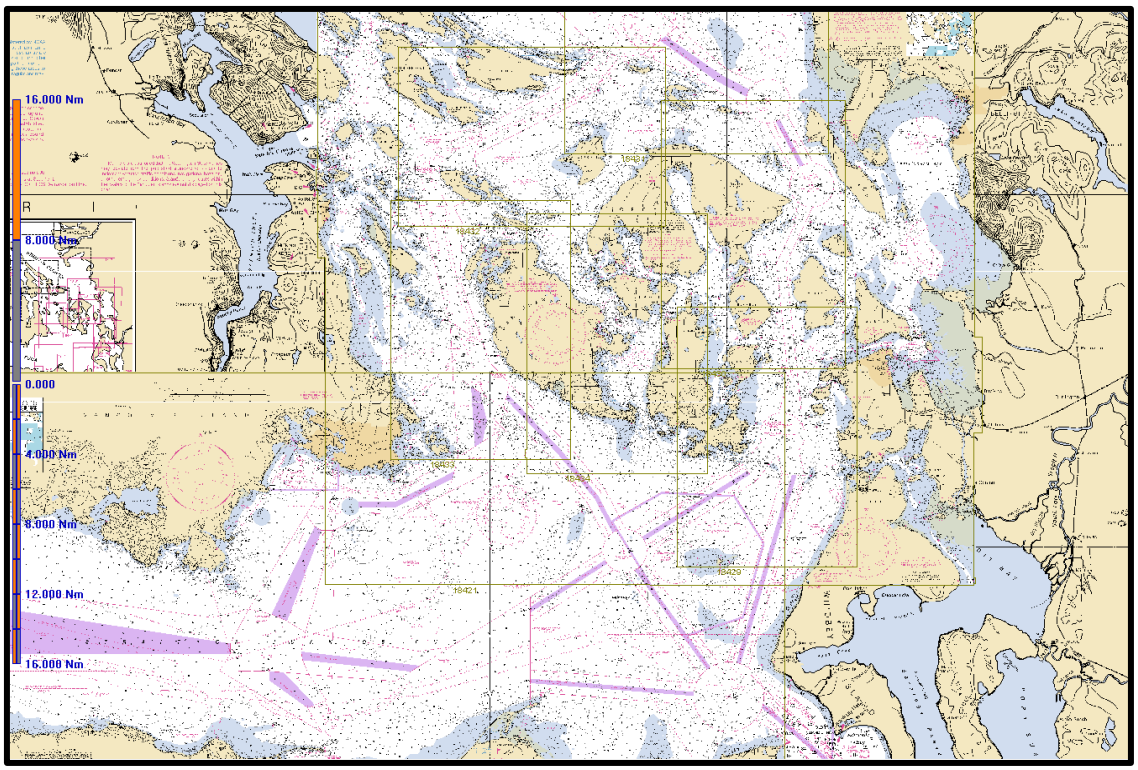
For 12 of the 23 risk factors evaluated, there was consensus (defined as 2/3 of the workshop participant teams being in agreement) that risks were well balanced by existing mitigations. For 10 risk factors there was no consensus among the participants that risks were well balanced by existing mitigations. For one risk factor there was consensus that risks were not well balanced by existing mitigations.

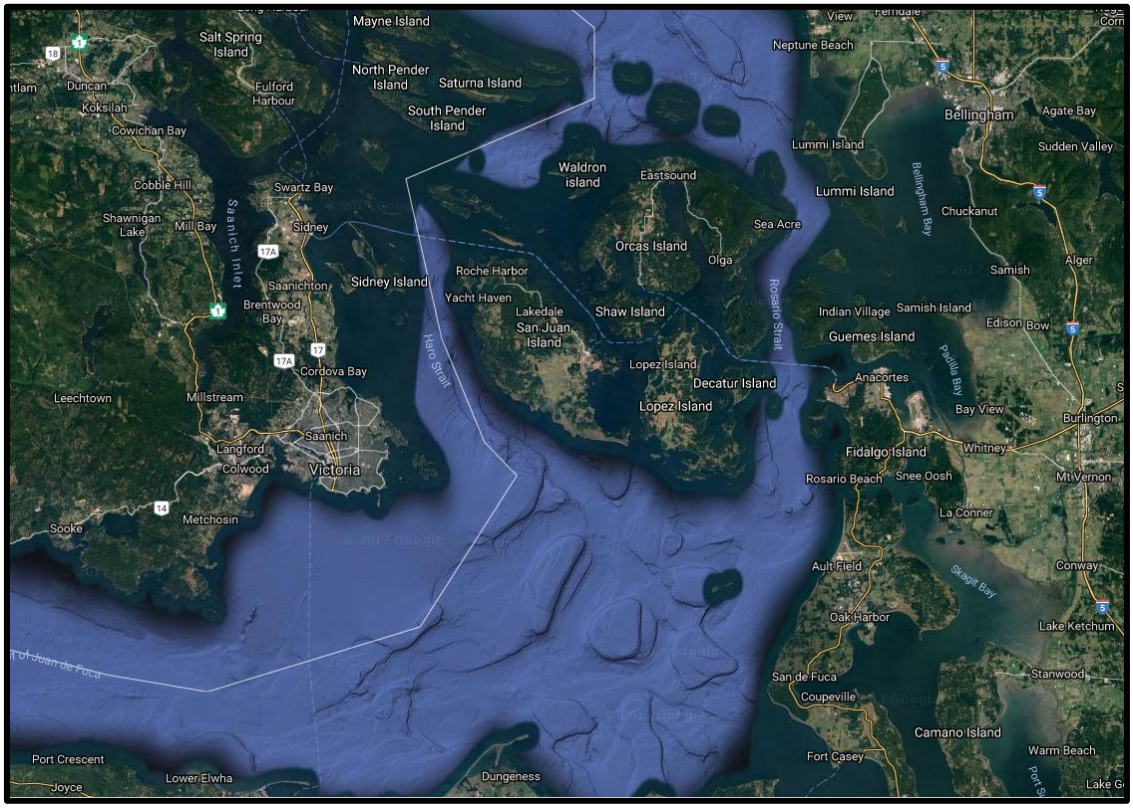
The results of the Baseline Risk Level survey (Workbook 1), Team Expertise Cross Assessment (Workbook 2), and Existing Risk Mitigation Strategies (Workbook 3), and participant comments and observations are outlined in this report with supporting data that was computed using the PAWSA Waterway Risk Model. Due to time limitations, workshop participants did not initiate the Identification of Additional Risk Intervention Strategies (Workbook 4). The Coast Guard Captain of the Port recommended that any additional mitigation strategies and recommendations be addressed through either the Puget Sound Harbor Safety Committee, an existing Canadian/U.S. policy development forum, or through the establishment of a Canadian/U.S. trans-boundary Marine Safety forum.

The goal of the Puget Sound PAWSA workshop was to not only to further the Marine Transportation System objective of improved coordination and cooperation between government and the private sector, and involving stakeholders in decisions affecting them, but to provide members of the waterway community with an effective tool to evaluate risk and work toward long term solutions tailored to local circumstances.

Section 1: Puget Sound PAWSA - Assessment Area

Figure 2: The assessment area included the eastern portion of the Strait of Juan De Fuca, the Port Angeles Precautionary Area, Haro Strait, Boundary Pass, and Rosario Strait. The figures below depict Electronic Charting System (ECS) and satellite imagery of the assessment area.





Section 2: Baseline Risk Levels

The first step in the workshop was the completion of workbook 1 to determine a baseline risk level value for each risk factor in the Waterway Risk Model. To establish the baseline risks level, participants discussed each of risk twenty-three applicable factors in the Waterways Risk Mode and selected a qualitative description for each risk factor that best described the conditions in the assessment area. The Tribal Treaties and Cultural Preservation factor was discussion based and was not assessed with a quantitative value, see Appendix C for Tribal comments. These qualitative descriptions were converted to discrete values using numerical scales that were developed during earlier PAWSA workshops.

On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value. Figure 3 below shows that eight of twenty-three risk factors were scored at or above the mid-risk value. Risk values highlighted in red (values at or above 7.7) denote very high baseline risk levels; risk values highlighted in green (values at or below 2.3) denote very low baseline risk levels

Baseline Risk Levels					
Vessel Conditions	**Traffic Conditions**	**Navigational Conditions**	**Waterway Conditions**	**Immediate Consequences**	**Subsequent Consequences**
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
2.7	3.8	2.4	5.6	8.7	8.8
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Tribal Treaties and Cultural Preservatiuon	Environmental
4.0	4.9	5.5	6.0	See Appendic C for Tribal Comments	9.0
Articulated Tug Barge Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Petroleum Discharge / Hazardous Materials Release	Aquatic Resources and Tribal Fisheries
4.8	5.2	5.5	7.3	8.8	8.4
Commercial Fishing and Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
8.5	3.3	5.6	8.2	7.1	8.2

As the participants discussed trends and observations for each of the twenty-three risk factors, their comments and observations were documented for inclusion in this workshop report. Appendix B is a summary of participant comments and observations on trends in the port and existing risk mitigations.

An ECS was used to displayed nautical charts of the assessment area and to plot the charted locations associated with participant comments and observations. Appendix E includes ECS chart extracts with the plotted locations associated with the comments/observations.

Section 3: Team Expertise Cross-assessment

The second step in the workshop was the completion of a team expertise cross-assessment (workbook 2). The team expertise cross-assessment was conducted early in the workshop process and was used to weigh the relative strengths of each team with respect to the six risk categories. The results of the team expertise cross-assessments were used to weight the inputs that each team provided in the other workbooks completed during the workshop.

After being presented with the concepts underlying the model, each participant team was asked to discuss (among themselves) how their background and experience aligns with the model. They then verbally presented their conclusions to the other teams. These presentations gave all teams a sense of where everyone thought they were strong – or perhaps not so strong. After all teams had spoken, each team then evaluated whether they were in the top, middle, or lower third of all teams present with respect to knowledge and expertise in the six risk category areas.

The participants assessed their own and all the other participant teams' level of expertise for each of the six categories in the Waterway Risk Model. Overall, 57% of the participant teams were placed in the upper third, 34% in the middle third, and 9% in the lower third of all teams.

Appendix A is a list of the PAWSA workshop participants and Tribal Observers.

The below table further breaks down the participants' expertise for each risk category.

Team Expertise -- Distribution

Risk Category	Top 1/3	Mid 1/3	Lower 1/3
Vessel Conditions	68%	16%	15%
Traffic Conditions	71%	22%	7%
Navigational Conditions	73%	24%	3%
Waterway Conditions	59%	40%	1%
Immediate Consequences	44%	46%	10%
Subsequent Consequences	26%	57%	17%
All Categories Average	57%	34%	9%

Section 4: Existing Risk Mitigations

The third step in the workshop was for participants to completion of workbook 3, which was used to evaluate the effectiveness of existing mitigation strategies in reducing the risk level for each risk factor. Workbook 3 is used for two purposes. First, after the participants describe the risk mitigation strategies that already exist to help reduce the risk level for their waterway, workbook 3 is used to evaluate the effectiveness of those strategies in reducing the risk level for each factor in the model. What results from that evaluation is the present risk level, taking into account those existing mitigations. Second, the participants decide whether the risk mitigation strategies already in place adequately balance the resulting risk level. If, for any given risk factor, there is consensus (defined as 2/3 of the workshop participant teams in agreement**)** that existing mitigations do adequately deal with those risks, then that risk factor is dropped from further discussion. Following the workshop, errors discovered in the PAWSA Decision Support Tool (MS excel file) resulted in decimal point changes to the reported results for some risk factor categories, and calculated the Traffic Mix risk factor as being not balanced (maybe). Once the errors were corrected this risk factor was calculated as being balanced by existing mitigations. The numbers shown in parentheses are the incorrect Book 3 risk levels that were displayed at the conclusion of the workshop.

For risk factors shown in green (Balanced) there was consensus that risks were balanced by existing mitigations.

For risk factors shown in yellow (Maybe) there was no consensus that risks were balanced by existing mitigations.

For risk factors shown in red (No) there was consensus that risks were not balanced by existing mitigations.

Mitigation Effectiveness					
Vessel Conditions	**Traffic Conditions**	**Navigational Conditions**	**Waterway Conditions**	**Immediate Consequences**	**Subsequent Consequences**
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
2.7 2.4	3.8 3.1 (3.3)	2.4 2.3	5.6 4.6 (4.5)	8.7 6.5 (6.8)	8.8 7.3
Balanced	Balanced	Balanced	Balanced	Maybe	Maybe
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Tribal Treaties and Cultural Preservation	Environmental
4.0 3.8	4.9 4.9	5.5 4.7 (4.5)	6.0 4.4 (4.5)	See Appendix C for Tribal Comments	9.0 7.9
Balanced	Balanced	Balanced	Balanced		Maybe
Articulated Tug Barge Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Petroleum Discharge / Hazardous Materials Release	Aquatic Resources and Tribal Fisheries
4.8 4.0	5.2 5.3 (5.0)	5.5 4.5 (4.3)	7.3 5.7	8.8 6.8 (6.9)	8.4 7.4 (7.5)
Maybe	Balanced	Balanced	Balanced	Maybe	Maybe
Commercial Fishing and Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
8.5 7.0	3.3 3.3	5.6 5.2 (5.1)	8.2 5.9 (5.7)	7.1 6.0	8.2 7.0
NO	Balanced	Balanced	Maybe	Maybe	Maybe

Risk Factor	
Book 1 Score	Book 3 Score
Consensus Reached?	

EXPLANATION

Book 1 Score	Level of risk - not taking into account existing mitigations
Book 3 Score	Level of risk - taking into account existing mitigations
Balanced	Consensus that risks are well balanced by existing mitigations
Maybe	No consensus that risks are well balanced by existing mitigations
NO	Consensus that existing mitigations DO NOT adequately balance risks

Section 5: Additional Risk Mitigations

This portion of the PAWSA process was not completed during the workshop.

Appendix A

Participant	Organization
Rachel Wold	Academia- NANOOS Executive Dir.
Scott Manley	American Waterway Operators Representative
Jack Harmon	Arrow Launch
Brad Taipalus	British Columbia Pilots, Director
Brian Bain	Canadian Coast Guard
Glenn Ormiston	Canadian Coast Guard
Glenna Evans	Canadian Coast Guard
Phillip Nelson	Canadian Council of Marine Carriers, President
Robert Lewis-Manning	Chamber of Shipping, President
David Carney	Clipper Navigation Inc.
Mark Homeyer	Crowley Maritime
Josh Ellis	Crowley Maritime
Mike Santini	Crowley Maritime
Susan Meyer	Environmental Protection Agency
Stephanie Buffum	Friends of the San Juans
Deborah Franco	Harley Marine
Scott Manley	Harley Marine
Bikram Kanjilal	Kinder Morgan
Dan Nutt	Kirby Offshore Marine
Mark Nielsen	Marine Andeavor Shipping Operations
Bruce Leach	Military Sealift Command Seattle
Crescent Moegling	National Oceanographic and Atmospheric Administration
Stan Bowels	Pacific Northwest Master Mariner (Canada)
Kevin Obermeyer	Pacific Pilotage Authority
Jeff Friedman	Pacific Whale Watching Association, President
William Crabbs	Phillips 66 Company
Fred Felleman	Port of Seattle Commissioner/Friends of the Earth
Lovel Pratt	Principal of Mulno Cove Consulting
Todd Hass	Puget Sound Partners
Scott Coleman	Puget Sound Pilots
Jostein Kalvoy	Puget Sound Pilots
Chris Wilke	Puget SoundKeeper Alliance
David Tribolet	Recreational boater/USCG Auxiliary
Jamie Stephens	San Juan County Commissioner - District 3

Peter Lolic	Seaspan Ship Management
Tracy Hascall	Shell
Jatinder Gill	Transport Canada
Dan Reid	Transport Canada
Elizabeth "Liz" Petras	US Coast Guard District 13 – District Response Advisory Team
Jeffrey Zappen	US Coast Guard Sector Puget Sound – Waterways Management
Darwin Jensen	US Coast Guard Sector Puget Sound – Chief of Prevention
Laird Hail	US Coast Guard Sector Puget Sound – Director of VTS
Jason Tessier	US Coast Guard Station Bellingham – Officer in Charge
Jeffery Anderson	US Navy
Ty Gaub	US Oil & Refining Company
Scott Ferguson	Washington State Department of Ecology
Greg Faust	Washington State Ferries
Dale Lathan	Washington State Ferries
Dale Jensen	Washington State Dept. of Ecology Spills Program Manager
Trevor Davis	Western Canada Marine Response Corporation
Kevin Gardner	Western Canada Marine Response Corporation
Chris Wellstood	Vancouver Port Authority
David Carney	Victoria Clipper

Tribal Observer	**Tribal Affiliation**
Shelley Chester	Ditidaht First Nation
Darryl Tale	Ditidaht First Nation
Lisa Wilson	Lummi Nation
Chad Bowechop	Makah Tribe
Haley Kennard	Makah Tribe
Amy Trainer	Makah Tribe
Lorne Underwood	Pauquachin First Nation
Melody Allen	Suquamish Tribe
Tom Ehrlichman	Swinomish Tribe
Barbara Dykes Ehrlichman	Swinomish Tribe
Patti Gobin	Tulalip Tribe
Tori Barabara	
Carleen Thomas	

Appendix B

Participant Observations- Trends in the Port and Existing Risk Mitigations

Deep Draft Vessel Quality:

Trends/Observations:

- Deep draft vessel quality is great overall. This is mostly driven by the existing mitigations.
- Most deep draft vessels are relatively new.
- Some crews have different nationalities. Officers and deck personnel are usually different nationalities. Communication challenges between these personnel can pose a safety risk.
- Sometimes there are language barriers between vessel crews and Vessel Traffic Service (VTS) controllers near the precautionary area before Canadian and US pilots are onboard.
- Military and commercial vessels present different risks to the waterway.
- Lacking Mitigation: Only single hulled vessels require two assist tugs.

Existing Mitigations:

- There are established Standards of Care[1].
- There are tools to rate a company's safety on an international level.
- Cargo companies have their own marine assurance departments. They thoroughly vet vessels before they are hired. Terminals complete their own inspections, based on the Ship Inspection Report Program (SIRE)[2] system. SIRE is a tank vessel risk assessment tool that is used by industry to track and document a tank vessels compliance with safety and inspection requirements. Companies mandate SIRE inspections
- Oil Company International Marine Forum (OCIMF) and International Marine Contracting Association (IMCA) Standards are followed for large passenger vessels.
- There are maintenance standards and policies. Most vessels use class-certified maintenance schedules. OCIMF sets international recommendations. Tankers typically must meet these recommendations to stay employed. International Tanker Owners Pollution Federation (ITOPF) also develops standards.
- The OCIMF maintains the Offshore Vessel Inspection Database (OVID). Additionally, they conduct audits, evaluate tug escort procedures, complete exercises, and hold classes.
- Some West Coast refineries have their own vessel inspections. These inspections are in addition to Coast Guard inspections. They are much more detailed and have stricter requirements than Coast Guard inspections.
- On the chemical side, there are chemical distribution inspections. Crews are educated and certified. They have specific endorsements[3].
- Shipping companies develop Key Performance Indicators (KPI). They regulate internally to meet KPIs.
- The shipping companies pressure vessel captains to report deficiencies.
- Crew training is completed and standardized as required by the International Convention of Standards of Training, Certification and Watchkeeping (STCW).
- Pilots practice bridge resource management (BRM).[4] Every time pilots board a vessel, they ask a series of questions regarding vessel conditions. If the answers are unsatisfactory, they are passed to the applicable government authorities.
- Puget Sound Pilots have their own safety guidelines[5]. These guidelines can be found on their website.
- Pilots have their own state-of-the-art navigation systems.

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[1] Puget Sound Harbor Safety Committee Harbor Safety Plan, https://pshsc.org/puget-sound-harbor-safety-plan/
[2] https://www.ocimf.org/sire/
[3] 46 CFR 13.605
[4] http://www.pspilots.org/qualifications-training/continuing-education/
[5] http://www.pspilots.org/wp-content/uploads/2017/07/PSPGuidelines2017JUN15.pdf

- In 2016, the British Columbia pilots had a 99.96% safety record. Only 4 minor incident in over 1,200 transits.
- The robust investigations program discovers other mitigation techniques.
- Bulk carriers have protected fuel tanks, and most bulk carriers are relatively new.
- Bunker fuels are improving to meet Emission Control Area (ECA) standards[6].
- If a tanker loses power, it maintains steering as long as it has momentum.
- The assist tug in Neah Bay has responded to over 50 vessels in the past decades, but responses usually required significant transits.
- Charts (both electronic and paper) are much more advanced than were 20-30 years ago. The survey technology has greatly improved, especially in this region.
- The USCG requires a 96-hour arrival notice for foreign vessels[7]. If the vessels are in a high-risk category, the vessel is boarded and inspected in Port Angeles before it reaches the precautionary area.
- The VTS actively monitors and queries traffic. If necessary, they request the pilots to further query vessels once onboard.
- Automatic Identification Systems (AIS) carriage requirements[8].
- Vessels are inspected the first time they enter the port.
- Turn Point is a Special Operating Area[9].
- 9 federal agencies joined the Puget Sound Federal Task Force.[10] The task force action plan has several mitigation measures and actions to be implemented through FY21. It can be found by searching the EPA's website.
- Canadians board and inspect all tankers arriving in Canada for the first time[11].
- US and Canada collectively enforce regulations; Memorandum of Understandings (MOU) that outline the respective roles and responsibilities.[12]
- Tankers are further regulated in Canada.
- Washington State has stringent vessel regulations[13].
- 40,000 GT tankers require an escort tug[14].
- Washington State has an award program for maintaining vessel safety.

Shallow Draft Vessel Quality:

Trends/Observations:

- This category includes whale watch vessels, ferries, and small inspected vessels. Tugs/barges and ATBs are in a separate category.
- Shallow draft vessel quality is different than deep draft vessel quality because the regulations and inspections are different.
- Overall, shallow draft quality is good. Vessels are inspected and operators are experienced/knowledgeable.
- The whale watch fleet is unique to the area, and they are different than other vessel types. However, the clear majority are Coast Guard-inspected vessels. Only six to seven vessels are 6-pack/uninspected vessels; these uninspected whale watching vessels are included in the "Small Craft Quality" category.
- Language barriers are minimal for shallow draft vessels. In this aspect, the quality is better than deep draft vessels.

[6] MARPOL Annex VI North American ECA compliance means vessels shift to low sulfur diesel.
[7] 33 CFR 160.212
[8] 33 CFR 164.46 - AIS requirements for vessels
[9] 33 CFR 161.13 - VTS special operating area requirements
[10] https://www.epa.gov/puget-sound/puget-sound-federal-task-force
[11] https://www.tc.gc.ca/eng/marinesafety/oep-inspection-psc-menu-1120.htm
[12] https://www.tc.gc.ca/eng/marinesafety/tp-tp13585-policy-mou-uscg-tc-594.htm
[13] Washington State DOE Bunkerng regulations Washington Administrative Code (WAC) 317-40 Vessel oil transfer advance notice and containment requirements (WAC) 173-184
[14] WAC 363-116-500 http://apps.leg.wa.gov/wac/default.aspx?cite=363-116-500

Existing Mitigations:

- State Ferry System: Crews are required to take a detailed familiarization training and Crew Resource Management training. No one works longer than 12 hours in a 24-hour period. They have their own maintenance facility, and average ship age is 30 years old. Mechanics know their ferries extremely well. It's one of the safest ferry systems in the world.
- Navigation technology and general machinery has advanced significantly.

Small Craft and Commercial Fishing Vessel Quality:

Trends/Observations:

- Commercial fishing vessel inspection requirements are different than other commercial vessels[15]. Therefore, commercial fishing vessels are combined with small craft. Both types of vessels are relatively high risk. Some participants disagree with this rationale because fishing vessel operators are generally more knowledgeable/experienced than small craft operators.
- The fishing fleet is very diverse. It includes all types of hulls, construction, and equipment. Risk usually depends on the type of fishery. For example, the Alaska fleet usually includes better constructed vessels and a different level of operator experience. Local fishing vessels are usually not constructed to the level of the Alaska fishing vessels.
- Fishing vessels comprise a large percentage of the incidents (especially pollution incidents).
- Small craft is defined as an uninspected vessel, which basically refers to recreational vessels. This includes paddle craft and charters with 6 passengers or less.
- Small craft/recreational boaters generally lack experience and onboard equipment (radios, radar, Global Positioning System (GPS), and electronic charts).
- Small craft/recreational boaters generally lack an understanding of the Rules of the Road. This is backed by VTS data regarding issues with Rule 10.
- Point of emphasis: No education is required for small craft/recreational boaters. This is a major reason for their elevated safety risk[16].
- Recreational boater education has improved within recent years. Efforts are ongoing.
- Smaller boats (20 feet and below) are particularly high risk. There have been 20 deaths in this category in State of Washington this year (2017). Half of these were non-motorized vessels.
- The Coast Guard has little incident data regarding vessels 20m and below.
- Mega-yachts are a unique category of vessels with some risk. These vessels can have a language barrier, and the number of these vessels is increasing.
-

Existing Mitigations:

- Vessel safety checks, dockside exams and safety classes provided by the by the CG Auxiliary and US Power squadron for small craft operators.
- Subchapter C equipment carriage requirements for uninspected commercial fishing vessels.

[15] Depending on the fishing vessels operations a inspection scheme is not required and only has to meet Sub C requirements. Most smaller fishing vessels are uninspected but do have a Decal requirement via the USCG CFV program.

[16] http://parks.state.wa.us/442/Mandatory-Boater-Education is required for many boaters

Tug/Barge and ATB Quality:

Trends/Observations:

- Cargo capacity is significantly less than deep draft vessels.
- Tug/barge and Articulated Tug Barge (ATB) quality is good, but it may be slightly less than deep draft quality. New regulations are improving the tug/barge and ATB quality.

Existing Mitigations:

- Subchapter M already applies for new vessels, and existing vessels must comply by July 2018. Most towing vessel companies already comply with Subchapter M[17].

Volume of Commercial Traffic:

Trends/Observations:

- This category includes assessing traffic volume in anchorages.
- Washington State's Vessel Entry and Transit (VET) Data indicates 75 ferries/day, and more than 50 other commercial vessels/day[18].
- Channel width alone cannot describe the risk associated with traffic volume. For example, Turn Point is a blind turn, and Vendovi is narrow and has tanker traffic.
- 4,100 deep draft vessels come into the Strait of Juan de Fuca with 2,600 arriving in US and 3,105 in Canada. Approximately 1,500 vessels commute between the US and Canada, which is approximately 8 vessels/day.
- Most traffic goes around the rotary, not through Rosario.
- Commercial fishing vessels need to be recognized.
- ATBs transit the area approximately twice a week.
- There are some seasonal fluctuations in traffic, especially for passenger vessels.
- There's significant tug and tow traffic within the VTS system that might not get captured by AIS data[19].
- TC1 and TC2: Haro Strait and Boundary Pass have light traffic, 16 total ships a day on average. Traffic has decreased in recent years. Additionally, traffic is very light when compared to other areas of the world such as the English Channel[20].
- TC3: 25 ferry transits per day.

Existing Mitigations:

- Unique to the Puget Sound area is the Cooperative Vessel Traffic Service (CVTS), a joint agreement with Canadian and United States VTS counterparts. The CVTS is designed to manage vessel traffic transiting between U.S. and Canadian waters. This agreement specifies VTS coverage areas, communications channels and handoff procedures for vessels leaving/entering US and Canadian waters. The CVTS is an international agreement that has been in place since 1970. The CVTS reduces traffic condition risks by monitoring and managing safe vessel movements in the US and Canadian boundary waters, sharing vessel movement data, and maintaining close liaison on each other's vessel traffic control procedures, equipment capabilities, and regulatory procedures. The Canadian Coast Guard operates the Prince Rupert Traffic Center which provides VTS coverage for the offshore approaches to the Juan de Fuca Strait and along the Washington State coastline from 48 degrees north, and Victoria Traffic Center which provides VTS coverage for both Canadian and US waters of Haro Strait, Boundary Passage, and the lower Georgia

[17] https://www.ecfr.gov/current/title-46/chapter-I/subchapter-M
[18] Washington Department of Ecology. "VEAT 2016." n.d. https://fortress.wa.gov/ecy/publications/documents/1708001.pdf
[19] See data provided by Marine Exchange, per PAWSA Profile Presentation, captures tug and tow. All tugs over 26' operating in VTS areas are required to have AIS. (33 CFR 164.46) Most UTVs operating in the puget sound area are in the Towing Vessel Bridging Program.
[20] Marine exchange data

Straits. The US Coast Guard Sector Puget Sound operates the VTS Puget Sound Center which provides VTS coverage for both the Canadian and US waters in the Juan de Fuca Strait and

- Automatic Identification Systems (AIS) carriage requirements improve situational awareness. AIS is a maritime navigation safety communications system standardized by the International Telecommunication Union (ITU) and adopted by the International Maritime Organization (IMO) that provides vessel information, including the vessel's identity, type, position, course, speed, navigational status and other safety-related information automatically to appropriately equipped shore stations, other ships, and aircraft; receives automatically such information from similarly fitted ships; monitors and tracks ships; and exchanges data with shore-based facilities
- TC4: Rosario Strait is one-way traffic for larger vessels.

Volume of Small Craft Traffic:

Trends/Observations:

- From Memorial Day to Labor Day, recreational traffic increases. Traffic is particularly heavy in Friday, Roche, and Sidney harbors.
- Fishing traffic is heavier during the four summer months. The fleet runs from the "J" Buoy to the San Juan Islands.
- San Juan County Park on the SW side of San Juan Island recently had two record years of personal water craft and kayak launches.
- There's heavy paddle craft traffic near Thatcher Pass, James Island, and Washington Park. The paddle craft are sometimes in large groups.
- Whales can attract heavy traffic. Southern Resident Killer Whale sightings are decreasing drastically and 2017 was a record low year. The other population of Killer Whales are very mobile and can be seen anywhere throughout the waterway. At peak season, the largest whale watching groups are 30 total vessels; only approximately 15 of these vessels are commercial whale watchers and the rest are recreational boats.
- San Juan Islands see extremely heavy traffic in the in the summer boating season.
- From a large vessel perspective, small craft are the greatest hazard. Greatest hazards are within the San Juan Islands and coming out of Admiralty Inlet.
- For the deep draft vessels, the volume of personal water craft is not a high risk. The actual risk is sailing and motor vessels crossing the channel.
- In FY16, USCG Station Bellingham had 116 search and rescue cases. In FY17, they had 99 cases. Breakdown of Search and rescue (SAR) cases:

FY16: Person in the water-19; vessel disabled/adrift-45; vessel taking on water-14; vessel on fire-4; vessel flare sighting-2; medivac-4; vessel aground-10
FY17: Person in the water-36; disabled/adrift-27; vessel taking on water-8; vessel on fire-4; vessel flare sighting-5; medivac-2; vessel aground-17

- TC5-TC8: High concentration of kayaks and small boats.
- TC9-TC10: Location of whale watching traffic.

Existing Mitigations:

- The CVTS system mitigates risk posed by high volumes of small craft traffic.

Traffic Mix:

Trends/Observations:

- Looking at 5 years of data, approximately 1/3 of VTS interventions involved the USCG, U.S. Navy, or Canadian Navy. Most incidents were in the precautionary areas.

- The area's traffic is very diverse: military, bulk, container, petroleum, ferry, recreational traffic, and tribal fishing. Turn Point is a sensitive area where this diverse traffic meets.
- Very little risk associated with the mix of piloted-traffic. From a VTS perspective, the risks are vessels without pilots, such as recreational boats and fishing vessels.
- Traffic mix data is somewhat lacking due to limited AIS use on small vessels.
- Traffic mix changes seasonally. The summer boating season has less prepared vessels and inexperienced operators.
- Conflicts between commercial and recreational traffic occurs where the San Juan Islands open to the main shipping channels.
- Pilots meeting commercial and non-commercial fishing vessels in Rosario Strait are a risk.
- TC11-TC15: High vessel traffic volume areas.
- TC16-TC17: Friday Harbor and Sydney Harbor have sea plane traffic.

Existing Mitigations:

- Marine event permits required by the Coast Guard provide visibility of waterside events that draw large numbers of small craft traffic.
- The CVTS mitigates risks by actively monitoring and managing the different types of vessels that navigated within the assessment area.
- AIS carriage requirements improve situational awareness.

Congestion:

Trends/Observations:

- Congestion is very seasonal.
- Turn Point is not a problem for piloted vessels, but sailing vessels occasionally interfere. The area has not reached its capacity, but a study/model is required to determine the maximum capacity[21].
- Two references suggest Turn Point and East Point are high-risk areas for "drift grounding." These points can be vulnerable to congestion.
    - Final Report Sept 25th, 2014: Report on the findings of the Pilotage Risk Management Methodology PRMM to assess the Use of Escort Tugs in Haro St and Boundary Pass for Liquid Bulk Vessels, In Product, less than 40,000 SDWT, Author: Chris Badger[22].
    - Trans Mountain Expansion Project Oil Spill Response Simulation Study, Arachne Reef and Westridge Marine Terminal, November 2013, A Tetra Tech Company[23].
- TC18: Approximately 60% of AIS traffic attributed to deep draft vessels.
- TC19: Traffic congestion in the pre-cautionary area off Victoria Harbor.
- TC20: The Vendovi Anchorage Area includes 4 anchorages separated by a mile. The anchorages are being used more frequently due to berth availability. The increased anchorage use is not an indication of waterway congestion.

Existing Mitigations:

- The CVTS mitigates the impacts from congestion by actively monitoring and managing traffic.
- The Coast Guard issues broadcast notice to mariners to alert vessel operators of congested areas.

[21] See the Pilot Risk Management Methodology (PRMM) report for a traffic assessment of the area.
[22] *https://apps.neb-one.gc.ca/REGDOCS/File/Download/2786305*
[23] https://www.sciencedirect.com/science/article/pii/S2214241X15002229

Winds:

Trends/Observations:

- The risk increases when winds are 20 kts or greater.
- The timing of the winds has changed within the past decades, and this is affecting primary production along the coast. This potentially impacts navigation within the study area.
- Wind prediction has significantly improved over the past 10-20 years. This is true for both the US and Canada.
- Small craft are vulnerable to strong winds, especially in open areas with wind waves. Responding to these search and rescue cases can consume USCG resources.
- The 2016 extreme wind event was very notable, but the winds were predicted days beforehand. Extra resources were dedicated to preparations, and there was no loss of life.
- High wind events cause paddle craft to drift away from shore. These "false" rescue cases can consume USCG resources.
- NC1: Standard day in the Strait of Juan de Fuca sees winds of 5-20 kts. The conditions vary greatly based on the exact location.

Existing Mitigations:

- The US and Canadian Coast Guard monitor environmental conditions and forecasts.
- Meteorological information is provided in real time and is rreadily available to help mariners plan/prepare for changes in weather conditions.
- Active weather monitoring by the CVTS alerts mariners to approaching adverse weather conditions that could impacts safe navigation.

Water Movement:

Trends/Observations:

- All of Rosario Strait has strong currents. It slows down tug and barge traffic.
- Any of the entrances have strong currents. Coupled with opposing winds, these are very challenging conditions for small craft.
- NOAA is remodeling tide and current predictions, and they should finish this year (2017). The predictions should improve in the future.
- Sometimes vessel operators are not prepared for adverse and rapidly changing conditions. This can require intervention from the VTS.
- There are areas of localized hazardous conditions, but these locations are predictable. They are areas where currents collide. These are some of the most violent currents in the state (3-5 kts).
- Recreational vessels underestimate the extreme tidal range. This results in groundings, and serves as a major pollution risk. Deception Pass is incredibly dangerous for recreational vessels.
- The setting current in Rosario Strait can be an issue for tugs/tows heading east. Turn Point and East Point are bad areas for water movement. There are areas of upwelling and whirlpools. These are very challenging conditions for recreational boaters.
- NC2-NC4: Locations with current and eddy issues.

Existing Mitigations:

- Mariners have local knowledge of water movement within the assessment area.
- Deep draft vessel pilots are very familiar with the tides/currents and the impact they have on navigation large commercial vessels.
- Meteorological information is provided in real time and is rreadily available to help mariners plan/prepare for changes in weather conditions.

Visibility Restrictions:

Trends/Observations:

- The whole region is mountainous. This creates geographic restrictions for radar.
- Fog is seasonal but very significant. When it's warm, fog is worse. It can persist for more than 24 hours.
- Fog can get dramatically worse in a short period of time. Conditions change while underway.
- The number of fog days per year is published in the Coast Pilot[24].
- Rain is not a major problem, but it can obstruct the line of site to small objects/vessels.
- Heavy wind and chop degrade radar pictures. This makes it difficult to see small vessels on the radar.
- Recreational boating during foggy and rainy days is increasing now that GPS and navigation technology are more common/available. This provides a false sense of security for amateur boaters.
- There are microclimates within the study area. Therefore, a forecast for the entire study area may not accurately reflect conditions at a specific location. This is a difficult concept to understand and teach to boaters.

Existing Mitigations:

- Good communication between the CVTS and the commercial vessel operators impacted by visibility restrictions.
- Meteorological information is provided in real time and is rreadily available to help mariners plan/prepare for changes in weather conditions.

Obstructions:

Trends/Observations:

- For this workshop, obstructions are floating objects. This definition may confuse mariners as obstructions are typically fixed objects.
- Deadheads are a major risk. The U.S. Army Corps of Engineers recovers deadheads and presents the numbers to the Harbor Safety Committee. High tides and major storms increase risk of deadheads.
- Fishing gear is a common obstruction in the area. Fishing gear took out 3 ferries during the summer of 2017. Issues mostly involve salmon nets and crab pots (approximately 12,000 missing pots a year). Pot fishing isn't just limited to Dungeness crab.
- Fishing is a year-round activity, and there's always a lot of gear in the water. National Marine Fisheries Service (NMFS) maintains a "List of Fisheries" that contains all state and federal fishing seasons[25].
- Beached and abandoned vessels can become an obstruction in the waterway given the area's extreme tidal ranges.
- NC5-NC6: Areas with fishing gear.

Existing Mitigations:

- The US and Canadian VTS's pass information concerning deadheads and obstructions to waterway users.
- Washington State has a derelict and abandoned vessel program[26].
- The Canadian Ocean Protection Act includes funding and legislation for removing abandoned vessels.

[24] Coast Pilot 7, Section 29 lists 25-40 days per year of fog

[25] https://www.fisheries.noaa.gov/national/marine-mammal-protection/list-fisheries-summary-tables

[26] https://www.dnr.wa.gov/programs-and-services/aquatics/recovering-derelict-vessels

Visibility Impediments:

Trends/Observations:

- Rocky shorelines, outcroppings, and other natural features are the primary risk.
- There are no issues with background lighting.
- Replacing physical aids to navigation with electronic aids to navigation may increase navigational risk. There are no plans to implement this change. Electronic aids to navigation will only augment the physical Aids to Navigation (ATON) constellation.
- WC1: Smaller vessels with sodium vapor lights impede visibility in Georgia Strait after rainfalls.

Existing Mitigations:

- ATON are well placed and maintained and not impacted by shore side back-ground lighting.
- ATON with Light-Emitting Diode (LED) lights help to make locating the ATON easier.
- Mariners have local knowledge of the known locations of impediments exist.

Dimensions:

Trends/Observations:

- All one-way channel widths are at least 3.5 times the maximum beam, and all two-way channel widths are at least 7 times the maximum beam. The narrowest portion of the waterway is 77 times the maximum beam.
- Kelp Reef restricts Rosario Strait to approximately half the size seen on the nautical chart.
- Passing/meeting may be possible in some of the narrow areas, but the narrow dimensions increase risk associated with mechanical casualties.
- The Kinder Morgan Pipeline may increase the number of vessels per year by 350 vessels, approximately 1 vessel per day. This is less than the number of vessels the area saw in 2003.
- There are other projects under consideration, which may increase future vessel traffic.
- Local Canadian port authorities set restrictions for bunkering, and Canada is revisiting shipping regulations under the Canada Shipping Act.
- WC2-WC3: Rosario Strait is recognized in regulations as a VTS Special Area.
- WC4: Ferry vessels carefully plan voyages to avoid close quarters meetings with other vessels.

Existing Mitigations:

- Tankers must have a tug escort.
- There are meeting and passing restrictions for tankers.
- Standards of care for high risk areas such as Turn Point.

Bottom Type:

Trends/Observations:

- The bottom type and shoreline are fairly rocky, which increases the severity of groundings.
- The charts indicate there are also sand and shale bottom types.
- There are silty areas near river bottoms.
- Likelihood of grounding in the rotary is low. The Rosario Strait has high risk of grounding due to the rocky shoals and currents.
- Vessel damage from grounding will be influenced by vessel speed.
- Accurately charted bottom types are important because mariners will look for soft areas to mitigate damages after an engineering casualty.
- WC6: Wide, deep, and rocky area.
- WC7: Narrow and rocky area.

Existing Mitigations:

- Vessels have the ability to drop anchor before running aground.
- There is usually deep water all the way to the shoreline in most of the assessment area.

Configuration:

Trends/Observations:

- Of the 60 VTS interventions over the past 5 years, 39 VTS interventions occurred in precautionary area. 25 of these interventions were for vessels entering or leaving Canada.
- The precautionary area contains obstructions, islands, and reefs.
- Rosario Strait and Turn Point are high-risk areas.
- The State of Washington completed a Haro and Boundary Pass Vessel Traffic Risk Assessment in 2015. The study suggests significant traffic growth with the current waterway configuration could increase risk.
- The US has a bilateral agreement with Canada regarding vessel traffic management and search & rescue. There is a Joint Coordination Group that has formalized international data sharing. Data sharing occurs at the government level, but distribution to stakeholders could be improved. Lack of data sharing at the stakeholder level makes it difficult for them to assess risk.
- WC8: The precautionary area is high risk. There are 4 track traffic lanes that meet in this location. Vessels entering the precautionary area from sea have not yet embarked a Pilot, which increases risk.
- WC9-WC13: Smaller vessels/ferries operating in close proximity to deep draft traffic.
- WC14-WC20: Area with high numbers of fishing vessels.

Existing Mitigations:

- The CVTS improves communications between the US and Canada. It manages traffic based on 3 geographic zones. This mitigates risk associated with the international boundary[27].

Personnel Injuries:

Trends/Observations:

- The entire whale watching fleet is under 100 vessels. One whale watching season can include 440,000 passengers.
- There are approximately 5 dinner cruises in the area.
- Vitoria Clipper averages approximately 300 daily passengers.
- Cruise ships average 20 transits (10 ships) per week, and traffic is seasonal. The cruise ships have up to 5,000 people onboard (2/3 passengers, 1/3 crew).
- Only smaller cruise ships transit Haro Strait and Boundary Pass on a regular basis with approximately 2 trips per month during the busy season.
- IC1-IC3: Large Washington State ferries operate between Anacortes, Orcas, San Juan Island, and Sidney. Ferries carry approximately 850 passengers. The Washington State ferries serve approximately 700,000 passengers annually.

Existing Mitigations:

- Regular mass casualty exercises are conducted and involve numerous federal, state, and local agencies.
- Vessel Response Plans that outline roles/responsibility in the event of a major casualty[28].

[27] PWSA 1972 implementation, 33 CFR 167.1300 , present scheme published in 2002 (USCG 2002-12702), background material of prior schemes at https://www.gpo.gov/fdsys/pkg/FR-1999-01-20/pdf/99-1200.pdf

[28] Vessel Response Plans are developed to address oil spills not rescue operations. (33 CFR 151)

Petroleum Discharge and Hazardous Materials Release:

Trends/Observations:

- The largest vessels going to Canada are partially laden Aframax tankers (60,000 GRT). Washington's largest vessels are Suezmax (80,000 GRT).
- The largest ATBs are the 650 class (20,000 GRT or 175,000 barrels).
- Petroleum volumes range from 30,000 to 800,000 barrels.
- From the industry perspective, the number one concern is avoiding incidents. By far, industry spends most of their efforts avoiding a petroleum discharge.
- Petroleum companies hold the shipping companies to very high standards. Petroleum companies inspect vessels twice a year. Internal inspections are completed 4 times a year, and crews inspect vessels monthly. Inspections are a random selection of 420 questions. Petroleum transport companies must meet these standards to stay in business. They also participate in drills, and the last one went really well.
- There is an unregulated community of vessels that are delivering petroleum products throughout the San Juan Islands. For example, a landing craft transporting a tanker trailer. The volumes are below the regulated amounts, and these vessels are very high risk. If one of these unregulated vessels has an incident, it paints a bad picture for the entire industry. A participant disagreed with this comment because all cargo vessels above 15 GWT are inspected by the Coast Guard. Coast Guard confirmed the vessels are inspected, but the fuel transfer is not[29].
- Bunker fuel spills are a risk, and studies suggest this fuel is very toxic to fish.
- Sinking oil is being shipped, and response plans haven't been established for this type of oil[30].
- A Kinder Morgan study suggested a spill at Turn Point could reach Roche Harbor within 10 hours. This would have huge economic impacts for people living in the area[31].
- Bulk commodity shipping is increasing. All these vessels carry fuel, so they present a risk for petroleum pollution[32].
- Regulations restrict petroleum vessels to 125,000 DWT (Puget Sound Load line). This regulation does not apply to bulk carriers.
- There is a proposal for a xylene export facility. This would increase traffic by 60 tankers per year.
- There are 15 ships a month with up to 300 chemicals at a time. Chemicals can sink, float, evaporate or dissolve so the type of chemical release will dictate the response[33].
- More chemical incidents occur on container ships then on chemical tankers. Chemical tankers have a greater subdivision than oil tankers. Crews operate at a higher level of awareness because they are carrying chemicals.
- The net water flow is outward, so floating oil will affect a large area. Because of the depths, sinking oil may be unrecoverable.

Existing Mitigations:

- All vessels are double hulled, and all cargo is subdivided in smaller tanks.
- A lot of the bulk carriers are required to have a void between the fuel tanks and the skin of the ship.
- Pacific States-British Columbia Oil Spill Task Force tracks data. Over 50% of spills in 2014 were diesel. The number of spills less than 42 gallons was an order of magnitude larger than spills greater than 42 gallons.
- Harley Marine and Phillips 66 recently completed worst-case scenario exercises.
- Cascadia Rising exercises cover natural disaster situations.

[29] Mobile transfers to land facilities are regulated by WA DOE. https://www.wsdot.wa.gov/Environment/HazMat/SpillPrevention.htm Vehicles containing hazmat are inspected by DOT (49 CFR).
[30] Addressed in NW Area Contingency Plan section 9412 https://www.rrt10nwac.com/NWACP/Default.aspx
[31] Transmountain Pipeline worst case scenario evaluation
[32] Number of vessels has been relatively flat per VTS / Pilots Data previously mentioned. VTS Harbor Safety Committee Data shows relatively constant 800 transits a month between Jan 2013 to Jun 2017
[33] The majority of bulk cargo vessels carry only a few cargoes. A high quantity of discrete chemicals would most likely be a container vessel, with the cargoes encapsulated in various packaging for transport.

- Worst-case exercises are exercises, not drills. Full-scale, unannounced exercises are not completed out of respect for partners with day jobs.
- British Columbia conducts approximately 130 exercises/drills per year. Only 10-12 are tabletop exercises. A year ago (2016), there was a large exercise with the deployment of resources and equipment.
- The US Coast Guard conducts four (4) unannounced waterfront drills each year.

Mobility:

Trends/Observations:

- Before closing portions of a waterway, the Captain of the Port considers all impacts including Tribal fishing and marine traffic. Immediate actions are tailored to the threat; then closures are continually evaluated and changed as appropriate. The process is very fluid.
- For the worksheet, major marine casualty was defined as a worst-case scenario.
- IC4-IC6: Waterway choke point that could significantly impact mobility if closed.

Existing Mitigations:

- Very good lines of communication between federal and state agencies and waterway users.
- The ability for most vessels to use either Rosario Straight or Haro Straight to navigate through the assessment area.

Health and Safety:

Trends/Observations:

- Waterborne traffic is a routine mode of transportation.
- There is a marine culture or identity. Most people have an attachment to the water.
- San Juan County has approximately 15,500 residents, and the population doubles in the summer.
- Victoria, Sidney, and Bellingham are all located near the waterway. Hundreds of thousands of people could be affected by a major incident.
- Almost all land within the study area has a dense population[34].
- SC1: Bellingham, located in Whatcom County, has a population greater than 80 thousand residents. The city and Bellingham Harbor and would be heavily impacted in the event of an oil spill or a hazardous materials discharge.

Existing Mitigations:

- Strong communication lines between Federal/State agencies and waterways users and stakeholders.
- Emergency response planning and annual exercises reduce the impacts of health and safety risks.

Environmental:

Trends/Observations:

- Local citizens generally share concern and interest for the environment. "Our economy is our environment, and our environment is our economy."
- Commercial shell fishing exists along the eastern side of the study area.
- Puget Sound is designated as a National Estuary. $25 million in federal funds are dedicated to Puget Sound recovery efforts every year.

[34] San Juan County has a population density of 92/sq. mi. The high density clusters are distinct from the majority of the study area. https://www2.census.gov/geo/docs/maps-data/data/gazetteer/counties_list_53.txt

- Southern Resident Killer Whale population is estimated to be 76 whales[35]. The species is endangered, and the entire study area is Southern Resident Killer Whale critical habitat[36].

Existing Mitigations:
- Area Contingency Plans identify pre-designated areas for placing containment boom.
- Active Federal/State Environmental response planning and capabilities.

Aquatic Resources and Tribal Fisheries:

Trends/Observations:
- Shellfish, oysters, geoducks, shrimp, and crabs are found throughout the entire PAWSA area. These fisheries are commercially important.
- Eel grass grows in the area, and is a herring spawning habitat. Herring are the primary food for salmon. Beaches are spawning habitat for surf smelt and other fishes.
- The area has numerous protected species such as salmon and rockfish.
- The area has 4 federal fisheries. Therefore, it has essential fish habitat that needs to be protected for the commercial fishing industry.
- The Frasier River is the second largest salmon spawning river in the world. The Skagit River is also important.

Existing Mitigations:
- Wide community awareness of the importance and impact fishing has on the community, both tribal and non-tribal fisherman.

Economic:

Trends/Observations:
- Huge economic consequences if the waterway were to close.
- There would be second and third order impacts. For example, the waterway is a major hub for Alaskan shipping.
- Approximately 85% of oil refined in the region is used locally, only 15% is exported to other parts of the country[37].
- Annually Washington State and British Columbia receive 22 million visitors. They contribute $29.4 billion to the economy.
- The maritime sector in Washington State and British Columbia contributes $41.1 billion to the economy.
- If there was a closure, traffic may permanently reroute to another port.
- A major oil spill could cost the region $10 billion and 65,000 jobs. There could also be socioeconomic implications.
- $437,000 worth of crab are killed each year due to derelict gear[38].
- The whale watching industry contributes $150 million to the economy each year. In addition, most whale watching boats are built in Washington State and British Columbia[39].
- A major marine disruption would influence distribution and shipping throughout all North America.

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[35] http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/pacific/2016/po2016_kiw-enpsr.pdf 81 in 2016
[36] Southern Residents are an endangered population segment, species as a whole not endangered. Link for Critical Habitat Designation http://www.westcoast.fisheries.noaa.gov/publications/frn/2006/71fr69054.pdf
[37] 35 percent of WA output to domestic (mostly OR/CA) consumers, 14% to BC consumers, in 2013. http://www.commerce.wa.gov/wp-content/uploads/2016/04/Energy-Petroleum-Whitepaper-7-15-2013.pdf
[38] WDFW data reported for Point Roberts http://nwstraitsfoundation.org/derelict-gear
[39] PWWA report commissioned 2014

- The "Salish Sea Model" describes the flow of water throughout the Salish Sea. Currents could distribute spilled oil from the study area to the entire Salish Sea[40].

Existing Mitigations:

- Good communication between all port partners and stakeholders.
- The Coast Guard Marline Transportation System Recovery Unit (MSTRU) and other response resources are very experienced in responding to events and mitigation economic risks.

[40] 35 percent of WA output to domestic (mostly OR/CA) consumers, 14% to BC consumers, in 2013. http://www.commerce.wa.gov/wp-content/uploads/2016/04/Energy-Petroleum-Whitepaper-7-15-2013.pdf
[40] WDFW data reported for Point Roberts http://nwstraitsfoundation.org/derelict-gear
[40] PWWA report commissioned 2014
[40] https://salish-sea.pnnl.gov/

Appendix C

Tribal & Indigenous Nations Input

The Puget Sound PAWSA workshop endeavored to include any interested Tribe or Indigenous group in the process. Despite these efforts, participants agreed during the course of the workshop that the process likely could be improved to facilitate Tribal participation in geographic assessment areas with Tribal interests. Sector Puget Sound committed to working with the Coast Guard's Office of Navigation Systems (CG-NAV) and Coast Guard District Thirteen on examining methods for incorporating Tribal input at future PAWSA workshops. As a result, the Coast Guard's PAWSA Workshop Guide has been revised to reflect the importance of engaging Tribes in advance of a workshop and encouraging Tribal participation in the process.

During this workshop, Tribal and Indigenous observers were provided the opportunity to make statements regarding immediate and long term impacts of vessel traffic on Tribal fisheries and cultural preservation. The purpose of this Appendix is to document these statements and do not necessarily represent the views or position of the U.S. Government or Coast Guard.

- Chad Bowechop, Makah Tribe:
  This forum allows us to share some of the work that the tribe has completed to address its cultural interest. Culturally speaking, Tribal history wasn't recorded in written form. History and formal meetings were recorded in potlatch. Prayer is spiritual and incorporated in social governance. Spiritual belief states everything is related, and there is a balance between the physical and spiritual worlds. It's our responsibility to maintain this balance. We must keep the family and tribes strong. In potlatch society, members of the tribe are recognized by name. Names are earned by seniority, and they change as seniority increases. Given the indigenous nature of the culture, senior names are reused. All tribal members must operate within cultural boundaries. This is enforced by a member's sponsor, and people can be excluded from the Tribe for continually acting outside cultural boundaries.

  People need to better understand the Tribe's inherent sovereign authority. The Treaty of Neah Bay was signed in 1855. This treaty provides means to preserve and express cultural identity and spiritual beliefs. Cultural values are based on the sovereign authority established by this treaty. The federal government is trusted with protecting tribal interests. One of these interests is marine resources. Industry cannot view oil spills as simply the cost of doing business. The impact is much greater; it's cultural. The basis of our decision-making process is expressing cultural identity. This is expressed by exercising prayer and connecting the spiritual and physical worlds.

  It's our responsibility to work together. Tribes are using this opportunity to share cultural values with other waterway users. Through one of the Coast Guard Authorization Acts, the Tribes formalized the ability to establish MOAs with the Coast Guard. Tribes are very active in legislature and rulemaking. They have learned to inject sovereign interest in this legislation and rulemaking. When given the proper opportunity and technical assistance, Tribal governments can express their cultural perspective and be viewed as assets to industry and the federal governments.

- Lorne Underwood, Pauquachin First Nation:
  We have a close relationship with other Tribes and Nations. We've never had a formal border, and we're all related. From a cultural perspective, we are taught to sit still and listen. If practiced, you will notice repetition. The same problems occur again and again. Honor and respect for patience is important when interacting with the tribal Nations.

  The tribe is not opposed to development or business, but we want to work together. Please be patient as we learn and strive to work with you. The tribal treaties are very important. Tribes want to collaborate and reconcile!

We have some traditions: the first frost dance and recognizing winter is over when the frogs start croaking. Climate change has altered the timing of the frost dance and frog croaking. Marine activity could have unintended consequences; there are consequences for all actions.

The tribe would like to take this PAWSA process over to Canada. The Douglas Treaty was a peace treaty, but it recognizes the Tribe as a sovereign nation.

- Brian Cladoosby, Chairman Swinomish Indian Tribal Community
  We are writing in response to your letter dated September 11, 2017 inviting the Swinomish Tribe to participate in a workshop on October 25 and 26, 2017 regarding the above-referenced Ports and Waterways Safety Assessment, also referred to as a "PAWSA Workshop." I have formally designated Tom Ehrlichman and Barbara Dykes Ehrlichman as the Swinomish observers at the PAWSA Workshop. Please ensure that your record of the proceedings notes that I am sending them merely as observers to the workshop, not voting participants, under the principles stated in this letter. Swinomish respectfully declines to participate in a vessel traffic community workshop that cannot directly and explicitly address our treaty rights and the need for government-to-government consultation with us, as a sovereign nation.

  Rather than participate as a "stakeholder" in the PAWSA workshop or Harbor Safety Committee, Swinomish again requests a formal government-to-government consultation with the Coast Guard to address these waterway planning issues, impacts to our treaty right, and a model for a holistic management system to increase the overall safety of all users of the Salish Sea. Government-to-government consultation is the appropriate forum to address our concerns about interference with our reserved treaty fishing rights during waterways planning under the Port and Waterways Safety Act.

  As you know, the Swinomish Tribe is a federally recognized tribe with a Reservation and Usual and Accustomed fishing areas reserved under the Treaty of Point Elliot of 1855 (U & A). As a federal agency, you are our trustee and have an obligation to ensure that those reserved treaty fishing rights, as defined in U.S. v. Washington, are not undermined in any way that prevents physical access to these areas. Our legal counsel, James Jannetta, has provided you with a written outline of established law in this area. As you know, our U & A extends all the way to the Canadian border and incorporates all three of the areas you will be studying in your workshop.

  Your efforts to understand the issues we are facing have been tremendous, including your personal visit to our homeland to see the effects of vessel traffic on our fishermen firsthand. We also greatly appreciate your participation in the September 29, 2017 Tribal Vessel Traffic Summit at Tulalip sponsored by the Coast Salish Gathering, a transboundary organization of First Nations and Treaty Tribes who live and fish on the Salish Sea, as we have for thousands of years.

  The professionalism of the Coast Guard's Sector Puget Sound personnel and your leadership on the important task of vessel traffic safety in our homeland is first rate. Swinomish supports all prevention and response efforts and shares your commitment to safety on the open seas. However, we remain concerned that physical interference with our treaty rights has not been meaningfully addressed and so called "mitigation measures" more often than not actually add vessel trips to already unacceptable levels of vessel traffic for our tribal fishermen.

  As made clear at our recent Summit, Swinomish and other tribes have an immediate concern about the unacceptable level of interference with our treaty fishing due to traffic and anchoring by large vessels, and traffic from support tugs and other smaller vessels that do not follow designated shipping lanes as they travel to and from anchorages and docks. Before approval of any additional vessel trips adding to this interference with our treaty right, we have called for a comprehensive analysis of current interference with our treaty right, and a government-to-government consultation with you on these matters.

Our understanding from the email with your invitation is that the scope of this PAWSA planning session is targeted to three specific areas that involve increases in vessel traffic in the Salish Sea in our treaty fishing grounds:

1. The Port Angeles precautionary area;
2. Haro and Boundary Pass; and
3. Rosario Strait

All three areas listed above are within our U & A. We anticipate that the mitigation measures you will be contemplating in all three of the areas described in Lt. Commander Sullivan's email will likely lead to an increase in use of escort tugs, emergency tug facilities and/or support vessel traffic, all of which contributes to and exacerbates an already intolerable interference with our current treaty-reserved tribal fishing.

We also wish to reiterate that none of the existing forums on vessel safety include a representative of Swinomish's interests and thus do not address our concerns as a sovereign nation, nor any of the other inland-sea sovereign tribal nations such as Tulalip, Suquamish, Nooksack or Lummi which also retain treaty fishing rights to the Canadian Border and around the San Juan Islands. Participation in such forums does not substitute for government-to-government consultation or satisfy the Coast Guard's trustee obligation to sovereign treaty tribes with respect to access to loss of treaty fishing grounds, in that our retained treaty rights cannot be abridged by consensus decisions of stakeholder groups or in facilitated forums.

I am also writing to express our strong concern with the stated intent of your PAWSA workshop. Your email communication through Lt. Commander Sullivan, chief of the Waterways Section, states that the discussion regarding Haro and Boundary Pass is intended to address the safety impacts of the: "anticipated increase in vessel traffic to ports in southern British Columbia including tanker traffic increases associated with the already approved Trans Mountain pipeline expansion increasing export of oil from Canada via the Kinder Morgan facility in Vancouver." While we have active concerns about waterway planning in all three of the above-described areas that are the subject of this workshop, Swinomish is particularly concerned about the forum being used as a community mitigation forum to address the impacts of the Kinder Morgan proposal. For starters, that proposal is approved at the Canadian federal level but is not yet approved for operation, due to ongoing court appeals involving First Nations, the City of Vancouver, and the British Columbia government's opposition to the proposal.

With its sister tribes the Lummi Nation, the Suquamish Tribe and the Tulalip Tribes, Swinomish appeared personally and through legal counsel at the National Energy Board hearings in Canada in opposition to approval of the Trans Mountain Pipeline expansion, due to the lack of analysis of impacts to fishing areas in U.S. waters reserved to us through the Point Elliot Treaty of 1855. Swinomish will not participate in a PAWSA workshop that purports to provide "mitigation" for the adverse impacts of this proposed pipeline expansion. You will note that Kinder Morgan's own spill modeling showed that spills would reach our Swinomish reservation shorelines and fishing areas. We remain completely opposed to its approval, because the increased risk of a catastrophic oil spill in our U.S. treaty fishing grounds is too great, even with mitigation measures you may choose to adopt as part of this workshop or in other proceedings. Again, while we support increases in funding and preparation for prevention and response capabilities, there is no amount of mitigation that can reduce this increased risk to an acceptable level in light of our treaty fishing right.

Please provide Tom and Barbara with an opportunity at the outset of the PAWSA Workshop tomorrow to read this letter to the workshop participants, in order to register these concerns and clarify our position for the record. As stated by Chairman Tyler of the Makah Tribal Council in his letter to you on the workshop, we also request your acknowledgement of our status as a sovereign nation with fishing rights thoughout the areas covered in the workshop, and that you, as our trustee, are required by law to protect our treaty rights, separate and apart from the PAWSA process.

As you know, our respective staffs have spent a considerable amount of time discussing a possible pathway to develop a macro approach to vessel management that would reduce the current level of interference with treaty fishing. It is my hope that these discussions can continue in earnest in preparation for true government-to-government consultation. I look forward to that consultation to discuss these matters of vital importance to the Swinomish Indian Tribal Community.

- Tom Erlichman, Swinomish Tribal Representative
  We wanted to thank you for the manner that you, personally, took to seek inclusiveness during the PAWSA workshop. We know you understand the position the Swinomish Indian Tribal Community took at the Workshop, to avoid being listed as a participant in a stakeholder "consensus" rating of risk and "mitigation" of impacts to treaty rights. Instead, we sought — and you agreed — to a direct line of communication with tribal chairmen on risk to treaty fishing, as part of your record in the PAWSA process. That was a significant decision on your part.

  We look forward to continuing the discussion on how best to do that. After the meeting yesterday, we spoke with Deb Lekanof about next steps. We have a green light to discuss technical details with Andy Connor this Wednesday by phone, as to the possibility of setting up the government-to-government consultation with Chairman Cladoosby, so that we can discuss PAWSA and the "macro" approach to vessel management in tribal fishing grounds. We look forward to staging the substantive Government-to-Government discussions quickly, hopefully in the next two weeks if your schedule will permit. It may be efficient to include other tribes and tribal chairs if they so desire.

  On the exploration of a macro approach, outlined generally in extensive phone conversations between us, Jim Jannetta, and Commander Scott, and described to you and your staff in our presentation on July 13, 2017 — we have some concrete suggestions on overall waterways management and would like to develop a protocol for how we discuss those with the Coast Guard in light of the PAWSA process you initiated.

- Swinomish Tribal Representative:
  We had family houses from Seattle to the Canadian Border. There was no property ownership; people just followed the resources. Tribes are sovereign nations. I'm a tribal member, Washington state citizen, and a county citizen. The history of the San Juan Islands is riddled with a tribal presence. They were the richest people in the world. We measure richness by the availability of resources, not money.

  Treaties have historically not been recognized for sovereignty. However, we will practice this sovereignty until there is no more earth. Every single island and waterway in the San Juan region is our land. It's not just about fishing; it's about determining what's best for our people.

  It's time for us to be at the table. Even 5 to 10 years ago, we were not at this table. Industry will grow, but we need to grow responsibly with respect to the uniqueness of nature and Washington State. Thank you for having us at this table.

  These waters and land are the life of our future. I fight for all ancestors. Please be patient with our passion and emotions because these are human journeys for us. These are life altering changes we are discussing. This process is frustrating because there so many futures at stake. Growth is inevitable, but how do we grow responsibly? We must do it correctly the first time and cannot rush it. The tribe reserves the right to submit comments to the PAWSA report.

  The animals and sea have no boarder. We came from a king salmon in the Salish Sea. Transformation from a king salmon to a human was granted under certain conditions. We must honor the Grandfather, sing and dance in honor near the sea (universal language for thanks), and treat other humans and the land in a good way (as other salmon and the Salish Sea were treated).

- Lorne Underwood, Pauquachin First Nation:
  Ship wakes are eroding shoreline, and this is destroying ancestral graves. The tribe is trying to preserve the

graves because it's culturally unacceptable to move these graves.

- Melody Allen, Suquamish Tribe:
  We cannot view the Salish Sea as only a marine highway. We have concerns, especially with oil spills. Traffic increases in general are a huge risk. Everything impacts tribal culture, and this is sometimes ignored or unrecognized.

- Lorne Underwood, Pauquachin First Nation:
  We did not share stories; we shared our laws. We are continually combining indigenous law with common law. There have been impacts to tribal fishing grounds. 27% of usual and accustomed areas (UNAs) in the Salish Sea are difficult or impossible to access due to marine traffic. In addition to access, there are safety issues and the loss of fishing gear.

- Amy Trainer, Makah Tribe: Another immediate consequence of a fossil fuel spill is the use of chemical dispersants. These dispersants can be toxic and more detrimental to the environment.

- Lorne Underwood, Pauquachin First Nation: Aviation fuel can be shipped on the water or stored near the water. Unregulated fuel shipments are a real issue. Condensate should also be considered because it's shipped on these waters.

- Amy Trainer, Makah Tribe: Best available technology requirements are important for spill response. They should be considered.

- Amy Trainer, Makah Tribe: The tribe does not benefit from a casino, and it is very dependent on fisheries (whiting, salmon, black cod, rockfish, shellfish). "Tide is out, table is set." Damage to our aquatic resources would be devastating. The assist tug was called out 3 times in the past 6 months.

- Amy Trainer, Makah Tribe: You cannot eliminate human error, and this is usually the cause of many mishaps. We should explore more mitigation measures that address human error.

- Chad Bowechope, Makah Tribe: Higher levels of tourist boating activities are impacting tribal treaty rights. It's also impacting tribal fishing.

- Melody Allen, Suquamish Tribe: Small craft volume impacts tribal fishing by running over fishing gear. This results in cultural, subsistence, and economic losses.

- Swinomish Tribe: We should address the possibility of future traffic growth.

- Lorne Underwood, Pauquachin First Nation: We alter our course often because of recreational traffic. We are concerned with our waterway, not other locations around the world. Please focus on our waterway.

- Melody Allen, Suquamish: We are sometimes forced to fish overnight to avoid the mix of vessel traffic. The risk has been increasing every year.

- Melody Allen, Suquamish Tribe: Vendovi Anchorage is usually congested with tankers. The Tribe's definition of congestion does not necessarily agree with other participants. For example, the channels could be empty, but the anchorages could be congested.

- Lorne Underwood, Pauquachin First Nation: Who is responsible for climate change? It is impacting the Tribal Community, especially in regards to rising sea levels.

- Lorne Underwood, Pauquachin First Nation: Fog is a big issue for oil spill recovery. Recovery plans incorporate fog considerations.

- Amy Trainer, Makah Tribe: Based on personal and anecdotal evidence, there are relatively narrow areas in Haro Strait, SE of Darcy Island. Southbound passing is particularly risky. Will tankers for the new Kinde Morgan Pipeline differ in size? Pilot's response: Tankers will not be bigger; size is limited by port infrastructure.

- Melody Allen, Suquamish Tribe: How will the total number of vessels increase with the Kinder Morgan Pipeline? Kinder Morgan response: 350 vessels/year, 1 vessel/day.

- Amy Trainer, Makah Tribe: A previous incident involved a tug that was intentionally grounded on a sandy shoal. As a result, no oil was discharged. This demonstrates how bottom type should be considered for risk mitigation.

- Chad Bowechop, Makah Tribe: It's an international waterway. This PAWSA is the perfect opportunity to understand how authorities are recognized and interact to configure the waterway. Governmental configuration of the waterway is important.

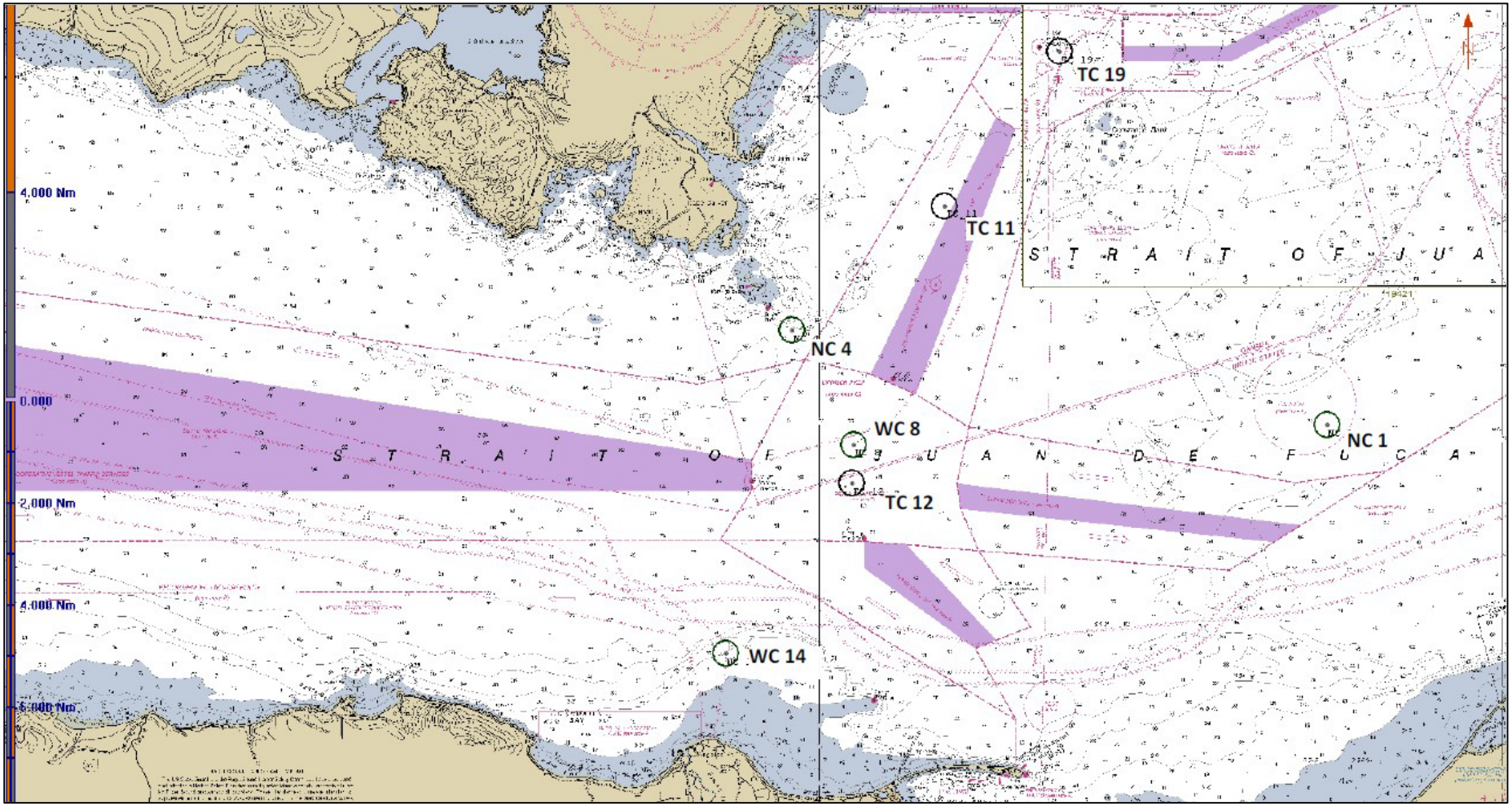
- Melody Allen, Suquamish Tribe: Tribes have a traditional fishing practice. The shipping lanes and configurations have created borders that impact Tribal fishing.

- Chad Bowechop, Makah Tribe: We need to develop a fundamental understanding of how our trans-boundary configuration was established. This discussion has been very beneficial.

Appendix D - Figure 1

Strait of Juan De Fuca – Eastern Part

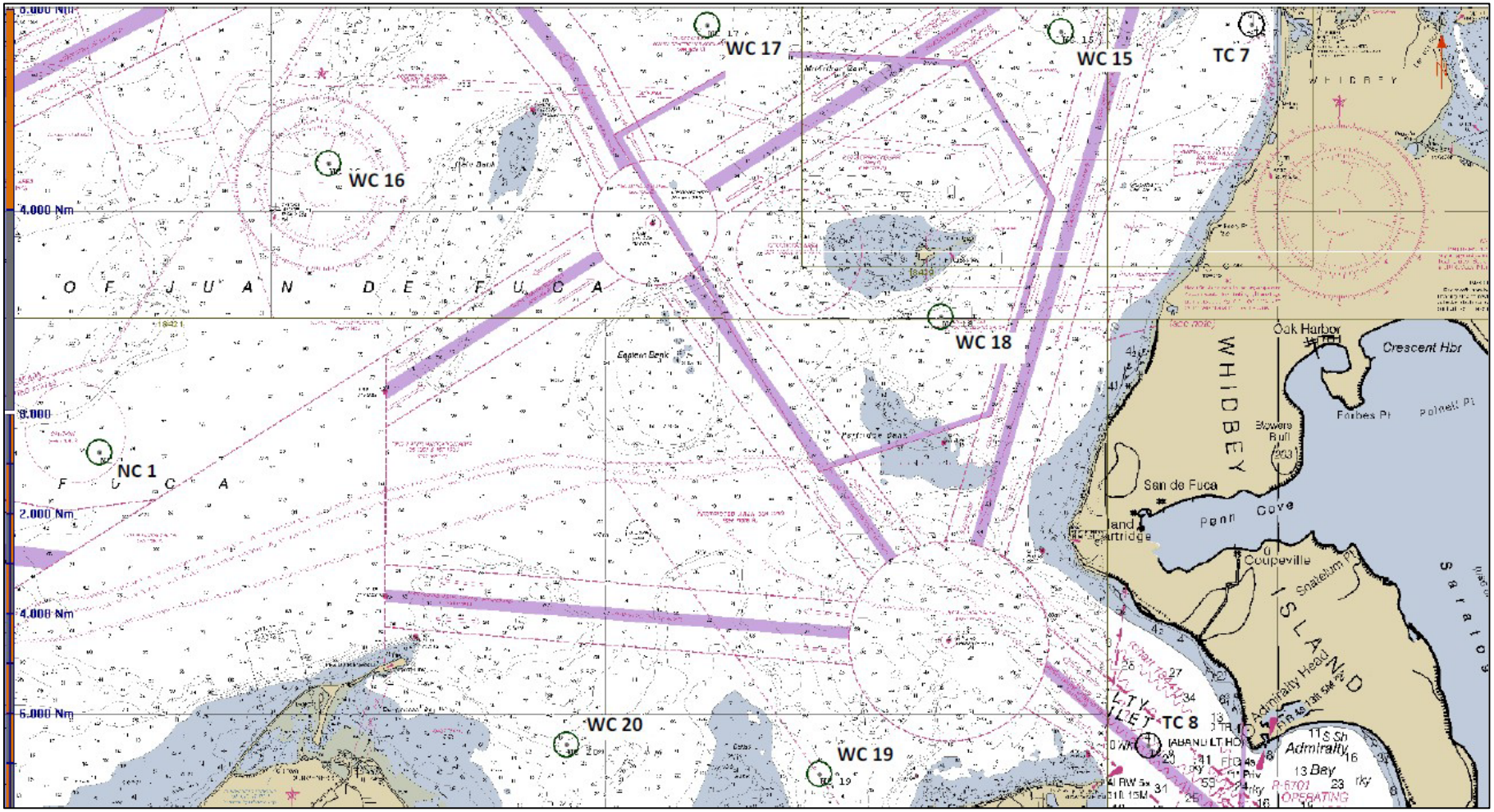
TC11, TC12	High vessel traffic volume areas.
TC19	Traffic congestion in the pre-cautionary area off Victoria Harbor.
NC1	Standard day in the Strait of Juan de Fuca sees winds of 5-20 kts.
NC4	Location with current and eddy issues.
WC8	The precautionary area is high risk.
WC14	Area with high numbers of fishing vessels.



Appendix D - Figure 2

Strait of Juan De Fuca – Western Part

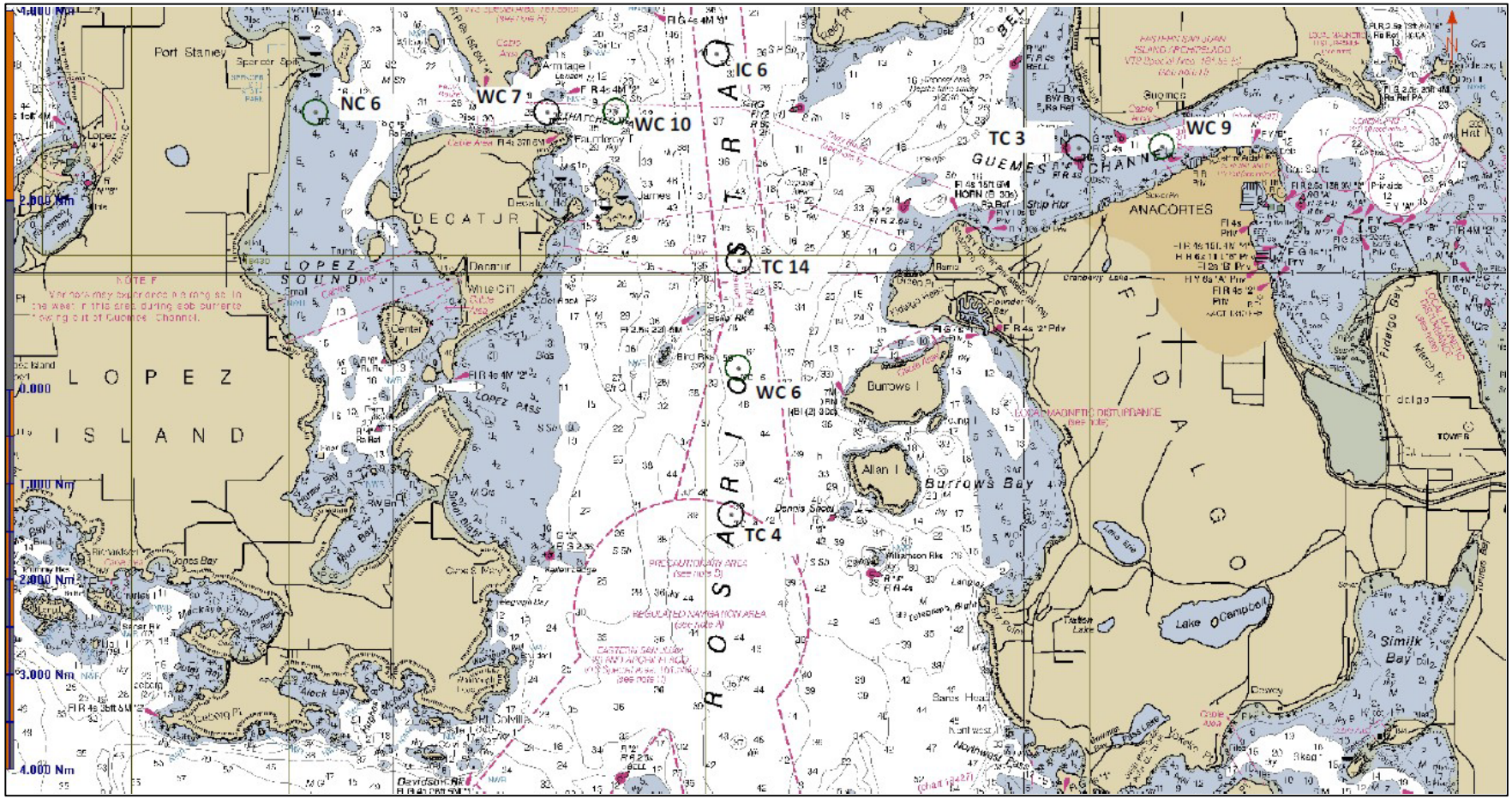
TC7	Areas with a high concentration of small boats.
TC8	Areas with a high concentration of kayaks and small boats.
NC1	Standard day in the Strait of Juan de Fuca sees winds of 5-20 kts.
WC15 -WC20	Areas with high numbers of fishing vessels.



Appendix D - Figure 3

Rosario Strait – Southern Part

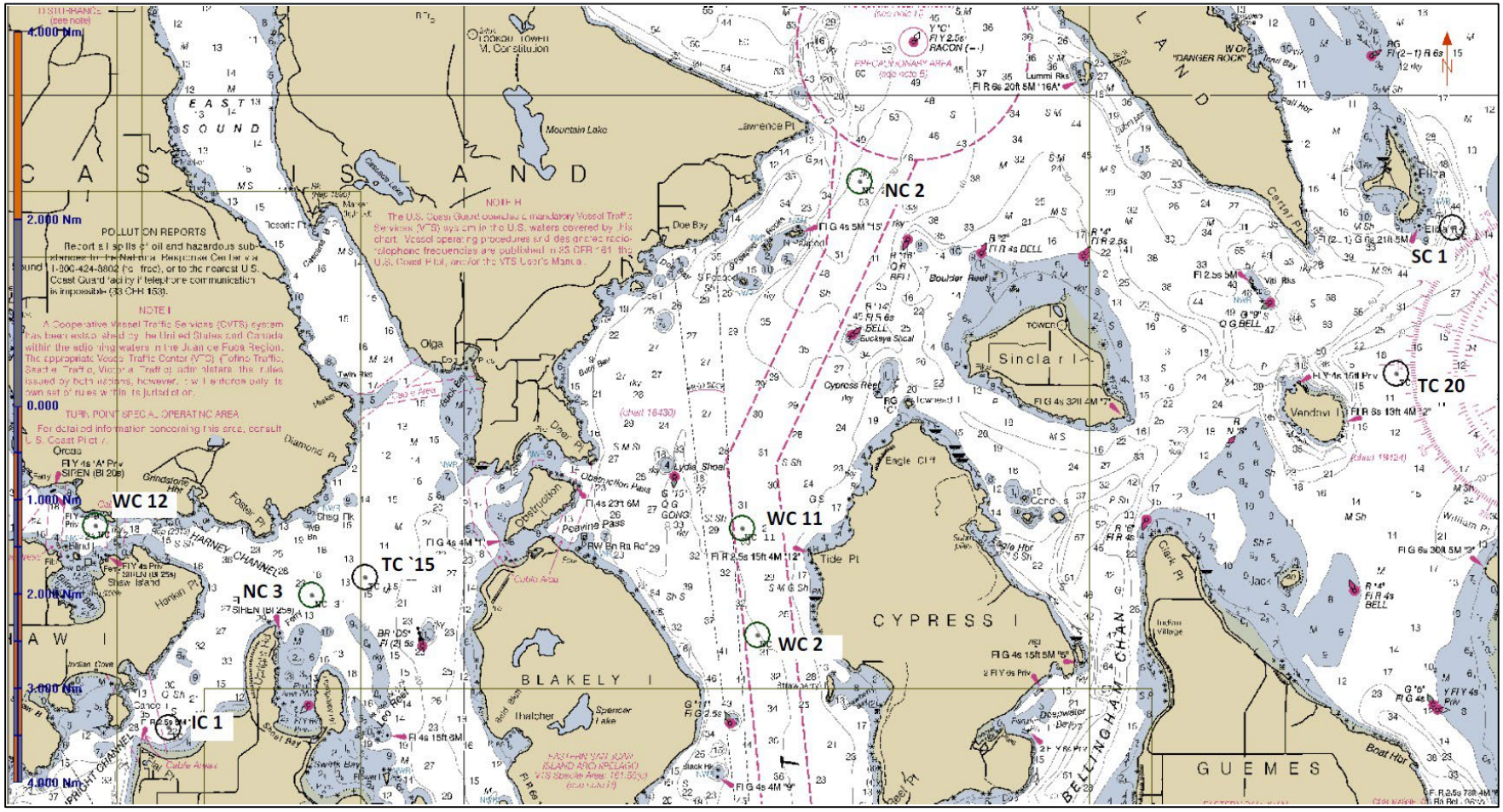
TC3	25 ferry transits per day.
TC4	Rosario Strait is one-way traffic for larger vessels.
TC14	High vessel traffic volume areas.
NC6	Areas with fishing gear.
WC6	Wide, deep, and rocky area.
WC7	Narrow and rocky area.
WC9, WC10	Smaller vessels/ferries operating in close proximity to deep draft traffic.
IC6	Waterway choke point that could significantly impact mobility if closed.



Appendix D - Figure 4

Rosario Strait – Northern Part

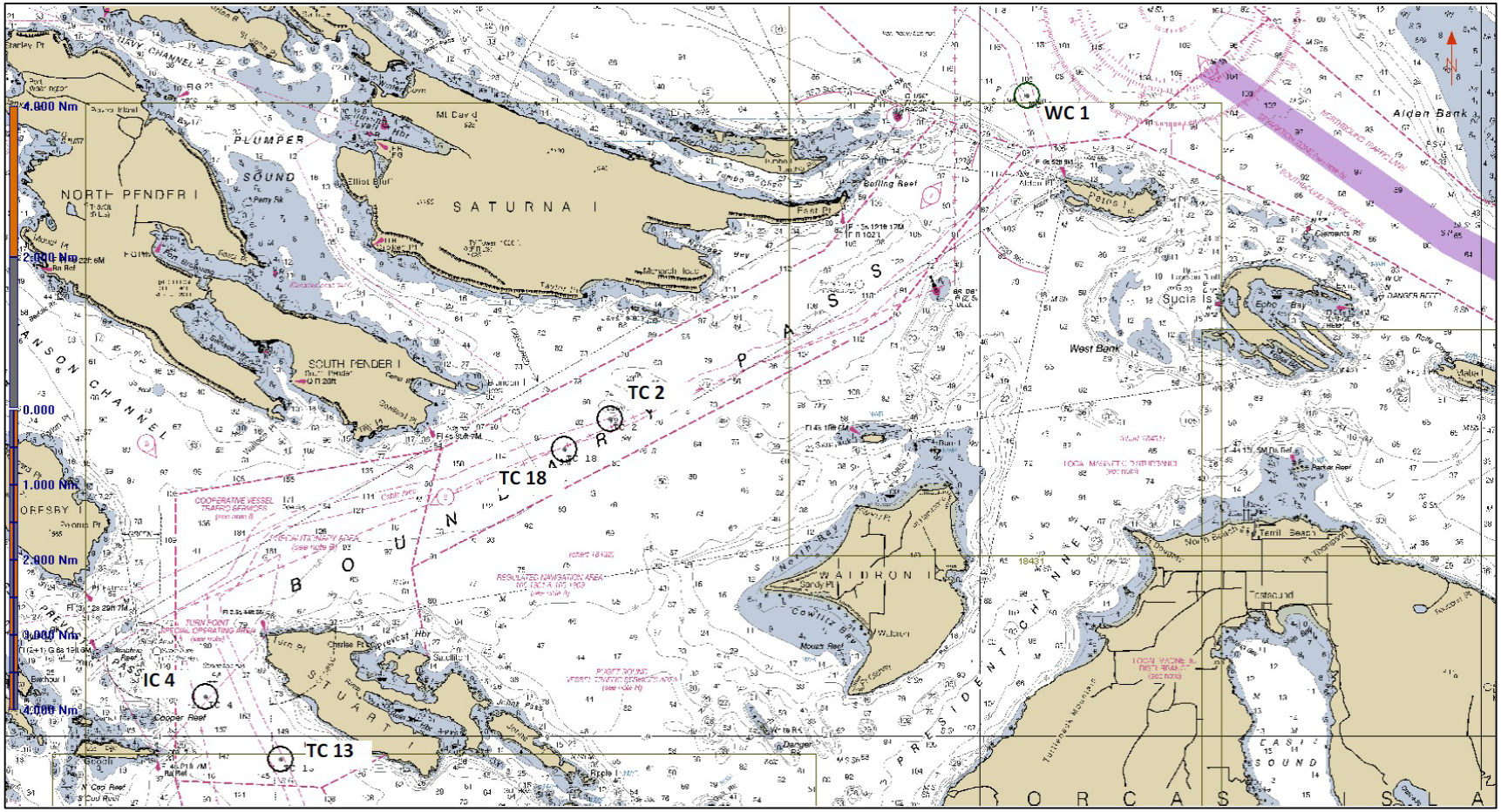
TC15	High vessel traffic volume area.
TC20	The Vendovi Anchorage Area includes 4 anchorages a mile apart.
NC2, NC3	Location with current and eddy issues.
WC2	Rosario Strait is recognized in regulations as a VTS area.
WC11, WC12	Smaller vessels/ferries operating in close proximity to deep draft traffic.
IC1	Large Washington State ferries operate between Anacortes, Orcas, San Juan Island, and Sidney. Ferries carry approximately 850 passengers.
SC1	Bellingham Harbor and Bay would be heavily impacted in the event of an oil spill or a hazardous materials discharge.



Appendix D - Figure 5

Boundry Pass

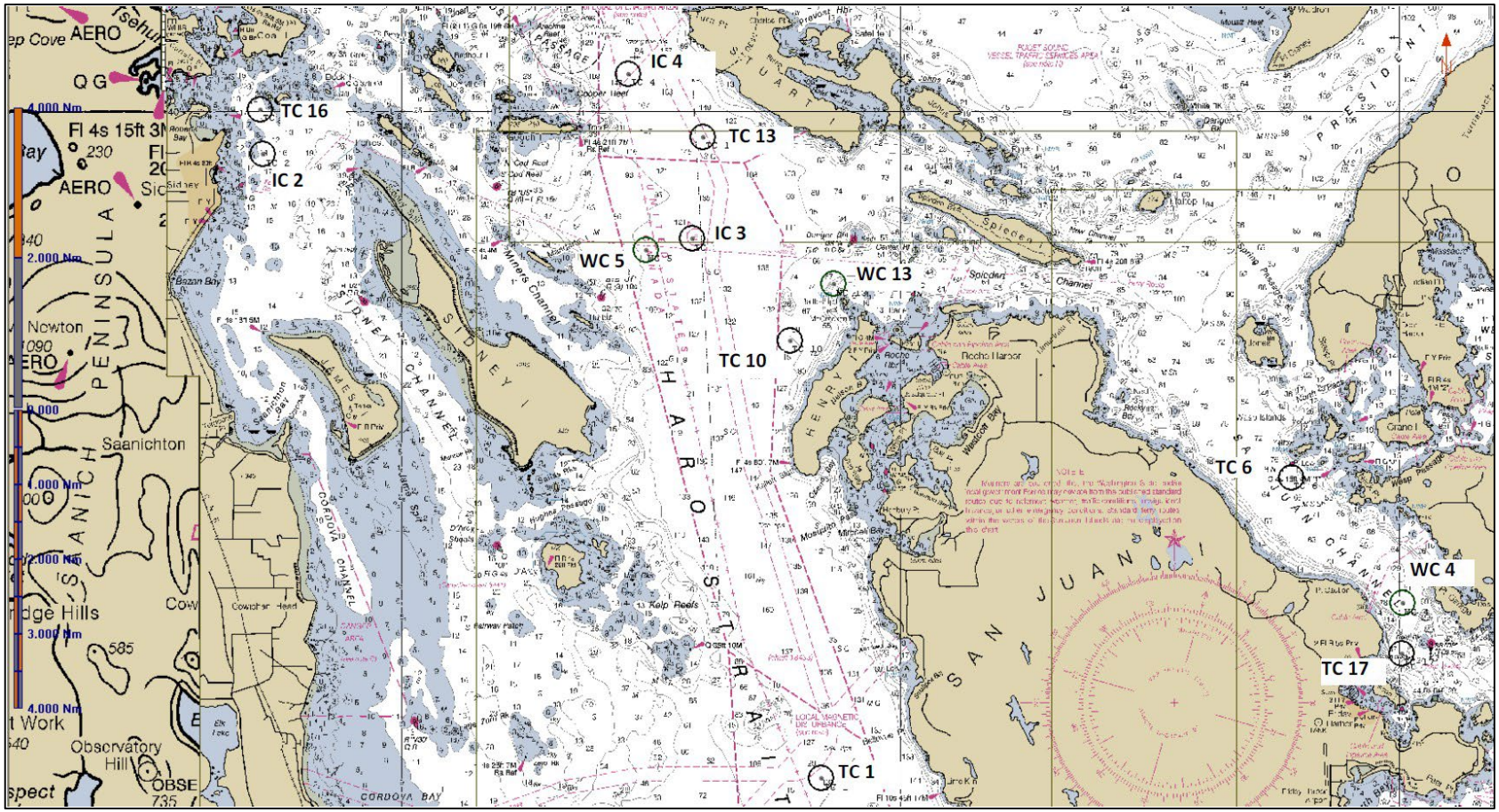
TC2	Haro Strait and Boundary Pass have light traffic, 16 total ships a day on average. Traffic volume has decreased in recent years.
TC13	High small vessel traffic volume areas.
TC18	Approximately 60% of AIS traffic attributed to deep draft vessels.
WC1	Smaller vessels with sodium vapor lights impede visibility in Georgia Strait after rainfalls.
IC4	Waterway choke points that could significantly impact mobility if closed.



Appendix D - Figure 6
Haro Straight – Northern Part

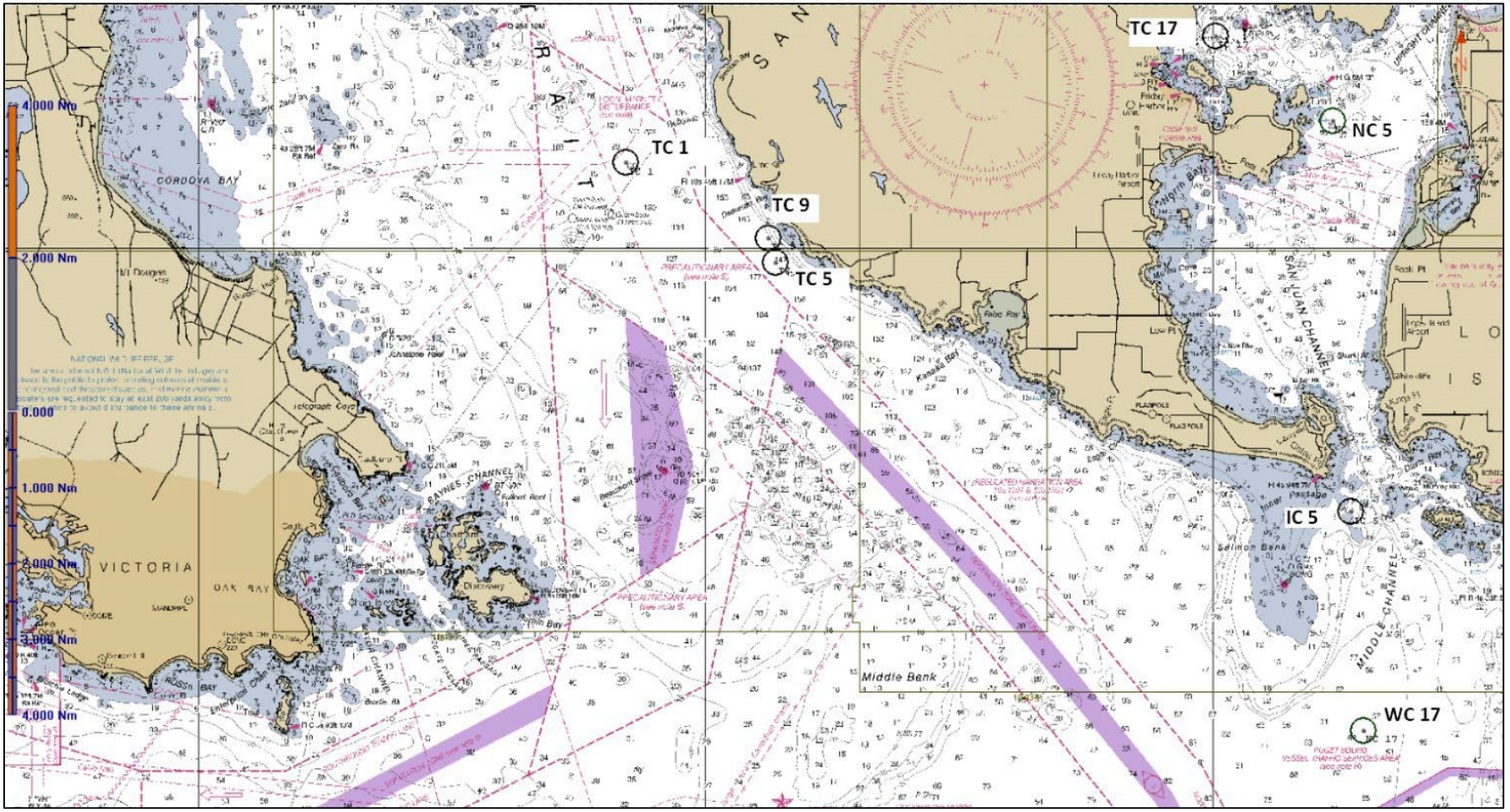
WC4, WC5	Ferry vessels carefully plan voyages to avoid close quarters meetings with other vessels.
WC13	Smaller vessels/ferries operating in close proximity to deep draft vessels.
IC2, IC3	Large Washington State ferries operate between Anacortes, Orcas, San Juan Island, and Sidney. Ferries carry approximately 850 passengers.
IC4	Waterway choke point that could significantly impact mobility if closed.

TC1	Haro Strait and Boundary Pass have light traffic, 16 total ships a day on average. Traffic volume has decreased in recent years.
TC6	High concentration of kayaks and small boats.
TC10	Location of whale watching traffic.
TC13	High small vessel traffic volume areas.
TC16	Sydney Harbor has sea plane traffic.
TC17	Friday Harbor has sea plane traffic.



Appendix D - Figure 7
Haro Straight – Southern Part

TC1	Haro Strait and Boundary Pass have light traffic, 16 total ships a day on average. Traffic volume has decreased in recent years.
TC9	Location of whale watching traffic.
TC5	Area with a high concentration of kayaks and small boats.
TC17	Friday Harbor has sea plane traffic.
NC5	Areas with fishing gear.
WC17	Areas with high numbers of fishing vessels.
IC5	Waterway choke point that could significantly impact mobility if closed.



Appendix E

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Appendix F

Abbreviations and Acronyms

ACP	Area Contingency Plan
AIS	Automated Identification System
ANPRM	Advance Notice of Proposed Rulemaking
ATON	Aids to Navigation
BWI	Boating While Intoxicated
BTM	Broadcast Notice to Mariners
COTP	Captain of the Port
EPA	Environmental Protection Agency
MARAD	Maritime Administration
MTS	Marine Transportation System
MTSRU	Marine Transportation System Recovery Unit
NDG	National Dialogue Group
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
OSRO	Oil Spill Response Organization
PAWSA	Ports and Waterways Safety Assessment
PDF	Personal Flotation Device
PSC	Port State Control
PORTS	Physical Oceanographic Real-Time System
RNA	Regulated Navigation Areas
STCW	Standards of Training Certification of Watchkeeping
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
VHF	Very High Frequency
VMRS	Vessel Movement Reporting System
VTM	Vessel Traffic Management
VTS	Vessel Traffic Service

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