Board of Pilotage Commissioners Tug Escort Rulemaking (Chapter 363-116 WAC) State Environmental Policy Act Draft Environmental Impact Statement

Transportation: Vessel Traffic Discipline Report

Washington State Board of Pilotage Commissioners

Washington State Department of Ecology

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Acronyms and Abbreviations

AIS	Automatic Identification System
ASTM	Advancing Standards and Transforming Markets International
АТВ	Articulated tug barge
BC	British Columbia
BPC	Washington State Board of Pilotage Commissioners
COLREGS	International Regulations for Preventing Collisions at Sea (Collision Regulations)
CVTS	Cooperative Vessel Traffic Service
DWT	deadweight tons
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
ESHB	Engrossed Substitute House Bill
FORs	functional and operational requirements
GOIA	Governor's Office of Indian Affairs
GT	gross tons
HR	Haro Strait
IMO	International Maritime Organization
ITC	International Tonnage Certificate
LNG	liquified natural gas
LPG	liquified petroleum gas
MCTS	Marine Communications and Traffic Service
MMSI	Maritime Mobile Service Identity number
OTSC	Oil Transportation Safety Committee
PAWSA	Ports and Waterways Safety Assessment
РРА	Pacific Pilotage Association
PSHSC	Puget Sound Harbor Safety Committee
RCW	Revised Code of Washington
RS	Rosario Strait
SEPA	State Environmental Policy Act
SJDF	Strait of Juan de Fuca

SOA	Special Operating Area
SOC	Standard of Care
SRKW	Southern Resident killer whale
STCW	International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers
TSS	Traffic Separation Scheme
US	United States of America
USCG	United States Coast Guard
VEAT	Vessel Entries and Transits for Washington Waters
VMRS	vessel movement reporting system
VTRA	Vessel Traffic Risk Assessment
VTS	Vessel Traffic Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

Summary

This Discipline Report is produced by the Washington State Department of Ecology (Ecology) as part of the development of an Environmental Impact Statement (EIS) as required pursuant to the State Environmental Policy Act (SEPA).

The Board of Pilotage Commissioners (BPC), in consultation with Ecology, is conducting a rulemaking to amend Chapter 363-116 of the Washington Administrative Code (WAC), Pilotage Rules. The rulemaking will consider 2019 legislative changes made to Chapter 88.16 of the Revised Code of Washington (RCW) (Pilotage Act) through the passage of Engrossed Substitute House Bill (ESHB) 1578. The rules will be designed to achieve best achievable protection, as defined in RCW 88.46.010, and will be informed by other considerations in ESHB 1578. The BPC and Ecology determined that the rulemaking may have significant adverse impacts on the environment and are developing an EIS.

This Transportation: Vessel Traffic Discipline Report describes the existing conditions and potential impacts to transportation (vessel traffic) resulting from the four rulemaking alternatives: No Action (Alternative A), Addition of Functional and Operational Requirements (FORs) (Alternative B), Expansion of Tug Escort Requirements (Alternative C), and Removal of Tug Escort Requirements (Alternative D). The study area for the transportation (vessel traffic) element includes the EIS Study Area which encompasses the rulemaking alternative boundaries and potential areas for tug escort commute to and from the alternative boundaries.

The following transportation (vessel traffic)-related topics were analyzed:

- Change in underway time for escort tugs
- Change in the number of escort jobs
- Potential navigational safety and congestion from changes in escort tug underway time and distribution

Significant and unavoidable adverse impacts to transportation (vessel traffic) were not identified for any of the alternatives. Table 1 summarizes anticipated impacts on transportation (vessel traffic).

Table 1. Transportation: vessel traffic impact summary.

Change in Activity	Resulting Impact on Vessel Traffic	Comparison to Alternative A	Mitigation	Significant and Unavoidable Adverse Impact?
Alternative A: No Action			1	
Underway Time and Escort Jobs: Continued escort of target vessels within the Alternative A boundary and associated commutes within the EIS Study Area.	610,107 annual underway minutes for target vessel escort tugs. Between 4 and 5 escort "jobs" for target vessels per day.	N/A	Continued adherence to federal and state regulations and safety measures, continued implementation of best practices and standards of care.	No
Navigational Safety and Congestion: Escort tugs for target vessels account for 0.96% of all AIS vessel traffic in the EIS Study Area. Some minimal continued congestion and navigational safety considerations (e.g. route switching).	 Target vessel escorts are a small percentage of total traffic in all zones. Tugs continue to wait at rendezvous points along the northern and southern boundaries of Alternative A. Some towed barges and ATBs continue to switch to Haro Strait/Boundary Pass route potentially in response to the requirements. 	N/A	Continued adherence to federal and state regulations and safety measures; continued implementation of best practices and standards of care.	No
Alternative B: Addition of Functional and Operational Requirements				
Underway Time and Escort Jobs: Continued escort of target vessels within the	Same as Alternative A	Same as Alternative A	Same as Alternative A	No

Change in Activity	Resulting Impact on Vessel Traffic	Comparison to Alternative A	Mitigation	Significant and Unavoidable Adverse Impact?	
Alternative A boundary and associated commutes within the EIS Study Area.					
Navigational Safety and Congestion: Escort tugs for target vessels account for 0.96% of all AIS vessel traffic in the EIS Study Area. Some minimal continued congestion and navigational safety considerations (e.g. route switching).	Largely the same as Alternative A.	Same as Alternative A	Same as Alternative A	No	
Alternative C: Expansion of T	Alternative C: Expansion of Tug Escort Requirements				
Underway Time and Escort Jobs: Increase in target vessel escort tug underway time of 2.41% and shift in commute and escort locations to accommodate expanded area with requirements for target vessels.	624,784 annual underway minutes for target vessel escort tugs. Number of escort jobs remains the same as Alternative A.	Minor to moderate increase in overall escort and assist tug underway time in the expansion area.	Same as Alternative A	No	
Navigational Safety and Congestion: Escort tugs for target vessels account for 0.99% of all AIS vessel traffic in the EIS Study Area. Some minimal changes to congestion and navigational	-Moderate increases in escort tug traffic in Strait of Georgia South and Strait of Georgia Zones. -Southern boundary rendezvous point remains the same. More dispersed waiting	 -Moderate increases in underway time in two zones. -Potential shift in rendezvous points at northern boundary where tugs are waiting. 	Same as Alternative A	No	

Change in Activity	Resulting Impact on Vessel Traffic	Comparison to Alternative A	Mitigation	Significant and Unavoidable Adverse Impact?
safety considerations (e.g. route switching).	behavior at the northern boundary. -Some towed barges and ATBs continue to switch to Haro Strait/Boundary Pass route in response to the requirements.	-No meaningful changes to route switching or tug shortage.		
Alternative D: Removal of Tug	Escort Requirements			
Underway Time and Escort Jobs: Removal of all underway time associated with target vessel escorts.	No escort jobs associated with target vessels. 18.76% reduction in total escort and assist tug underway time from Alternative A.	Less escort and assist tug underway time overall.	Target vessels only: Continued adherence to federal and state regulations and safety measures; continued implementation of best practices and standards of care.	No
Navigational Safety and Congestion: Reduction of 0.96% of all AIS vessel traffic in the EIS Study Area. Some changes to congestion and navigational safety considerations (e.g. route switching).	 -Escort and assist tug traffic reduced in all zones. -No tugs waiting for target vessels at rendezvous points in the rulemaking area. -Towed barges and ATBs may switch <i>back</i> to the Rosario Strait route. 	 -Minor Reduction in overall vessel traffic in all zones. -Waiting at rendezvous points eliminated from rulemaking area. -Potential for limited increase in target vessel traffic using Rosario Strait. 	N/A	No

1.0 Introduction

1.1 Background

The Board of Pilotage Commissioners (BPC), in consultation with the Washington Department of Ecology (Ecology), is conducting a rulemaking to amend Chapter 363-116 of the Washington Administrative Code (WAC), Pilotage Rules. The rulemaking will consider 2019 legislative changes made to Chapter 88.16 of the Revised Code of Washington (RCW) (Pilotage Act) through the passage of Engrossed Substitute House Bill (ESHB) 1578. The rules are intended to improve the safety of oil transportation and reduce threats to southern resident killer whales. They should also achieve best achievable protection, as defined in RCW 88.46.010, and will be informed by other considerations in ESHB 1578.

The rulemaking will:

- Describe tug escort requirements for the following vessels (referred to as "target vessels" throughout this report) operating in the waters east of the line extending from Discovery Island light south to New Dungeness light and all points in the Puget Sound area:
 - Oil tankers of between 5,000 and 40,000 deadweight (DWT) tons.
 - ATB and towed waterborne vessels or barges greater than 5,000 DWT tons that are designed to transport oil in bulk internal to the hull.
- Specify operational requirements for tug escorts, where they are required.
- Specify functionality requirements for tug escorts, where they are required.
- Consider the existing tug escort requirements applicable to Rosario Strait and connected waterways to the east, established in RCW 88.16.190(2)(a)(ii), including adjusting or suspending those requirements, as needed.
- Describe exemptions to tug-escort requirements, including whether certain vessel types or geographic zones should be precluded from the escort requirements.
- Make other changes to clarify language and make any corrections needed.

The purpose of expanding tug escort requirements is to reduce oil spill risk from target vessels in Puget Sound. However, the rulemaking could also change the amount of escort tug traffic in a way that affects oil spill risk and other elements of the environment. As a result, the BPC and Ecology determined that the rulemaking may have significant adverse impacts on the environment. The BPC and Ecology issued a Determination of Significance on February 22, 2023, which initiated development of an Environmental Impact Statement (EIS) as required under RCW 43.21C.030 (2)(c) under the State Environmental Policy Act (SEPA). Ecology also issued a formal scoping notice

Note: Unless specified otherwise, the following terminology applies throughout this EIS:

- **"Tug escort"** refers to the act of a tug escorting a target vessel that is specifically affected by this rulemaking.
- "Escort tug" refers to the tug that conducts escorts of target vessels. Underway time for an escort tug includes active escort time and time spent commuting to and from an escort job.

as required through the SEPA process. Ecology conducted an EIS Scoping Meeting on March 21, 2023, to invite comments on the scope of the EIS and a comment period was open from February 22, 2023, through April 8, 2023.

The BPC and Ecology have agreed to act as co-lead agencies under SEPA and share lead agency responsibility for the EIS. The elements of the environment to be included in the EIS were preliminarily identified in the scoping notice. This Discipline Report serves as the detailed analysis of an element identified for inclusion in the EIS, and will serve as supporting documentation to the EIS.

The BPC is conducting the rulemaking process concurrently with the EIS development and is working closely with Ecology to coordinate the public involvement process. The rulemaking effort includes regular public involvement workshops designed to share information with stakeholders, Tribal government representatives, and the public. The BPC also appointed the Oil Transportation Safety Committee (OTSC). The OTSC is an advisory committee of subject matter experts representing different areas like the regulated industry, Tribal governments, and environmental groups. The OTSC meets regularly to develop recommendations for the BPC, and the BPC makes the final decisions related to this rulemaking.

1.2 Rulemaking Alternatives

Through the rulemaking public involvement process, the BPC developed rulemaking alternatives for consideration in the EIS. The BPC has proposed four reasonable¹ rulemaking alternatives to be analyzed in the EIS. This Discipline Report analyzes the impacts associated with the four proposed rulemaking alternatives: No Action (Alternative A), Addition of Functional and Operational Requirements (FORs) (Alternative B), Expansion of Tug Escort Requirements (Alternative C), and Removal of Tug Escort Requirements (Alternative D). The proposed rulemaking alternatives are summarized below and are shown on Figure 1.

Alternative A. No Action. Under Alternative A, the existing tug escort regulations would continue in effect with no changes.

Alternative B. Addition of Functional and Operational Requirements. The existing tug escort regulations would continue with the addition that escort tugs operating under the rule would need to meet the following three functional and operational requirements:

- 1. Pre-escort conference: Prior to beginning the escort, the escort tug and the target vessel need to coordinate and discuss safety measures and other standard requirements.
- 2. Minimum horsepower: Escort tugs must meet minimum horsepower requirements based on the DWT of the escorted vessel:
 - $\circ~$ Escort tugs must have 2,000 hp for vessels greater than 5,000 and less than 18,000 DWT.
 - Escort tugs must have 3,000 hp for vessels equal to or greater than 18,000 DWT and less than 40,000 DWT.

¹ As defined in Chapter 197-11-786 WAC.

3. Propulsion specifications: To ensure sufficient propulsion, escort tugs must have a minimum of twin-screw propulsion.

Alternative C. Expansion of Tug Escort Requirements. This alternative would maintain the geographic scope of the current tug escort regulations and extend them to the northwest (See Figure1 below). The expansion would add 28.9 square miles to the existing area where tug escort requirements apply. The expansion area would begin at the northern boundary of the existing tug escort requirement. Alternative C also includes the three functional and operational requirements described in Alternative B.

Alternative D. Removal of Tug Escort Requirements. This alternative would remove the current tug escort requirement for the target vessels within the rulemaking boundaries.



Figure 1. Proposed rulemaking alternatives

Under ESHB 1578, Ecology developed a model to simulate vessel traffic patterns and oil spill risk, including tug escort activity. The model was based on historical automatic identification system (AIS) data from 2015-2019 and was used to inform the 2023 Analysis of Tug Escorts for Tank Vessels. For the current EIS effort, Ecology used the model 1) to simulate the tracks of escort and assist² tug traffic, based on 2015-2019 historical AIS data, and 2) to simulate the current volumes of escort and assist tug traffic along these tracks while accounting for tug escort requirements that went into effect in 2020.

The model produced 1,000 annual simulations of escort and assist tug traffic. To represent current conditions and Alternative A, Ecology selected the simulation output with the highest

² Escort tugs are often referred to as "escort/assist tugs" in this analysis because the same vessels typically perform both escorting and assisting work. Ecology used the model to simulate traffic for both escorting and assisting work; however, only escorting work would be affected by the rulemaking alternatives.

amount of escort tug traffic (i.e., the "worst case scenario") to ensure that the EIS does not undercount potential environmental impacts and to account for other potential near-term growth in vessel traffic (e.g., traffic from the Trans Mountain Expansion). For Alternative C, Ecology modified the Alternative A simulated traffic outputs to account for the proposed changes in tug escort requirements under that alternative.

Ecology used 2023 historical AIS data (i.e., not simulated) to represent all vessel categories other than escort and assist tugs, with some adjustments to account for recreational and fishing vessels that are not equipped with AIS. Traffic for these other vessel categories did not require simulation because it would not change based on the rulemaking alternatives.

The simulation outputs are used here to show the differences in underway time for escort tugs^{3,4} under Alternative A and Alternative C. Figure 1 and Figure 2 show the results of these simulations, compiled to indicate the total minutes per year (min per yr) of escort tug underway time within each one-square-kilometer grid cell. Figure 3 depicts the change in escort tug underway time between Alternatives A and C. Escort tug activity under Alternative B would not be expected to be meaningfully different than activity under Alternative A, while Alternative D would result in zero tug escorts. Refer to Section 2.0 Methodology for details regarding the vessel activity simulation methodology. Results are described in this Discipline Report.

³ Escort tug underway time includes time spent traveling to an escort job, time while escorting a target vessel, and time spent traveling from an escort job.

⁴ Unless specified otherwise, the terms "escort tug" and "tug escort" refer to the subset of overall tug escort activity or underway time associated with the escort of target vessels that are specifically affected by this rulemaking. It includes both active escort and commute time.



Figure 2. Simulated escort tug underway time under Alternative A and B.



Figure 3. Simulated escort tug underway time under Alternative C.



Figure 4. Simulated change in escort tug underway time between Alternative A and Alternative C. An additional accessible version of this map is available in Appendix M.

1.3 Resource Study Area

The study area for the vessel traffic analysis is the EIS Study Area (see Figure 5). The EIS Study Area includes both:

- The boundaries of the alternatives where tug escort requirements could change to meet the requirements of the updated rule, and
- Modeled commute routes of escort tugs to and from the boundary where the requirements could change.

The EIS Study Area extends west to include Port Angeles, south to Olympia, and north to the US-Canadian border. To support the communication of results, the Study Area has been divided into zones. Zones labeled "BPC Zones" are those established by the BPC in support of the modeling and analysis effort as required by RCW 88.16.260(1)(d)(i). Additional non-BPC zones have been established where needed to assure all areas within the Study Area can be referenced (see Figure 6).



Figure 5. Boundary of the EIS Study Area.



Figure 6. Map of BPC and Non-BPC zones in the EIS Study Area

1.4 Resource Description

This Transportation: Vessel Traffic Discipline Report (Report) describes existing vessel traffic resources in the EIS Study Area and models escort tug underway time. This Report evaluates the potential impact to these resources from each of the rulemaking alternatives. The assessment focuses on these sub-elements:

- Number of escort jobs per simulated year
- Number of underway minutes per simulated year for escort tugs actively escorting a target vessel
- Number of underway minutes per simulated year for escort tugs commuting to or from an escort job
- Distribution of escort tug underway minutes by BPC zone for each alternative
- Comparisons to all escort and assist tug traffic
- Comparisons to 2023 historical AIS data
- Discussion of non-AIS vessel traffic
- Potential navigational safety and congestion outcomes of each rulemaking alternative

1.5 Regulatory Framework

Table 2 identifies the laws, plans, and policies relevant to the evaluation of vessel traffic impacts in the study area. Additional narrative descriptions for the major regulatory components are included in subsections for each regulatory body, following Table 2.

Table 2. Summary of relevant federal, state, Tribal, and local regulations relevant to transportation (vessel traffic)

Regulation, Statute, Guideline	Description
Federal	
Vessel Traffic Management (33 CFR 161)	Establishes a national system of Vessel Traffic Services (VTS) under the authority of the U.S. Coast Guard and associated vessel operating and reporting requirements. It also defines specific VTS areas and Cooperative Vessel Traffic Services (CVTS) areas for transboundary waterways with Canada, including for the Puget Sound.
Navigation Safety Regulations (33 CFR 164)	Establishes navigation safety requirements for vessels operating in Waters of the United States, including but not limited to specific navigational safety requirements for tankers; requirements for vessels at anchor; requirements for steering, equipment, and charts, and Automatic Identification System (AIS).
International Regulations for Prevention of Collisions at Sea, 1972 (33 CFR Subchapters D and E)	Codifies the 1972 International Regulations for Prevention of Collisions at Sea (COLREGS) developed by the International Maritime Organization and ratified by the U.S. in 1977 (Subchapter D), as well as the U.S. Inland Navigation Rules (Subchapter E). The COLREGS are

	standardized navigation rules which aid mariners in safe navigation.
Offshore Traffic Separation	Establishes Traffic Separation Schemes (TSS),
Schemes (33 CFR 167,	precautionary areas, and areas to be avoided. Subparts
specifically §§ 167.1321	167.1320 through 167.1323 describe requirements for the
through 167.1323 for	Puget Sound and its approaches.
Washington waters)	
Tribal	
Treaty of Medicine Creek	Treaty between the U.S. Government and the following
(1854)	federally recognized Tribes: Nisqually, Puyallup, Squaxin Island, and Muckleshoot Tribes (WDFW, n.d.), as well as other Tribes and bands (GOIA, n.d.). Article 3 includes the right of taking fish at all usual and accustomed grounds and stations in common with citizens of what was then the Washington Territory.
Treaty of Point Elliott (1855)	Treaty between the U.S. Government and what are today the following federally recognized Tribes: Lummi, Nooksack, Stillaguamish, Swinomish, Upper Skagit, Suquamish, Sauk-Suiattle, Tulalip, and Muckleshoot Tribes (WDFW, n.d.) and other Tribes and bands (GOIA, n.d.). Article 5 includes the right of taking fish at all usual and accustomed grounds and stations in common with citizens of what was then the Washington Territory.
Treaty of Point No Point	Treaty between the U.S. Government and what are today
(1855)	the following federally recognized Tribes: Jamestown S'Klallam, Port Gamble S'Klallam, Lower Elwha, and Skokomish Tribes (WDFW, n.d.) and other Tribes and bands (GOIA, n.d.). Article 4 includes the right of taking fish at all usual and accustomed grounds and stations in common with citizens of the United States.
Treaty of Neah Bay (1855)	Treaty between the U.S. Government and what is today the federally recognized Makah Tribe (WDFW, n.d.). Article 4 includes the right of taking fish, whaling, and sealing at all usual and accustomed grounds and stations in common with citizens of the United States.
Quinault Treaty/Treaty of Olympia (1856)	Treaty between the U.S. Government and what are today the following federally recognized Tribes: Quinault, Hoh, and Quileute Tribes (WDFW, n.d.). Article 3 includes the right of taking fish at all usual and accustomed grounds and stations in common with citizens of what was then the Washington Territory.
United States v. Washington,	In this decision, the federal district court interpreted the
384 F. Supp. 312 (W.D. Wash.	rights of treaty Tribes to take fish in their "usual and
1974), "Boldt Decision"	accustomed places in common with all citizens" to mean
	that treaty Tribes have a treaty-reserved right to harvest
Fisherias regulations of	50% of the narvestable portion of fish.
risheries regulations of	their own ficheries regulations
murriuuai iribes as relevalit.	

State		
Chapter 363-116 WAC, Pilotage Rules	Describes the training, licensing, and regulation of Washington state maritime pilots to ensure safe pilotage. The rule also describes tug escort requirements for vessels carrying oil in Washington waters (WAC 363-116-500).	
RCW 88.16.190, Pilotage Act, Oil Tankers – Restricted Waters – Requirements	Describes tug escort requirements for oil tankers for the Puget Sound. As of 2019, it also includes tug escort requirements for laden articulated tug barges and towed oil barges.	
RCW 88.16.260, BPC authorized to adopt rules in consultation with other entities – Tug escorts	Directs the Board of Pilotage Commission, in consultation with the Department of Ecology, to adopt tug escort rules for oil tankers between 5,000 to 40,000 dwt, and articulated tug barges and towed oil barges over 5,000 dwt.	
RCW 88.46, Vessel Oil Spill Prevention and Response	Describes the Department of Ecology Spills Program authority over vessel oil spill prevention and response. Includes the requirement for the Program to develop a model to assess oil spill risks, tug escorts, and emergency response towing vessels.	
Local		
Puget Sound Harbor Safety Committee Standards of Care (voluntary)	The Harbor Safety Committee develops voluntary standards of care (SOCs) as part of the Harbor Safety Plan. The SOCs are practices and procedures that go beyond regulatory requirements.	

1.5.1 U.S. Coast Guard

The U.S. Coast Guard (USCG) is the primary federal agency responsible for vessel traffic and prevention and response to oil spills within navigable waters of the United States. The EIS Study Area is located within USCG District 13 and Sector Puget Sound. The USCG mission programs include maritime law enforcement, maritime response, maritime prevention, marine transportation system management, maritime security operations, and defense operations (U.S. Coast Guard, n.d.-a). The USCG works closely with state, local, Tribal, and maritime industry representatives, and Canada to manage vessel traffic. Several of the USCG's primary responsibilities related to vessel traffic management and tug escort requirements are summarized below.

1.5.1.1 Vessel Traffic Management:

The US Coast Guard manages vessel traffic in the Puget Sound through the Vessel Traffic Service (VTS) Puget Sound⁵ under 33 CFR 161. The VTS includes a vessel movement reporting system (VMRS), a Traffic Separation Scheme (TSS), and a surveillance system that uses radar, AIS, and closed-circuit television to monitor vessel traffic (U.S. Coast Guard, 2021). The purpose of the Puget Sound VTS is to "facilitate good order and predictability on the Salish Sea waterways by coordinating vessel movements through the collection, verification, organization, and

⁵ See 33 CFR Part 161, Table 1, Designation #10 (Puget Sound) for the specific geographic boundary covered under the Puget Sound VTS. See <u>USCG 2021 VTS Manual, pages 1-8</u>, for a map of the various VTS and CVTS zones.

dissemination of information" (U.S. Coast Guard, 2021). The USCG achieves this through continuous monitoring and vessel traffic management. The USCG can also communicate and intervene via radio as needed. The USCG VTS requirements apply to:

- Power-driven vessels 40 meters or greater in length while navigating.
- Every towing vessel of eight meters or greater in length, while navigating (engaged in towing).
- Every vessel certificated to carry 50 or more passengers for hire, when engaged in trade, regardless of whether passengers are on board (U.S. Coast Guard, 2021).

The target vessels and escort tugs associated with the rulemaking are required to participate in the VTS. Towed barges are included via communications with their towing vessel (tug).

1.5.1.2 Cooperative Vessel Traffic Management:

The USCG and Canadian Coast Guard work together to seamlessly manage vessel traffic across the transboundary waters of the Salish Sea. This system is called the Cooperative Vessel Traffic Service (CVTS) (33 CFR 161) and its authority derives from the Oregon Treaty of 1846. A map of the CVTS areas of operation and the respective vessel traffic management by traffic center is included below. Lines where vessels switch between US- and Canadian-based Vessel Traffic Services are specifically defined (see Figure7 below). The areas proposed for changes in tug escort requirements in this rulemaking are within the boundaries of the US Coast Guard Seattle Traffic Zone. Tugs commuting to or from an escort job could travel through Canadian-managed waters.



Figure 7. Map of the Vessel Traffic and Cooperative Vessel Traffic management areas (U.S. Coast Guard, 2021).

The Canadian Coast Guard operates three vessel traffic service zones: Vancouver, Tofino, and Prince Rupert, which are managed by Victoria Traffic (Vancouver zone), and Prince Rupert Traffic (Tofino and Prince Rupert zones). The Canadian system is called the Marine Communications and Traffic Service (MCTS). MCTS participation applies to:

- Commercial power-driven vessels 20 meters or greater in length.
- Pleasure craft 30 meters or greater in length.
- Fishing vessels 24 meters or greater in length, and 150 GT.
- Towing vessels 20 meters or greater in length, or, if the object being towed is 20 meters, or, overall length of tug and tow is 45 meters (Consolidated Federal Laws of Canada, Vessel Traffic Services Zones Regulations, 2007).

1.5.1.3 Traffic Separation Schemes and Precautionary Areas:

The USCG also manages rules and agreements on traffic routing. These include the Traffic Separation Scheme (TSS), Precautionary Areas, and Special Operations Areas. We summarize the more common navigational rules related to the rulemaking below.

- Traffic Separation Scheme (TSS): The TSS is a designated routing measure aimed at separating vessel traffic traveling in different directions through the establishment of traffic lanes separated by a zone with no traffic, known as a separation zone (16 CFR 33 § 167.5). The TSS is managed by the CVTS and is visible in Figure 7. The Puget Sound TSS includes three parts: Rosario Strait, approaches to Puget Sound other than Rosario Strait, and Puget Sound. There is a TSS for the Strait of Juan de Fuca, Puget Sound including Rosario Strait, and Haro Strait, Boundary Pass, and the Strait of Georgia.
- Precautionary Area(s): The TSS also includes several Precautionary Areas, which are defined areas where ships must navigate with particular caution and within which the direction of traffic flow may be recommended (33 CFR§ 167.5). These include five precautionary areas within Haro Strait, Boundary Pass and the Strait of Georgia, 12 precautionary areas within Puget Sound and its approaches (including Rosario Strait), and one precautionary area in the Strait of Juan de Fuca and approaches.
- Eastern San Juan Island Archipelago Special Operating Area: There is a VTS Special Area in the waters east of the San Juan Islands, which is where this rulemaking considers changing tug escort requirements. Because of this, these requirements are described in greater detail. The Eastern San Juan Island Archipelago VTS Special Area includes the waters of the eastern San Juan Island including Rosario Strait, Orcas Island, Guemes Channel, Bellingham Channel, Padilla Bay, and Bellingham Bay (see 16 CRF 33 § 161.55 for coordinates). In this area, vessels have additional safety requirements. These include:
 - A vessel of less than 100 meters does not require VTS permission to meet, cross, or overtake any other VMRS User in the area.
 - A vessel of 100 meters or more in length will not be permitted to meet or overtake; or cross or operate within 2,000 yards (except when crossing astern) of a vessel of 40,000 DWT or greater.
 - A vessel of 40,000 DWT or more will not be permitted to meet or overtake; or cross or operate within 2,000 yards (except when crossing astern) of a vessel 100 meters or more in length.
 - A VTS User engaged in towing shall do so with as short a hawser as safety and good seamanship permits, and shall not impede the passage of a vessel of 40,000 DWT or more.
 - A vessel of 40,000 DWT or greater always requires prior VTS approval to enter or get underway in the special area. All other VMRS Users do not, unless a hazardous vessel operating condition or circumstance exists. Permission to enter a special area with a known vessel defect or hazardous condition, or continue a transit if a hazardous condition develops within the special area itself, requires explicit approval of the Captain of the Port after contacting the VTS. Special conditions or restrictions may be placed upon the vessel, or authorization may be withheld. An alternate route around the special area may be recommended. Ballast state does

not exempt a vessel of 40,000 DWT from the necessity to gain VTS authorization to enter or get underway in a special area.

- All VMRS Users must make safe passing arrangements on Channel 13 prior to meeting, crossing, or overtaking in the special area, and must comply with all other applicable International Collision Regulations.
- **Turn Point Special Operating Area (SOA):** The United States and Canada, in cooperation with industry and the British Columbia Coast Pilots, established a Special Operating Area at the intersection of Haro Strait and Boundary Pass in the vicinity of Turn Point Light (U.S. Coast Guard, 2021). Portions of this area can see strong currents. In this area, vessels are restricted from meeting, overtaking, or following too closely to another vessel (U.S. Coast Guard, n.d.-b). Vessels must also maintain a minimum distance from Turn Point on Stuart Island while transiting through this waterway.

1.5.1.4 Common International Standards:

Vessels navigating in the US and Canadian waters of the Salish Sea follow the same navigational rules of the road known as the International Regulations for Prevention of Collisions at Sea (COLREGS). This helps prevent collision and ensures predictability across the transboundary waterway. Applicable vessels operating in the US and Canadian waters also follow the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), which sets qualification standards.

1.5.1.5 Escort Requirements for Certain Tankers:

The Oil Pollution Act of 1990 and the Coast Guard Authorization Act of 2010, were regulations that required laden single-hull tankers over 5,000 Gross Tons to be escorted by at least two escort vessels in applicable waters, including the waters of Puget Sound east of a line connecting New Dungeness Light with Discovery Island Light and all points in the Puget Sound. When these federal regulations were written, double-hulled requirements for oil-carrying vessels were still being phased in. The last exceptions to the double-hull requirement ended in 2015; today, all tankers are double-hull and the single-hull tankers that this federal requirement applied to are no longer in operation.

1.5.2 Washington State Board of Pilotage Commissioners

1.5.2.1 Pilotage

Compulsory pilotage is a tool used by many jurisdictions worldwide to increase marine safety and help prevent vessel accidents within their waters (Quick, 2008). The Washington State Board of Pilotage Commissioners (BPC) regulates pilotage in Washington state through the Washington State Pilotage Act (Chapter 88.16 RCW). The intent of the law is to "prevent the loss of human lives, loss of property and vessels, and to protect the marine environment of the state of Washington through the sound application of compulsory pilotage provisions in certain of the state waters" (RCW 88.16.005).

Foreign-flagged vessels in Washington state pilotage districts are required to use a statelicensed pilot. In addition, the Washington Legislature recognized that the "Puget Sound and adjacent waters have limited space for maneuvering a large oil tanker and that these waters contain many natural navigational obstacles as well as a high density of commercial and pleasure boat traffic. For these reasons, it is important that large oil tankers be piloted by highly skilled persons who are familiar with local waters and that such tankers have sufficient capability for rapid maneuvering responses" (Wash. Rev. Code § 88.16.170, 1991). To address this concern, US-flagged oil tankers of five thousand gross tons or greater are required to take a Washington state licensed pilot while navigating the Puget Sound (Wash. Rev. Code § 88.16.180, 1991). The US Coast Guard runs the licensing program for federal pilotage.

1.5.2.2 Tug Escorts

Tug escorts have been part of the marine safety system in Washington state since 1975. Tug escorts are best suited to intervening in loss of propulsion and loss of steering events (Allan, 2000; ASTM, 2021). Preventing these types of events before they result in drift groundings also prevents potential oil spills. Although drift groundings are rare and drift groundings resulting in a spill are even more rare,⁶ there have been at least two large spills resulting from a vessel drifting aground on Washington's outer coast.⁷

Tug escorts are useful in high-risk areas because they can provide immediate assistance to the vessel if a loss of propulsion, steering, or other navigational issue occurs (Nuka Research & Planning Group, LLC, 2013). Escort tugs can also serve as an additional set of eyes and equipment to support vessel positioning, situational awareness, and hazard identification (Gray & Hutchinson, 2004).

The 2015 VTRA modeled the risk reduction benefits of tug escorts for ATBs and towed tank barges east of Port Angeles and found a decrease in potential oil loss of 3percent, and an approximately 15 percent reduction in potential accident frequency (Van Dorp & Merrick, 2016). A Canadian Marine Pilots' Association study found that the use of escort tugs in Vancouver, BC produced a twelve-fold decrease in risk of tank ship groundings (Ecology, 2019). Previous reports have prioritized recommendations to expand tug escort requirements to oil barges and ATBs in waters east of Port Angeles (Ecology, 2016, 2019). Other reports have also suggested updating tug escort requirements in Washington state to include both a horsepower requirement and a requirement for twin screw propulsion (Glosten Associates, 2004).

The ESHB 1578 also required Ecology to develop a risk model and complete an analysis of tug escorts. The analysis evaluated how tug escorts can help prevent drift groundings from tank vessels. The model results showed that the 2020 tug escort requirements reduced drift groundings by 2.3 percent and that expanding tug escorts to the project's entire study area (most of Puget Sound) would further reduce drift groundings by 1.8 percent. The model also estimated hazard frequency from the escort tugs based on changes in underway time. The analysis concluded that tug escort requirements are an important part of a network of vessel traffic safety measures. They provide a level of protection against drift groundings. See the

 ⁶ See Analysis of Tug Escorts Report (Ecology, 2023b), How Drift Groundings Contribute to a Spill (p.23)
 ⁷ Drift groundings associated with large oil spills include the 1964 drift grounding near Moclips, Washington of a towed oil barge after it broke free from its tug and the 1972 drift grounding of a navy ship just south of Cape Flattery. The navy ship broke free while under tow and drifted ashore. Neither event was the result of loss of propulsion or loss of steering.

Analysis of Tug Escorts Report for more information (Ecology, 2023b). We use the same risk model to evaluate potential impacts for this EIS.

1.5.2.3 Current Tug Escort Requirements - Washington State, British Columbia

Tug escort requirements in Washington state are documented in Wash. Rev. Code § 88.16.190, 1994 and administered by the Board of Pilotage Commission. These requirements apply to tank vessels while laden with oil. The requirements include:

Oil Tankers Over 125,000 DWT: Prohibited from proceeding east of the line extending between Discovery Island light south to New Dungeness light, unless authorized by the US Coast Guard.

Oil Tankers Between 40,000 – 125,000 DWT: Required to take a tug escort east of the line extending between Discovery Island light south to New Dungeness light and all points in the Puget Sound area that are within the territorial boundaries of Washington. The escort tug or tugs must have an aggregate shaft horsepower equivalent to at least 5 percent of the DWT of the escorted tanker.

Oil Tankers Between 5,000 – 40,000 DWT (Effective Sept. 1, 2020): Required to take a tug escort in Rosario Strait and connected waterways east. The escort tug or tugs must have an aggregate shaft horsepower equivalent to at least 5 percent of the DWT of a forty thousand deadweight ton oil tanker. Tank vessels of this size engaged in bunkering are exempt from this requirement.

ATBs and Tank Barges over 5,000 DWT (Effective Sept. 1, 2020): Required to take a tug escort in Rosario Strait and connected waters east. The escort tug or tugs must have an aggregate shaft horsepower equivalent to at least 5 percent of the DWT of a forty thousand deadweight ton oil tanker. Tank vessels of this size are exempt from this requirement while providing bunkering or refueling services.

Because the maximum vessel size requiring an escort is 125,000 DWT, the maximum required horsepower for a single escort tug would be 6,250 shaft horsepower. There are several tugs operating in Washington that have sufficient shaft horsepower to carry out one-tug escort duties. A list of tugs that engaged in escorting work between 2020 – 2021 is included in Appendices P and Q of the Synopsis of Changing Vessel Traffic Trends Report (BPC & Ecology, 2021). The Board of Pilotage Commissioners provide the names and horsepower of the tugboats used to escort vessels subject to the provisions of RCW 88.16.190. This information is included each year in the Board of Pilotage Commissioners annual report (BPC, 2023).

Tugs used for escort service in Washington state are typically of a twin-propeller design due to horsepower and maneuverability needs, and typically of a tractor type, which is generally recommended for tank ship escort work. The Puget Sound Harbor Safety Committee (PSHSC) Standards of Care (SOC) recommends the tanker Master and Pilot to confirm that escort vessels are tractor type in configuration and capable of suitable power (PSHSC, 2023). The PSHSC also recommends a pre-escort conference and provides other safety and efficacy standards.

There are also tug escort requirements in Canadian waters. Escort tugs are required for tankers and large commercial ships within the Port of Vancouver (Port of Vancouver, 2025). Outside the Port of Vancouver, tug escorts are required by the Pacific Pilotage Association (PPA) for vessels

over 40,000 Summer DWT within English Bay, the Strait of Georgia, Boundary Pass, Haro Strait and the Strait of Juan de Fuca (Pacific Pilotage Authority, 2019). The approved Trans Mountain expansion project includes additional escorting requirements for laden tankers outbound from the Westridge Marine Terminal. (See (Ecology, 2019) for a comparison of tug escort requirements in other jurisdictions and British Columbia)

1.5.3 Washington State Department of Ecology

The Washington State Legislature has set a goal of creating a zero spills strategy to prevent any oil or hazardous substances from entering the waters of Washington state (RCW 90.56.005 (Sec.2)). Ecology's Spill Prevention, Preparedness, and Response Program (Spills Program) is part of the implementation of a comprehensive effort to meet that goal. Under ESHB 1578, the Spills Program was specifically directed to work with the BPC to develop several reports on vessel traffic safety and movement, to create a risk model that would allow for the analysis of tug escorts and emergency response towing vessels, and to support this rulemaking. In addition to providing subject matter expertise, the work defined under ESHB 1578 is consistent with several components of existing Spills Program work. The Spills Program works across four primary areas:

- **Prevention:** Prevention requirements apply to industries that handle or transport oil in Washington state, including the target vessels for this analysis. This work also includes inspections of vessels, facilities, and oil transfers as well as review and approval of operations manuals, prevention plans, pre-booming, safe and effective threshold determination reports, and training and certification programs for oil handling facilities.
- **Preparedness:** Preparedness work includes developing and testing contingency plans, documenting lessons learned from spills and drills, and coordinating with other spill and emergency response entities, including federal and local partners and industry.
- **Response:** The Spills Program maintains a 24/7/365 response capacity and works with federal, other state agencies, Tribal, and local responders to coordinate oil spill and hazardous materials response for incidents that impact or threaten to impact state waters.
- **Restoration:** Anyone responsible for spilling oil into state waters is liable for damages resulting from injuries to natural, cultural and historic, and publicly owned resources. The Spills Program leads the Natural Resources Damage Assessment process to determine damages, and fund restoration projects.

1.5.4 Puget Sound Harbor Safety Committee

The Puget Sound Harbor Safety Committee (PSHSC) is a nonprofit organization that promotes marine safety. Its membership includes industry, Tribal Government, Local Government, labor, fishing, environmental, and other advocacy groups interested in marine safety. It is advised by state and federal agencies, including but not limited to the U.S. Coast Guard, the U.S. Army Corps, and the Washington State Department of Ecology. The PSHSC develops and maintains the Puget Sound Harbor Safety Plan (PSHSP) "to enhance marine safety and environmental stewardship via risk-based decision making" (PSHSC, 2023). As part of the PSHSP, the PSHSC

develops and maintains formalized "Standards of Care" (SOC), which are voluntary measures that go beyond regulatory requirements that "experienced and prudent maritime professionals follow to ensure safe, secure, efficient, and environmentally responsible maritime operations" (PSHSC, 2023). Examples of SOCs relevant to this rulemaking include:

- Propulsion Loss Prevention
- Rosario Towing Vessel Operations
- Tanker Escort Operations
- Towing Vessels Bollard Pull Testing
- Towing Vessel Operations

2.0 Methodology Summary

For the vessel traffic analysis, we provide a brief descriptive overview of current vessel traffic to establish existing conditions in the affected environment. Existing conditions include the implementation of the 2020 amendments to RCW 88.16.190, which expanded requirements for tug escorts in Rosario Strait and waters east (Alternative A). The overview of current vessel traffic includes a review of previous Ecology studies and data, focusing primarily on trends in target vessel and escort tug traffic.

We also review historical AIS data from 2023 to provide context for target vessels and assist/escort tugs under the conditions of the 2020 amendments (Alternative A). Historical AIS data provides observed vessel traffic as a frame of reference for the simulated results described later in the analysis. AIS is an automatic tracking system used on ships and by vessel traffic services for identifying and locating vessels by electronically exchanging data with other nearby ships, AIS base stations, and satellites. AIS transmissions include a ship's position along with other information, such as speed, course, status, and heading. AIS transmitters also broadcast additional vessel details, including Maritime Mobile Service Identity number (MMSI), vessel type, International Maritime Organization (IMO) number, call sign, and vessel dimensions. Most commercial vessels are required to carry AIS under United States Coast Guard (USCG), IMO, and Transport Canada regulations.

However, there are some notable exceptions to AIS requirements related to this analysis. Towed barges are not required to carry AIS as they are not self-propelled, although the tugs that move them are required to have AIS. Fishing vessels and recreational vessels are only required to have AIS if they are over 20m in length. While this includes many large fishing vessels (e.g. commercial fishing vessels, fishing factory ships), many Tribal treaty fishing vessels, as well as recreational fishing vessels are smaller than this and don't carry AIS. Those vessels are not included in this data, but we discuss their contributions to vessel traffic in Section 3.1 (Affected Environment).

The 2023 AIS dataset includes all vessel types, including the vessel categories that the simulated data produced by the Ecology risk model uses. Ecology selected 2023 because it is the most recent complete year of vessel traffic data. Additionally, the 2020 regulations went into effect in the middle of the COVID-19 pandemic and impacts from the pandemic were observed in vessel traffic in 2020 and 2021, so those years are not representative of normal vessel traffic patterns.

The primary metric that we get from historical AIS data is underway time for various categories of vessel types. However, AIS data is not useful for looking at future projections or long-term trends as a result of the recently implemented law. It does not include vessel traffic from the Trans Mountain Expansion or potential future projects like Roberts Bank Terminal 2. It is also limited in that it cannot be used to assess vessel dynamics for a scenario that does not exist (i.e. Alternative C). Previous reports have used AIS crossing line data to estimate vessel movement. Crossing line data is limited in its ability to provide details on activity, differentiate between tugs assisting vs. escorting, and distinguish between commute time vs. active escort, which will

be used to estimate other environmental impacts in the EIS (e.g. underwater noise, air emissions).

To evaluate escort tug underway time across alternatives in a consistent manner, we used a simulated dataset from the Ecology risk model. Using simulated data allows for a standardized comparison of Alternative C, for which there is no historical AIS data. Simulated data makes it possible to test how changes in variables—such as new regulations or shifts in traffic patterns—could impact vessel traffic and can be easily differentiated by activity. The use of simulated data in EISs is standard agency practice. The Ecology risk model was developed to simulate vessel traffic patterns and evaluate changes in oil spill metrics (Ecology, 2023b). It was developed using historical AIS data from 2015-2019. A detailed description of the Ecology risk model development, modules, and theoretical and modeling approach can be found in the 2023 Summary of Tug Escort Analysis Results (Ecology, 2023b).

Because the proposed regulatory changes only directly affect the movement of escort tugs providing services to target vessels, simulated data is only used for escort/assist tug underway time in this analysis. The 2023 AIS dataset is used to estimate volumes of other types of vessel traffic and for the comparison of certain vessel categories to 2023 vessel traffic.

The Ecology risk model produces 1,000 different simulated variations of a single year of vessel traffic. Due to the structure of the risk model, the level of simulated traffic varies for each simulated year. For this analysis, we selected the simulation run with the highest amount of escort tug underway time to ensure that the EIS is not undercounting potential impacts. This approach is also designed to account for both inter-annual variation and any potential near-term growth in the volume of vessel traffic that requires escort and assist tugs (oil tankers of all sizes, ATBs, and towed oil barges), including traffic from the Trans Mountain Expansion and potential future projects. This more conservative approach is consistent with agency practices for EISs in general and with the SEPA WAC regarding uncertainty.

The conditions of the Expansion and Removal Alternatives were modeled from the same baseline simulated data to allow for an equivalent comparison to Alternative A. The following values were calculated for each alternative:

- Number of escort jobs per simulated year.
- Number of escort tug underway minutes actively escorting a target vessel per simulated year.
- Number of escort tug underway minutes commuting to or from an escort job per simulated year.
- Distribution of escort tug underway minutes by BPC Zone for each alternative.

We also developed heat maps showing the modeled density of escort tug underway time.

Based on changes in escort tug underway time, we qualitatively assess potential navigational safety and congestion impacts, both direct and indirect (e.g. route switching). More detailed assessments of vessel impacts and interactions are provided in the relevant chapters (e.g. Recreation, Tribal Resources).

The Oil Transportation Safety Committee (OTSC) and subject matter experts (SMEs) were also asked to comment on concerns regarding navigational safety and interaction with other vessel types. The OTSC includes pilots, Tribes, and other maritime experts with deep knowledge of these waterways. Their comments informed the vessel traffic analysis and are incorporated directly into this Discipline Report where appropriate.

The Draft EIS will focus on significant adverse impacts, with some information provided on moderate adverse impacts. Direct, indirect, and cumulative impacts from the four alternatives will be considered. Elements of the environment without significant adverse impacts will be summarized more briefly than elements with significant adverse impacts. Table 3 outlines the impact indicators that will be assessed relative to vessel traffic. The associated thresholds will be used to determine whether there would be an adverse impact and whether the adverse impact would be significant.

Table 3. Significance Thresholds for Vessel Traffic

Indicator	Significance Threshold
Change in escort tug underway time	• Rule change would result in more than a moderate increase in escort tug underway time relative to current vessel traffic under Alternative A at the level of the EIS Study Area or within any individual zone.
Increase in Navigational Safety Issues and Congestion	 Rule change would result in more than a moderate increase in negative outcomes for navigational safety and congestion of the waterways. SMEs and experts have concerns with the increase in congestion and navigational safety resulting from this change.

3.0 Technical Analysis and Results

This section describes the affected environment for vessel traffic resources within the EIS Study Area. It also describes the anticipated modeled changes in escort tug underway time from the four alternatives: No Action (Alternative A), Addition of FORs (Alternative B), Expansion of Tug Escort Requirements (Alternative C), and Removal of Tug Escort Requirements (Alternative D). It also includes a qualitative discussion of potential navigational safety and congestion outcomes from each of the four alternatives. This section also identifies mitigation measures that could avoid, minimize, or reduce the potential impacts and determines if there would be significant and unavoidable adverse environmental impacts.

3.1 Affected Environment

The transboundary waters of the Strait of Juan de Fuca, the Puget Sound, and the Strait of Georgia, often collectively referred to as the Salish Sea,⁸ are a large and diverse body of water with a wide variety of vessel traffic. The Strait of Juan de Fuca is the entrance to several large commercial ports on both sides of the U.S.-Canadian border, including the Ports of Seattle and Tacoma in Washington and Vancouver in British Columbia, which are three of the largest ports on the West Coast. These ports are part of the international shipping system and maintain consistent levels of commercial vessel traffic. There are several refineries in the region and oil travels by rail, pipeline, and vessel in and out of the area. Vessels transporting oil, as well as the vessels like escort tugs that support their safe passage, are part of the region's existing vessel traffic profile. There is extensive Tribal treaty fishing and First Nation fishing in the region at both commercial and subsistence scales, in addition to non-Tribal commercial and recreational fishing. Public and private ferry systems carry daily commuters and vacationers alike to several locations on a frequent basis. Recreational vessels also contribute to overall vessel traffic.

3.1.1 Shipping Lanes and Conditions

The Department of Ecology's 2019 Report of Vessel Traffic and Vessel Traffic Safety summarized the geography of the Puget Sound and the movement of vessel traffic within it (Ecology, 2019). That summary is reproduced below. See Figure 8 for a map of shipping lanes and waterbodies to accompany the description below. A more detailed description of some of the higher risk areas is included below in Section 3.1.2.

⁸ The term "Salish Sea" is used here to describe the transboundary waters of the Strait of Juan de Fuca, the Puget Sound, and the Georgia Strait. The name for this waterbody was proposed in 1989 by a marine science professor at Western Washington University to emphasize the region as a single ecosystem. It has since been formally adopted by the Washington State Committee on Geographic Names (Chapter 237-990 WAC) and the British Columbia Geographical Names Office (*BC Geographical Names*, n.d.). It was named for the Coast Salish Tribes who live on or near the Salish Sea on both sides of the U.S.-Canadian border. However, the defined geographic boundary of the Salish Sea also extends into the lands and waters of Tribes that are not Coast Salish, including the Makah Tribe (Nuu-Chah-Nulth). We use the term "Salish Sea" in this analysis, but recognize the diversity of native peoples that have lived in and used these waters since time immemorial.
The waters of the Salish Sea are deep, compared to the dynamic and shallow channels of the East Coast, and tend to change slowly. Therefore, descriptions of the waterway written for a 1997 report, *Scoping risk assessment: Protection against oil spills in the marine waters of northwest Washington State*, still accurately portrays conditions that impact marine traffic when navigating these waters.

The Strait of Juan de Fuca separates the south coast of Vancouver Island, Canada, from the north coast of Washington state. It is the principal waterway by which international and regional commerce moves to and from the Washington state ports of Port Angeles, Bellingham, Everett, Seattle, Tacoma, Olympia; the oil terminals at Anacortes and Ferndale; and the Canadian ports of Victoria, Vancouver and Roberts Bank.

The Strait is approximately 80 miles long. From its mouth to Race Rocks (opposite Port Angeles), approximately 50 miles east, it averages 12 miles in width. From Race Rocks to Whidbey Island, its eastern boundary, approximately 30 miles further east, the Strait widens to 16 miles. The traffic lanes are approximately one nautical mile wide. There are very few dangerous shoal areas, and the waters are generally deep, except near the shoreline. The depth of water in the traffic lanes regularly used by commercial oceangoing ships generally ranges from over 600 feet at the entrance of the Strait to 100 feet near the eastern end of the Strait.

The eastern portion of the Strait is the shipping crossroads of the waterway. Oceangoing ships bound for Canada will turn north at Port Angeles, board pilots at Victoria, and proceed north via Haro Strait and Boundary Pass for Canadian ports on the Strait of Georgia. Ships for the United States board pilots at Port Angeles and proceed east through the Coast Guard Precautionary area. Those for south Puget Sound ports head due east for Admiralty Inlet, while shipping for Anacortes and Bellingham turn approximately northeast for Rosario Strait. Traffic separation schema are used in all cases. The crossroads area also sees a great deal of inland traffic trading between U.S. and Canada ports.

The San Juan Islands lie north of the eastern Strait of Juan de Fuca. This archipelago lies within the United States boundary and is known to residents and tourists alike for its natural beauty. Haro Strait (width from 1½-6 nautical miles), flowing roughly on a north-south axis to the islands' west, and Boundary Pass (minimum width of 2 ½ nautical miles), running east to west to the Islands' north, separate them from Vancouver Island and the Canadian Channel Islands. Ships on this route must make three sharp course changes.

The eastern rim of the waterway is marked by more areas of shallow water and extensive tidal marshes and mudflats in Padilla, Bellingham, Lummi, and Skagit Bays in Washington state, and Boundary Bay and Roberts Bank in Canada.

Rosario Strait (1³/₄ - 4 nautical miles wide) bounds the San Juans to the east. Tankers bound for the Anacortes refineries transit the narrow Guemes Strait between Fidalgo and Guemes Islands and terminate in Padilla Bay. Those for Cherry Point and Ferndale transit the entire Rosario Strait and enter the Precautionary Area between Lummi Bay and Alden Bank for approach to the terminals.

The southeastern portion of the waterway runs from Port Townsend at the mouth of Admiralty Inlet to Olympia and Hammersley at the southern extreme. Washington's population centers are here, as are the heaviest marine traffic concentrations. Admiralty Inlet (2½ -5 miles width) runs roughly southeast for approximately 20 miles, past the mouth of the Hood Canal to Point No Point, where Puget Sound proper begins.

The Puget Sound channel runs about 40 miles in length to Commencement Bay at Tacoma, passing by approaches to harbors at Everett, Kingston, Seattle, Eagle Harbor, and Bremerton. Tacoma Harbor is on Commencement Bay, south of which there is no traffic separation scheme. Passage south to Olympia is quite narrow (in many places less than one mile) and has several sharp turns and shallows to negotiate. The approaches to both Olympia and Hammersley narrow to less than ½ mile in width. (Dyer et al., 1997)



Figure 8. Map of the shipping lanes with major waterbodies and cities identified.

3.1.2 High-Risk Areas and Vessel Traffic Risk Assessments

State and federal agencies, Tribes, stakeholders, industry, and environmental and community representatives have worked together over several decades in this region to assess and mitigate risks associated with vessel traffic in this area. Recent efforts include but are not limited to a formal Vessel Traffic Risk Assessment (Van Dorp & Merrick, 2016), an assessment using the Pilotage Risk Management Methodology (Badger, 2014), a Ports and Waterways Safety Assessment (PAWSA) (U.S. Coast Guard, 2017), and forums such as the Salish Sea Oil Spill Risk Mitigation Workshop (Ecology, 2016). The area under consideration for this rulemaking includes several high-risk areas for vessel traffic. In this section, higher-risk areas are discussed, followed by a summary of findings of the 2017 PAWSA, the most recent risk assessment process specific to this region.

High-risk areas for vessel traffic include:

- Rosario Strait and Waters East (General): Rosario Strait is the easternmost channel between the Strait of Juan de Fuca and the Strait of Georgia and is used primarily by vessels bound for Cherry Point, Ferndale, Anacortes, and Bellingham, as well as tug and tow traffic between Washington and ports in British Columbia or to ports in Alaska via the Inside Passage (CH2M et al., 2016). This area has substantial tidal currents and numerous hazards to navigation (PSHSC, 2023), as well as strong currents that can slow down tug and barge traffic, significant interaction with commercial and non-commercial fishing vessel traffic, and high risk of grounding due to rocky shoals and currents (U.S. Coast Guard, 2017). There are shallow water hazards, narrow channels and significant channel bends, and transit corridors are limited by off-lying hazards and distance from infrastructure (Ecology, 2019; U.S. Coast Guard, 2017).
 - **Huckleberry and Saddlebags Islands:** A choke point of just two tenths of a mile (Ecology, 2019).
 - **Kelp Reef:** Restricts Rosario Strait to approximately one half the size seen on the nautical chart (U.S. Coast Guard, 2017)
 - Shallow Shoals: Lawson Reef, Belle Rock, Black Rock, Lydia Shoal, Buckeye Shoal, Peapod Rocks, and Clements Reef are all shoals with depth of less than 10 fathoms (60 feet). (Ecology, 2019).
- **Port Angeles Precautionary Area:** There is significant congestion as vessel traffic lanes meet at this location, some of them without a pilot. There are also obstructions, islands, and reefs. A significant proportion of VTS interventions occurred in the precautionary area (U.S. Coast Guard, 2017).
- San Juan Islands: Conflict between commercial and recreational vessels where the Islands open to the main shipping channel (U.S. Coast Guard, 2017). There is also significant ferry traffic in the Islands, particularly in the summer, when the population doubles due to tourism.
- Haro Strait and Boundary Pass (General): This region has shallow water hazards, narrow channels, significant channel bends (Badger, 2014; U.S. Coast Guard, 2017).

Recreational traffic contributes significantly to Haro South crossing line transits (Ecology, 2021).

Turn Point and Turn Point East: High risk for drift groundings, vulnerable to congestion, whirlpools, and upwelling (Badger, 2014; Ecology, 2019; U.S. Coast Guard, 2017). Portions of this area can also have heavy and dangerous tide rips (Lutnick et al., 2024).

In 2017, a USCG Ports and Waterways Safety Assessment (PAWSA) was conducted for the eastern portion of the Puget Sound including the Port Angeles precautionary area, Haro Strait, Rosario Strait, and Boundary Pass (U.S. Coast Guard, 2017). The geographical focus of the PAWSA reflects the area under consideration for tug escort requirements in the rulemaking. The PAWSA found that there was:

- Consensus that **risks ARE well-balanced** by existing mitigation measures for the following categories:
 - Deep draft and shallow draft vessel quality
 - All vessel traffic conditions (volume of commercial and small craft traffic, traffic mix, and congestion)
 - All navigational conditions (winds, water movement, visibility restrictions, and obstructions)
 - Visibility impediments
 - Dimensions of the waterway
 - Bottom type of the waterway
- No consensus of risks being mitigated with current measures for the following categories:
 - Immediate consequences (personnel injuries, Tribal Treaties and Cultural Preservation, petroleum or hazmat release, and mobility)
 - Subsequent consequences (health and safety, environmental, aquatic resources and Tribal fisheries, and economic consequences)
 - Configuration of the waterways
 - Quality of articulated tug barges
- Consensus that existing mitigations **DO NOT adequately balance risk:**
 - Commercial fishing and small craft quality

The areas without consensus on risk mitigation are primarily related to the impacts of a spill or of vessel traffic safety on the people and resources of this region. Oil spill impacts are discussed in more detail in the Oil Pollution chapter. Other concerns relevant to tug escort requirements include configuration of the waterways and the quality of articulated tug barges. The PAWSA also demonstrated that there is a suite of existing vessel traffic safety measures already in place that support vessel traffic safety. Expanding tug escort requirements are being considered as part of an existing network of safety measures already in place.

3.1.3 Measures in Place to Mitigate Vessel Traffic Risks

The Salish Sea is internationally regarded for its ecological, economic, and cultural significance. There has not been a major oil spill in the Salish Sea from collisions or groundings for almost 30 years (Van Dorp & Merrick, 2016).⁹ This safety record is a result of a comprehensive safety regime that includes international, federal, and state standards and voluntary measures that support navigational safety and oil spill prevention. The safety regime is sustained through ongoing cooperation among state and federal agencies, Tribes, industry, and environmental and community representatives. Most of these requirements are summarized in detail in Sec.1.2 Regulatory Context, but are also listed here as well. For measures related specifically to oil spill prevention (e.g. double hull requirements), see the Oil Pollution Section. Existing vessel traffic risk mitigation measures include:

- US Coast Guard Vessel Traffic Service and Cooperative Vessel Traffic Service
- Traffic Separation Scheme
- Precautionary Areas
- Vessel Traffic Service Special Areas
- Common International Standards (e.g. COLREGS)
- Compulsory Pilotage
- Tug Escort Requirements
- Vessel Inspections
- Ongoing Contingency Plan Review
- Voluntary Standards of Care

3.1.4 Vessel Categories Relevant to the Analysis

This analysis focuses on four primary categories of vessels: oil tankers, articulated tug barges (ATBs), and towed barges as well as escort tugs (often called escort/assist tugs in this analysis as the same vessels typically perform both escorting and assisting work). Oil tankers 5,000 to 40,000 DWT, and ATBs and towed oil barges over 5,000 DWT are collectively referred to as the "target vessels" in this analysis as the rulemaking considers new tug escort requirements for these specific vessel types and sizes. Other types of vessels are referenced throughout. Descriptions of the four primary vessel categories are included below. These descriptions are adapted from two recent agency reports developed under this legislation (BPC & Ecology, 2021; Ecology, 2023b)):

• **Oil Tanker:** A self-propelled tank vessel that is constructed or adapted to carry oil in bulk as cargo. Pursuant to RCW 88.16.190(2)(a)(ii), this analysis focuses on "small" oil tankers, between 5,000 and 40,000 DWT only. Oil tankers as a class of vessel are also discussed, particularly when using historical AIS data. An example vessel on the smaller end of this range is 520 feet and 25,235 DWT, while a vessel on the larger end of this

⁹ The 2015 VTRA is referring to the barge grounding on Clements Reef in 1994, which resulted in an estimated 29,936 gallons spilled. The 2015 VTRA defines a major spill as over 10,000 gallons.

range is 604 feet and 39,309 DWT. These smaller tankers tend to be parcel or chemical tankers.¹⁰ Larger oil tankers (over 40,000 DWT) are already required to have an escort tug east the line between Discovery Island light and New Dungeness light, so are not included in this assessment, except as part of the background vessel traffic. The category of oil tankers for this analysis combines the following vessel types from Ecology's risk model. These categories are also included individually in data summaries:

- Tanker (Chemical): A tank ship that carries oil or substances defined as oil as cargo, and could also carry non-oil liquid cargo
- Tanker (Crude): A crude tanker is designed to carry unrefined oil
- Tanker (Product): A tank ship that carries refined oil in bulk
- Articulated Tug Barge (ATB): A tug-barge combination vessel capable of operation on the high seas, coastwise, and further inland. These vessel types are identified from AIS data as tugs that almost exclusively travel with a linked tank barge. ATBs combine a barge, with a bow resembling that of a ship, but having a deep indent at the stern to accommodate the bow of their tug. The fit is such that the resulting combination behaves almost like a single vessel at sea, as well as while maneuvering. In this report, ATBs only refer to tug-barge combinations where the barge is a tank vessel (designed to carry oil). Pursuant to RCW 88.16.190(2)(a)(ii), this analysis focuses on ATBs over 5,000 DWT. In this region, an example ATB on the smaller end of the existing range might be 421 feet and 11,500 DWT, while an ATB on the larger end might be 690 feet and 27,000 DWT.
- **Towed Oil Barge:** A tug and barge operation where the barge is constructed or adapted to carry, or that carries oil in bulk as cargo internal to the hull. This does not include articulated tug barges (ATBs)or tank ships. Towed barges do not have their own propulsion systems and therefore are not required to have AIS. They rely on tugboats or other vessels to move. The risk model identifies this vessel type as "Towing Vessel (Oil): tugs that generally operate with a tow (ahead or astern) that contains oil as cargo" (Ecology, 2023b). In accordance with RCW 88.16.190(2)(a)(ii), this analysis focuses on towed barges over 5,000 DWT. In this region, an example of a towed barge on the smaller end of the existing range might be 241 feet and 5,310 DWT, while a towed barge on the larger end might be 360 feet and 12,821 DWT.
- **Escort/Assist Tug:** These are tugs that generally do not operate with an assigned tow. Instead, they assist and/or escort other vessels. They are generally over 50 feet long (Ecology, 2023b). Escort/assist tugs are tugs designed to accompany specific vessel transits at speeds over 6 knots, while maintaining the ability to effect steering or braking control over that ship in the case of a propulsion or steering failure. For the purposes of

¹⁰ Parcel chemical tanker – A chemical tanker capable of carrying many kinds of chemical cargoes including petroleum products. Chemical tankers usually range from 5,000 to 59,000 DWT, smaller than the average size of other tanker types.

this assessment, escort tugs include tugs that are purpose built for escorting as well as multi-purpose tugs that do tug escort work and meet the existing requirements for that work. See Appendices P and Q in the Synopsis of Changing Vessel Traffic Trends Report (BPC & Ecology, 2021) for a list of the tugs observed engaging in escort work in 2021. Vessel characteristics are also included.

Other types of vessel traffic operating in this region that are referenced in this analysis include the following. Definitions are consistent with the Ecology risk model definitions as that data is used most heavily

- Bulk Carrier: A commercial ship that carries bulk (non-liquid) Cargo
- Container Ship: A commercial ship that carries containerized cargo
- Cruise Ship: A large overnight passenger vessel with a tonnage over 2000 International Tonnage Certificate (ITC).
- Fishing Vessel: A commercial fishing vessel Note that this category only includes fishing vessels that transmit AIS and is only a portion of all fishing vessels in Washington waters. This likely does not include most Tribal treaty fishing (both commercial and subsistence in scale but using smaller vessels) or non-Tribal recreational fishing.
- Tanker (Liquefied Gas): A commercial ship that carries liquefied gas, including natural gas (LNG) and liquefied petroleum gas (LPG).
- Vehicle Carrier: A commercial ship that carries vehicles as cargo and loads and discharges via a ramp.
- General Cargo: A commercial ship that carries general cargo not specified in other cargo ship categories.
- Towing Vessel (Non-Oil): Tugs that generally operate with a tow (ahead or astern) that does not contain oil as cargo.
- Towing Vessel (Oil) Bunkering: Tugs that generally operate with a tow (ahead or astern) that contains oil as cargo and engage in bunkering of other vessels
- Ferry (Car): These vessels carry vehicles and passengers on set routes between established ferry terminals.
- Ferry (Fast): Fast passenger ferries are vessels that only carry passengers (no vehicles) on set routes between established ferry terminals. These are catamaran hull vessels that travel at speeds over 20 knots.
- Other Tug: Smaller vessels that do construction, vessel assist, and other local work.
- Other Passenger: Includes other types of commercial passenger vessels, including monohull passenger ferries, whale watching ships, tour ships, and pocket cruise ships.
- Recreational Vessels: A non-commercial vessel. Includes yachts, sailboats, sport fishing, etc. that carry AIS.
- Other: This category consists of all vessel types not within the above categories that transmit AIS. This includes research vessels, military, and search and rescue vessels.

3.1.5 Vessel Traffic Trends – Target Vessels and Escort Tugs

Ecology collects and publishes data on commercial vessel traffic in Washington waters in an annual report called the Vessel Entries and Transits for Washington Waters (VEAT) Report (Ecology, 2023c). The VEAT data provides an overview of commercial vessel traffic in the region and the 30-year long dataset provides information about trends in commercial vessel traffic. This section also summarizes other studies that have looked at vessel traffic movement and trends. The primary vessel categories for this analysis are addressed individually below in more detail. Outside of those vessel categories, ferry traffic is a primary contributor to overall commercial vessel traffic, accounting for most individual transits counted in VEAT data. See the Historical AIS data section below for more information.

3.1.5.1 Trends – Oil Tankers

Over the past 10 years, the number of individual oil tankers (crude, chemical, and product) entering via the Strait of Juan de Fuca, Haro Strait, and Rosario Strait has remained relatively stable (Figure 9). These tankers are mostly bound for oil terminals and refineries in Washington state. There is a slight upward trend in these transits in recent years, particularly apparent when considering total transits via both routes (Ecology, 2024c). However, this trend is not without inter-annual variation. In this 10-year period, the highest number of entering transits was in 2018 (436 transits) while the lowest was in 2015 (328 transits), with approximately a 33 percent increase between the lowest and highest years.



Figure 9. Tanker entry transits to Washington state from 2013-2023, including both transits entering from the Strait of Juan de Fuca (SJDF) and Haro and Rosario Straits (HR/RS)

Since Ecology began compiling VEAT data, the total number of entering transits made by oil tankers has decreased slowly over time. The change reflects reduced output from Alaskan oil fields and an increase in crude oil arriving by rail and pipeline (Ecology, 2023a). The reduced number of oil tanker entries may also be due to an increase in transits by articulated tug barges

(ATBs) moving refined product to Canada, between Puget Sound refineries, and along the west coast (Ecology, 2024c).

Canadian ports experienced a large increase in oil tanker transits around the purchase and expansion of the Trans Mountain Pipeline in 2005. Between 2006-2007, both the number of entering transits and the number of individual oil tankers transiting to Canadian ports doubled. Tank ship traffic to Canadian ports has remained relatively stable since then, even seeing a slight decrease in recent years (Figure 10). The Trans Mountain Expansion Project became operational in May of 2024, which could increase the number of tank ship transits by up to 348 per year (National Energy Board of Canada, 2016). Prior to the expansion there were approximately 5 transits per month; this increased to approximately 34 transits per month after the expansion.



Figure 10. Tanker entry transits to Canadian ports from 2013-2023

In 2023, the most recent complete year of VEAT data, there were 586 entering transits of oil tankers. Just over two thirds were bound for Washington ports via the Strait of Juan de Fuca (384) and Georgia Strait and Haro Strait (29). The remainder were bound for Canadian ports via the Strait of Juan de Fuca (173) (Ecology, 2024c). Previous reports have looked at entering transits and north-south transits and found that there is additional movement of deep draft vessels within the Puget Sound as vessels shift locations among ports and refineries (Van Dorp & Merrick, 2016).

In September 2020, tug escort requirements for target vessels in Rosario Strait and waters east went into effect. In 2021, Ecology assessed the impact of tug escort requirements for target vessels on vessel traffic (BPC & Ecology, 2021).¹¹ The period of this analysis was September 1, 2019 – August 31, 2020 (Year 1) and September 1, 2020 – August 31, 2021 (Year 2). Ecology

¹¹ More information about the closure can be found in the 2021 Synopsis of Vessel Traffic Trends.

VEAT data for vessel traffic during this period reflects an overall decline in 2020 due to the economic disruptions of the early months of the pandemic. The intent of this assessment was to capture initial trends in how vessels were responding to the new requirements and specifically whether the new requirements were causing vessels to switch routes from Rosario Strait to Haro Strait. For tankers between 5,000-40,000 DWT, Ecology found that transits along both routes increased after the implementation of ESHB 1578, but likely not because of it. The small increases were primarily attributed to inter-annual variation in markets, business decisions, the effects of the pandemic, and increased export of nonene from an Anacortes refinery. In the short term, the new escort requirement did not appear to cause a trend of route switching for tankers 5,000 to 40,000 DWT.

3.1.5.2 Trends - ATBs

Over the past 10 years, ATB use has increased significantly, particularly within Puget Sound, while entering transits have remained relatively stable. The total number of ATB transits has increased by 35 percent since 2013 (see Figure 11) and the number of individual ATBs has more than doubled during the same period (Ecology, 2024c). Based on this steady increase in ATB traffic and the plans of companies like Crowley Fuels LLC and Tidewater Canada to build new ATBs or tugs for ATB retrofits, the trend of increased ATB traffic will likely continue (Crowley, 2018; Hocke, 2017). There is also significant inter-annual variation with the highest overall ATB transit year (2021, 1,125 transits) being a 54 percent increase over the lowest ATB transit year (2014, 723 transits) during the same period.



Figure 11. ATB transits in Washington waters, including both entering transits and transits within the region from 2013-2023

In 2023, the latest complete year of available VEAT data, there were 1,006 ATB transits into or within the Puget Sound (Ecology, 2024c).

The 2021 assessment (BPC & Ecology, 2021) of the impacts of the new tug escort requirements on vessel traffic also included an assessment of ATBs. The report concluded that five of the 79 transits by ATBs through Haro Strait in the year after the requirements went into effect might have switched routes due to the new rule. These five transits represent six percent of the total ATB transits through Haro Strait during the assessment period and only 0.5 percent of the combined ATB transits through Rosario and Haro Straits. A limited number of ATB transits did appear to have switched their route in response to the new tug escort requirements.

3.1.5.3 Trends – Tank Barges

Towed oil barge transits both into and within the Puget Sound have remained relatively stable since 2013, exhibiting a slight declining trend over the last few years (Figure 12). There was a relatively steep drop in tank barge transits 2020 and tank barge transits have not returned to pre-2020 numbers as of the 2023 VEAT data (Ecology, 2024c). We also see inter-annual variation in overall transits for tank barges. The year with the highest number of tank barge transits was 2019 (3749 transits) and the lowest number of tank barge transits was 2021 (2624 transits), translating to an approximately 43 percent difference. In 2023, the latest year of complete VEAT data, there were approximately 2,708 barge transits into and within the Puget Sound (Ecology, 2023c).



Figure 12. Total tank barge transits in Puget Sound from 2013-2023.

The 2021 assessment (BPC & Ecology, 2021) of the impacts of the new tug escort requirements on vessel traffic also included an assessment of tank barges. Tank barge traffic increased slightly through both Haro Strait and Rosario Strait from 2020 to 2021. This increase was not significant in the context of inter-annual variation for tank barge traffic and the context of the pandemic. Ecology also found that 11 of the 16 total barge transits through Haro Strait in the year after the new requirements went into place may have selected that route in response to the new

requirements. The single year of data post-rule implementation suggests that route switching in response to the new requirements happened most commonly with barges.

3.1.5.4 Trends – Escort Tugs

The 2021 Report on vessel traffic trends also looked at how tug traffic was affected by the new requirements in the first year of their implementation (BPC & Ecology, 2021). This analysis looked at crossing line data and transits. It is important to note that transits can be reported in any direction and that a tug performing escort duties may transit several crossing lines in a single trip, may cross the same crossing lines multiple times in a single trip, and may perform more than one escort job during a single trip.¹² This method doesn't provide information on total underway time, the proportion of time spent commuting versus escorting, or the number of escort "jobs" completed, as some of the data provided later in this section will.

In addition to the economic disruption of the pandemic during the period of assessment under this report,¹³ there was also a temporary border closure between Washington and Canada, and the PPA suspended out of district assignments for the British Columbia Coast Pilots which also particularly affects these results.

Ecology found that 18 individual tugs were observed providing escort activities in the first year after the new requirements went into effect. The report found that tug transits in Rosario Strait and waters east increased by 49.56 percent in the year after the new requirements were implemented, going from 6,062 transits in Year 1 to 9,066 transits in Year 2. See Table 4 below for details in the distribution of the change in total escort tug transits.

Table 4. Tug crossing line data for the year before and after the 2020 tug escort requirements were implemented. Pulled from the 2021 Synopsis of Vessel Traffic and Vessel Traffic Trends (BPC & Ecology, 2021)

Crossing Lines	Bellingham Channel	Guemes Channel	Rosario Strait N	Rosario Strait S	Saddlebag Guemes	Sinclair Lummi	Total Transits
Year 1 Transits	197	1,979	1,282	1,236	1,023	345	6,062
Year 2 Transits	374	2,345	1,992	2,029	1,109	1,217	9,066
Change in # of transits	+177	+366	+710	+785	+86	+872	+3,004

During the EIS development phase, Ecology received a few comments regarding a potential tug shortage. In investigating this further, Ecology did not find any indication that tug availability would be affected by this rulemaking. In fact, at least two additional tugs have been added to the escort and assist tug fleet since the 2021 Synopsis of Changing Vessel Traffic Trends Report

¹² See Figure 18 in the 2021 Synopsis of Vessel Traffic Trends for a map of crossing lines used and more information about how they were developed.

¹³ Time period of assessment: September 1, 2019 – August 31, 2020 (Year 1) and September 1, 2020 – August 31, 2021 (Year 2)

was created. Market considerations will be addressed in more detail through the Preliminary Regulatory Assessment as part of the rulemaking.

3.1.6 Describing Vessel Traffic in the EIS Study Area

As described in Sec.2 (Methodology Summary), describing vessel traffic for this analysis requires both historical AIS data and simulated traffic data. Both datasets include "underway minutes," which excludes AIS messages or modeled time where the vessel speed is zero. Here we describe current vessel traffic using both datasets used in this analysis. In Section 3.1.6.1 we provide a general description of vessel traffic in the EIS Study Area using AIS data from 2023, along with a short discussion of non-AIS traffic. Then, in Section 3.1.6.2, we present the simulated data for escort/assist tugs used in this analysis. In Section 3.2.6.3 we provide a short comparison of the historical AIS and simulated traffic data.

3.1.6.1 Using 2023 Historical AIS Data to Describe Current Conditions in the EIS Study Area

The assessment of current conditions uses historical AIS data from January 1 – December 31, 2023. In 2023, there were 62,473,688 minutes of underway time from vessels that carry AIS in the EIS Study Area (Ecology, 2024a). Table 5 shows the breakdown of 2023 AIS data into percentage of underway time by vessel type. Recreational vessels and car ferries together contribute to over 60 percent of all AIS traffic underway time in this region. Because this AIS data is from 2023, it is consistent with the conditions of Alternative A and includes the 2020 tug escort requirements for target vessels.

Assist and escort tugs make up a small portion of all AIS traffic; approximately 3.89 percent of total underway minutes in 2023. This includes tugs escorting target vessels, escorting oil tankers over 40,000 DWT, assisting vessels, and other underway time of those tugs. This is equivalent to approximately 111 hours per day. Underway hours per day can exceed 24 hours because it includes multiple vessels operating simultaneously. We simulate this vessel category using modeled traffic data for the comparison of the rulemaking alternatives.

<u> Annual Underway Minutes by Vessel Type (2023) – Historical AIS</u>					
Vessel Type	Annual Underway	% of All AIS Traffic			
	Minutes				
Recreational	32,328,921	51.75%			
FerryCar	5,907,409	9.46%			
Other	4,201,921	6.73%			
TowNonOil	3,487,396	5.58%			
Fishing	2,635,277	4.22%			
Escort and Assist	2,431,285	3.89%			
Other Tug	2,327,470	3.73%			
Bulk	1,771,813	2.84%			

Table 5. Historical AIS traffic from 2023 broken down by vessel category and percent of total AIS traffic.

<u> Annual Underway Minutes by Vessel Type (2023) – Historical AIS</u>					
Vessel Type	Annual Underway Minutes	% of All AIS Traffic			
Other Passenger	1,447,103	2.32%			
Cargo	998,577	1.60%			
Container	854,412	1.37%			
FerryFast	809,055	1.30%			
TowBunkering	775,849	1.24%			
ATB	658,714	1.05%			
TowOil	523,934	0.84%			
Vehicle	442,076	0.71%			
Product	234,255	0.37%			
Cruise	229,249	0.37%			
Crude	193,623	0.31%			
Chemical	173,274	0.28%			
LG	42,075	0.07%			
Grand Total	62,473,688	100.00%			

The focus of the rulemaking is on expanding tug escort requirements to oil tankers 5,000 to 40,000 DWT, ATBs and towed oil barges over 5,000 DWT, collectively the "target vessels." Vessels engaged in bunkering are excluded from the rule. Table 6 shows just the underway time from target vessels in the specific size range specified by the legislation and not conducting bunkering. In 2023, we saw 1,233,517 minutes of underway time for target vessels, with the majority of that coming from ATBs and barges (see Table 6).

Table 6. Historical AIS underway time for target vessels only.

Target Vessel Type	Historical AIS Underway Minutes
Oil Tanker – Chemical	41,215
Oil Tanker – Crude	867
Oil Tanker – Product	13,715
АТВ	657,606
Towed Oil Barge	520,114
Total	1,233,517

The AIS data also demonstrates that vessel traffic does have some seasonal variation within the EIS Study Area. However, most of that variation comes from recreational traffic (see Figure 13). Because many recreational vessels do not carry AIS, we can assume that the summer seasonal peak indicated by the AIS data in Figure 13 is likely even more significant when including non-AIS vessel traffic.



Figure 13. AIS by month and vessel type. Includes all vessel types.

If we consider vessel types that could receive an escort as well as the escort/assist tug category, seasonal variation is minimal (See Figure 14). For this reason, this analysis does not calculate variations in target or escort tug traffic on a seasonal basis.



Figure 14. AIS by month for target vessels and escort and assist tugs only, demonstrating minimal seasonal variation.

Although we focus on AIS vessel traffic in this analysis, not all vessels carry AIS. In particular, a large portion of smaller fishing and recreational vessels are not required to carry AIS. Using arial surveys in the Salish Sea, Serra-Sogas et al. (2021), it is estimated that between 85-87 percent of recreational and fishing vessels do not carry AIS. However, AIS use by these vessel categories has likely increased since the data collection in 2016 and 2017. We estimate that up to 75 percent of recreational and fishing vessels do not transmit AIS. Using this scaling factor to include non-AIS recreational and fishing vessels, these two categories together would account for over 83 percent of all vessel traffic. This is intended to set the context for the vessel traffic analysis only. The rule only changes the escort and assist tug traffic associated with target vessels – all of which transmit AIS. Therefore, we chose to use traffic from vessels that transmit AIS as the comparative baseline for the Transportation (vessel traffic) analysis.

3.1.6.2 Using Simulated Data to Describe Current Conditions in the EIS Study Area

Although historical AIS data provides some general information about vessel traffic, there are important aspects of vessel traffic that it does not capture. For this reason, simulated data from the Ecology risk model is also used to compare escort and assist tug time among the alternatives (Ecology, 2024b). This section describes the simulated escort/assist tug data modeled using current tug escort requirement conditions (those of Alternative A).

Under the same tug escort requirements as exist in the 2023 historical AIS dataset, the simulated dataset includes 3,252,896 annual underway minutes of escort and assist tug traffic. The simulated data can be broken down further to just include escorting of target vessels, which is the variable that could change based on rulemaking alternatives. Tugs escorting target vessels for this rulemaking account for approximately 18.76 percent of all underway time for escort and assist tug traffic, but just 0.96 percent of all historical AIS underway time for 2023. Table 7 shows how other tug activities contribute to the overall simulated tug traffic.

Table 7. Escort and assist tug underway time broken out by tugs escorting target vessels, tugs escorting non-target vessels (tankers over 40,000 DWT), tugs performing assist work, and background movement of escort and assist tugs.

Breakdown of Simulated Escort/Assist Tug Underway Time for Alternative A (No Action)				
Escort/Assist Tug Activity (includes commutes) Simulated Underway Minu				
Tugs Assisting	1,276,981			
Tugs Background	1,061,702			
Tugs Escort – NON-TARGET (Tankers over 40,000 DWT)	304,106			
Tugs Escort – TARGET VESSELS	610,107			
Total Simulated Underway Minutes – All Tug Activity	3,252,896			

For the purposes of the analysis, tug escort activity for the target vessels can be broken down further into commutes to and from the escort job, the actual active escorting itself (See Table

8). See (Ecology, 2023b), for more details on how the model simulates commutes.¹⁴ This information also allows individual escort jobs to be calculated. Using the simulated tug traffic data, we find that there are 1,537 individual escort jobs of the target vessels in the simulated year, 785 individual escort jobs of non-target vessels (oil tankers over 40,000 DWT). This is equivalent to approximately 6-7 escort jobs per day, of which 4-5 are newly required under the 2020 law. There are also 9,099 individual assist jobs per year, or between 24-25 per day.

Table 8. Target vessel escort tug underway time broken out by activity: actively escorting a target vessel and commuting to or from the escort job. Presented in number of annual underway minutes per year.

Escort of Target Vessels by Commute vs. Escort – Underway Time per Year					
Escort of Target Vessels	Simulated Underway Minutes				
Commuting to and from active escort	385,689				
Active Escorting	224,418				
Total	610,107				

3.1.6.3 Comparing 2023 Historical AIS and Simulated Escort/Assist Tug Datasets

Both historical and simulated data tell us useful things about vessel traffic under current conditions, with the 2020 requirements in place. Historical data from 2023 showed that assist and escort tugs accounted for 3.89 percent of all AIS vessel traffic in the study area (2,431,285 underway minutes). The simulated data showed 821,611 more underway minutes for assist and escort tug traffic than the historical data. This is 33.79 percent more escort/assist tug traffic than the 2023 historical AIS assist/escort data, but a relatively small difference in the overall distribution of vessel traffic by type. Figure 15 shows the comparison between the historical and the simulated data for assist/escort tugs. When compared to all traffic, the simulated tug traffic would represent 5.14 percent of the total AIS vessel traffic, which is 1.25 percent higher than the 2023 AIS data.

¹⁴ "Commute" for the purpose of modeling impacts assumes that each escort job requires a tug to travel from a "home" berth to a rendezvous point with the escorted vessel, and back to an end point (not necessarily the same one) after the escort job is completed. This is a simplification of the existing system, in which escort jobs could be scheduled consecutively. However, input from the OTSC at the early stage of methods development highlighted the complexity and uncertainty of real-world decision-making regarding tug escort scheduling (see related scoping comments for details). Modeling this level of complex decision-making is not feasible and would be a departure from the existing modeling approach, which has already undergone stakeholder and expert review. Longer commute routes and less consecutively scheduled escort jobs may account for some of the increase in total escort time in the simulated data vs. the 2023 historical data. Because the intent of the EIS is to document potential negative impacts to the environment resulting from proposed rule, a conservative approach ensures that impacts are not under-represented.



Figure 15. Historical and simulated data for the escort and assist vessel type, showing the amount of underway time as well as the relative percentage of all historical AIS vessel traffic.

3.1.7 Comparison of Proposed Alternatives

Probable impacts to vessel traffic from the alternatives under consideration are described below for the four rulemaking alternatives: Alternative A (No Action), Alternative B (Addition of FORs), Alternative C (Expansion), and Alternative D (Removal). Specifically, this section looks at how the proposed changes in tug escort requirements for the target vessels directly impact escort tug traffic as described by the amount of underway minutes per simulated year both while escorting and while commuting. Impacts are summarized relative to the total 2023 underway time for all vessels using AIS. Additional details are included in the analysis of each alternative. Indirect impacts to other vessel types and congestion are discussed under each alternative. Cumulative impacts are discussed in Section 5 of the EIS. Where probable significant impacts exist, mitigation measures that could avoid, minimize, or reduce the identified impacts below the level of significance are identified.

Change in underway time relative to total underway time for all alternatives are summarized in Table 9. The first column looks at the change in the total amount of combined escort and assist tug traffic under each alternative. While the change between Alternatives A, B, and C is relatively small, Alternative D reduces the amount of escort and assist tug traffic by 18.76 percent. The second row looks at only the change in target vessel escort tug underway time for each alternative. There is a 2.41 percent increase between Alternative A and Alternative C. The third and fourth rows show the difference between target vessel escort tug underway time spent commuting and actively escorting. Interestingly, while Alternative C has a higher overall amount of target vessel escort tug underway time, there is a slight reduction (-1.61 percent) in commute time and larger increase (9.31 percent) in active escort time. In Alternative C, escort tugs spent less time commuting to and from the escort jobs.

Tug Activity - Underway Minutes per Simulated Year for Each Alternative						
	Alternative	Alternative B	Alternative C	Alternative D		
	A (No	(Addition of	(Expansion)	(Removal)		
	Action)	FORs)				
Total Underway Minutes	3,252,896	0% change	+0.45% from	-18.76% from No		
– All Escort/Assist Tug		from No	No Action	Action		
Activity (includes Assist,		Action				
Non-target, background)						
Total Tug Escort Activity	610,107	0% change	+2.41% from	-100% from No		
 Target Vessels 		from No	No Action	Action		
(includes commutes and		Action				
escort job)						
Escorts for Target	385,689	0% change	-1.61% from	-100% from No		
Vessels – Commutes		from No	No Action	Action		
(Depart and Return)		Action				
Escorts for Target	224,418	0% change	+9.31% from	-100% from No		
Vessels – Escort Job		from No	No Action	Action		
(Actively Escorting)		Action				

Table 9. Changes in underway time for each alternative relative to Alternative A.

Although it's not a direct comparison, we can also compare the change in simulated underway time under each alternative to the historical AIS total underway time (see Table 10 below). Percentages were calculated for each alternative by subtracting historical assist/escort tug traffic from total historical AIS underway minutes and adding the total simulated assist/escort traffic for each alternative. Alternative D provides the largest change, resulting in a reduction of almost 1 percent of AIS vessel traffic.

Table 10. Change in simulated underway time relative to total historical AIS underway time and to Alternative A.

	No Action	Addition of	Expansion	Removal
		FORS		
Tug Escort	0.96% of	0% change from	+0.03% from No	-0.96% from No
Activity as % of	Historical AIS	No Action	Action	Action
Total Underway	Traffic			
Minutes – All				
AIS Traffic (2023				
Historical				
Reference Year				

There are also slight differences in the distribution of commute time vs. time spent actively escorting across the four alternatives (See Figure 16 below). Under Alternative C, total underway time goes up, but both the time spent commuting and the proportion of time spent



commuting is reduced. This suggests that Alternative C makes more efficient use of escort underway time than Alternative A or B. Under Alternative D, there is no underway time associated with the escort of target vessels.

Figure 16. Comparison of underway time by activity (active escort or commuting) for each of the four Alternatives.

Ecology also compared underway time by zone across the four alternatives. For all four alternatives, there is an existing level of escort and assist tug activity that is unrelated to the rulemaking and remains constant across the four alternatives. This includes escort of oil tankers over 40,000 DWT (304,106 underway minutes per year), assist jobs (1,276,981 underway minutes per year), and background/other activity from assist/escort tugs (1,061,702 underway minutes per year). In total, that is 2,642,762 underway minutes of assist and escort traffic *without* the target vessel escorts. This baseline amount of assist and escort traffic is depicted by zone in Figure 17 below.

As Figure 17 shows, the Puget Sound Zone has by far the most escort and assist traffic of nontarget vessels. Four of the five zones primarily being considered under this rulemaking (Bellingham Channel Zone, Guemes Channel and Saddlebags, Rosario Strait, and Strait of Georgia Zones) are within the top nine zones with the highest amount of underway time by escort and assist vessels. This means that these zones have consistent escort and assist tug traffic unrelated to the 2020 requirements of this rulemaking. Strait of Georgia South, one of the smaller zones, ranks 18th meaning that it has less other escort and assist tug traffic.





We can also look at underway time by zone for the target vessels for each alternative:

- Alternative A: 610,107 minutes of escort tug underway time for target vessels
- Alternative B: 610,107 minutes of escort tug underway time for target vessels (no change from Alternative A)
- Alternative C: 624,784 minutes of escort tug underway time for target vessels (2.41 percent increase over No Action)
- Alternative D: zero minutes of escort tug underway time for target vessels (requirements are removed).

Figure 18 shows the underway minutes by zone for tugs escorting target vessels. Alterantives A, C, and D are included (Alternative B does not affect underway time). Note that not all zones are represented in Figure 18 because escorts of target vessels did not travel through all zones (e.g., South Sound to Olympia, Southern Gulf Islands) to conduct these escort jobs. A detailed description of underway time in each zone is provided in the summary section for each Alternative.



Figure 18. Target vessel escort tug underway time only broken down by zone for Alternatives A, C, and D (no change to underway time for Alternative B). Note that for Alternative D, there is no underway time in any zones because the tug escort requirements for target vessels is eliminated.

Table 11 below shows how the distribution of underway time for tugs escorting target vessels changes by zone across each alternative. Alternative D of course affects all 16 zones included in Figure 18 (above). Between Alternative A and Alternative C, there is a slight reduction in the amount of underway time spent by escort tugs in the zones included in Alternative A (Bellingham Channel, Guemes Channel and Saddlebags, and Rosario Strait Zones) as well as a few other zones outside of that area which were included as commute routes.

In Alternative C, there is also an increase in the underway minutes for the Strait of Georgia and Strait of Georgia South Zones. This is partly because there would be additional required escorts in these zones under Alternative C. It may also be because more tugs would commute from locations within these zones if the tug escort requirements were expanded north. The Strait of Georgia Zone has the second highest amount of escort/assist tug traffic unrelated to target vessels (see Figure 18). This means that there are already many escort/assist tugs in the area that could escort target vessels.

The reduction in underway time for other zones under Alternative C is likely being compensated for by additional tugs commuting to and from refineries and infrastructure further north in Whatcom County. For Alternative D, all escort requirements for target vessels are removed, so

there are zero commutes and zero escort jobs for target vessels, a 100 percent reduction in target vessel escort time over Alternative A across all zones.

	Alternative A: Annual Underway Minutes	Alternative B: % Change in Underway Minutes from	Alternative C: % Change in Underway Minutes from	Alternative D: % Change in Underway Minutes from
Zone		No Action	No Action	No Action
Bellingham Channel	75,826	0%	-10.67%	-100%
Eastern Strait of Juan de		0%		
Fuca	42,509		-0.15%	-100%
Guemes Channel and		0%		
Saddlebags	105,325		-3.26%	-100%
Puget Sound	67,407	0%	-0.12%	-100%
Rosario Strait	205,376	0%	-2.62%	-100%
San Juan Islands	387	0%	-23.26%	-100%
Strait of Georgia	41,276	0%	19.04%	-100%
Strait of Georgia South	340	0%	7,047.35%	-100%

Table 11. Distribution of underway time by zone as a percent change from Alternative A. Only those zones with a change in underway time are shown.

3.2 Alternative A: No Action

3.2.1 Impacts from Implementation

Alternative A represents the most likely future conditions if we make no changes to existing tug escort requirements for target vessels. Tug escort requirements for target vessels would remain in place in the current rulemaking area as established by RCW 88.16.190(2)(a)(ii). As described in Section 3.1 above, Alternative A using the simulated data includes a variety of tug activity within the EIS study area.

3.2.1.1 Direct Impacts - Total Underway Time:

Under Alternative A, there are 3,252,869 minutes of escort/assist tug activity (5.14 percent of underway minutes for all historical AIS vessel traffic). This includes:

- Escort Jobs Target Vessels: 610,107 underway minutes per simulated year
- Escort Jobs Non-Target Vessels: 304,106 underway minutes per simulated year
- Assist Jobs: 1,276,981 underway minutes per simulated year
- Background/Other Tug Activity: 1,061,702 underway minutes per simulated year.

For this analysis, we focus on escort jobs for the target vessels with new tug escort requirements as of September 1, 2020 (610,107 underway minutes per simulated year). Target vessel escort tug underway time is 0.96 percent of the total underway time for all vessel traffic. That includes:

• Active Escort Time: 224,418 underway minutes per simulated year.

• Commute Time: 385,689 underway minutes per simulated year

The actual escort jobs (Actively Escorting) represent 36.78 percent of the escort tug traffic associated with target vessel escorts, with commutes making up the remaining 63.22 percent (see Figure 19 below).



Figure 19. Breakdown of target vessel escort tug underway time by activity (commuting and active escorting).

3.2.1.2 Direct Impacts - Number of Commutes and Escort Jobs per Simulated Year

Under Alternative A, there are 1,537 individual escort jobs of target vessels in the simulated year. Each escort job includes a commute to the rendezvous point with the target vessel and a return commute from the rendezvous point at the end of the escort job. Because Historical AIS data for escort/assist tugs demonstrates that underway time is relatively stable throughout the year, 1,537 escort jobs of target vessels can be approximated to 4.21 escort jobs per day or approximately 128 escort jobs per month. However, tugs escorting target vessels are not the only escort/assist tugs on the water, even though that is the only variable that changes under different rulemaking alternatives. Along with the specific escort tug traffic of target vessels in Alternative A, there is other existing escort/assist tug traffic that remains unchanged across all alternatives: 2.15 escort jobs per day of oil tankers over 40,000 DWT (785 per simulated year) for non-target vessels and 24.93 tug assist jobs per day (9,099 per simulated year).

Figure 20 shows the distribution of simulated escort tug traffic for target vessels under Alternative A. This includes just the 1,537 escort jobs of target vessels per simulated year. The scale of this map represents the minutes of underway time per square kilometer per simulated year. It ranges from light red (1-100 underway minutes per square kilometer per year) to dark red (5,001+ underway minutes per square kilometer per year). The underway minutes shown in the map are influenced by the number of tugs passing through each grid cell as well as the amount of time that they spend in the grid cell. The highest concentration of escort tug traffic is within the region defined by the 2020 requirements. Escort tug underway time is further concentrated around major refineries in Anacortes, which has the highest concentration of escort tug traffic for target vessels in the EIS Study Area. This is consistent with historical AIS distribution of target vessels (see Figure 21), which typically carry oil to, from, and between refineries.

There are also higher concentrations of tug activity around the north and south boundaries of the rulemaking boundary where escort requirements for target vessels begin. This suggests that tugs may spend time there waiting to rendezvous with the escorted vessels. Finally, there are higher concentrations of tug activity around the Port of Seattle, which is in the Puget Sound Zone. Figure 21 shows that historically there have been high concentrations of target vessel traffic in this area, meaning that there are likely already a lot of escort/assist tugs. It makes sense that tugs could be commuting from this high-tug density area to meet the requirements for target vessels under Alternative A.



Figure 20. Movement of escort tugs associated with target vessels under Alternative A (and Alternative B). Simulated data.



Figure 21. Movement of target vessels based on Historical AIS data from 2023.

To complement the heat maps, a breakdown of escort and assist tug traffic for Alternative A is included in Table 12. The table is further separated into "non-target tug activity," which includes assist tug traffic, escorting of non-target vessels (oil tankers over 40,000 DWT), and background movement of escort and assist tugs; and "target vessel escort tug activity" which includes the active escort of target vessels and associated commutes. Non-target tug activity is displayed in underway hours per day and as a percentage of the total historical AIS traffic within that zone. Target vessel escort tug activity is displayed in three ways: in underway hours per day, as a percentage of the total historical AIS traffic within that zone, and as a percentage of the total escort/assist tug traffic within the individual zone. Showing the target vessel escort tug activity as a proportion of total escort/assist tug traffic shows where implementing the 2020 requirements has had the biggest impact on the amount of tug underway time spent in any individual zone.

Under Alternative A, escort tug underway time associated with target vessels accounts for 18.67 percent of all escort and assist tug underway time across the EIS Study Area. The zones with the highest amount of escort tug underway time from this proposed rulemaking are the zones where tug escorts for target vessels are required: Rosario Strait, Bellingham Channel, and Guemes Channel, and Saddlebags Zones. The escort tug underway time occurring in the other zones is due to escort tugs passing through on their way to or from escorting target vessels. Rosario Strait is the only zone where escort tug underway time associated with target vessels makes up over 50 percent of total escort/assist tug underway time.

Table 12. Shows modeled escort/assist tug traffic. The first column is the identified zones and the EIS Study Area as a whole. The second column is underway time for escort/assist tug traffic not associated with target vessels and the third column compares that to all historical AIS traffic. The fourth column is underway time for escort tugs associated with target vessels (the focus of this rulemaking). Column five compares the target vessel escort tug underway time to all historical AIS traffic and column six compares it to all escort/assist tugs for both target and non-target vessels.

	Non-Target Vessel	Non-Target Vessel	Target Vessel Escort Tugs:	Target Vessel Escort Tug	Target Vessel Escort Tug
	Escort/Assist	Escort/Assist Tug	Hours per Day	Activity: % of	Activity: % of all
	Tugs: Hours per	Activity: % of	of Underway	Historical AIS	Escort/Assist Tug
	Day of	Historical AIS	Time	Vessel Traffic	Activity
Zone	Underway Time	Vessel Traffic			
Rosario Strait	5.49	5.56%	9.38	9.49%	63.08%
Bellingham Channel	4.08	2.98%	3.46	2.53%	45.90%
Guemes Channel and					
Saddlebags	7.57	5.28%	4.81	3.35%	38.86%
Admiralty Inlet	4.58	3.91%	2.86	2.44%	38.41%
Eastern Strait of Juan de Fuca	5.45	6.03%	1.94	2.15%	26.25%
San Juan Islands	0.08	0.03%	0.02	0.01%	17.81%
Strait of Georgia South	0.13	2.03%	0.02	0.24%	10.59%
Strait of Georgia	16.06	16.06%	1.88	1.88%	10.50%
Puget Sound	52.63	7.24%	3.08	0.42%	5.53%
Western Strait of Juan de Fuca	8.19	3.53%	0.32	0.14%	3.75%
Possession Sound and					
Saratoga Passage	2.33	2.63%	0.07	0.08%	3.07%
Port Orchard	0.10	0.45%	0.00	0.01%	1.89%
Rich Passage and Sinclair Inlet	0.60	1.14%	0.01	0.02%	1.76%
Colvos Passage	0.64	3.26%	0.01	0.03%	0.79%
Hood Canal	0.92	4.70%	0.00	0.02%	0.40%
Lake Washington Ship Canal	0.33	0.18%	0.00	0.00%	0.01%
Carr Inlet	0.00	0.04%	0.00	0.00%	0.00%

Zone	Non-Target Vessel Escort/Assist Tugs: Hours per Day of Underway Time	Non-Target Vessel Escort/Assist Tug Activity: % of Historical AIS Vessel Traffic	Target Vessel Escort Tugs: Hours per Day of Underway Time	Target Vessel Escort Tug Activity: % of Historical AIS Vessel Traffic	Target Vessel Escort Tug Activity: % of all Escort/Assist Tug Activity
Skagit Bay	0.04	0.22%	0.00	0.00%	0.00%
South Sound to Olympia	1.03	1.86%	0.00	0.00%	0.00%
Strait of Georgia - Below 49th	1.33	3.81%	0.00	0.00%	0.00%
Haro Strait and Boundary Pass	3.24	4.64%	0.00	0.00%	0.00%
Southern Gulf Islands	5.84	1.54%	0.00	0.00%	0.00%
Grand Total	120.68	4.18%	27.86	0.96%	18.76%

Figure 22 depicts escort/assist tug underway time by zone, broken down by Non-Target/Other Tug Activity and Escort – Target Vessels.



Figure 22. Comparison of target vessel escort tug underway time and non-target escort/assist tug underway time by zone for Alternative A.

3.2.1.3 Congestion and Navigational Safety:

Under Alternative A, underway time associated with target vessels accounts for 18.67 percent of all escort and assist tug underway time. As described in Table 12 above, target vessel escort tugs make up less than one percent of total AIS vessel traffic. This is based on the simulated dataset which was specifically selected to be a high estimate of escort tug underway time. The zones with the highest amount of target vessel escort traffic relative to other escort and assist tug traffic in Alternative A are:

- Rosario Strait Zone
- Bellingham Channel Zone
- Guemes and Saddlebags Zone
- Admiralty Inlet Zone
- Eastern Strait of Juan de Fuca Zone

Escort tug underway time associated with target vessels makes up less than one percent of total AIS vessel traffic. However, in individual zones, target vessel escort tugs can make up a larger portion of overall AIS traffic. Rosario Strait Zone sees the highest proportion of target vessel escort tug underway time relative to overall AIS traffic at 9.49 percent. In the other zones, target vessel escort tug underway time makes up less than 3.5 percent of all AIS vessel underway time. Despite the escort tug underway time in individual zones, maritime experts in the OTSC did not identify concerns around navigational safety and/or congestion under the Alternative A conditions.

The 2017 PAWSA (U.S. Coast Guard, 2017) and other reports (See e.g., (Ecology, 2019)) have identified Rosario Strait and waters east (which covers the Rosario Strait, Bellingham Channel, and Guemes Channel Zones) as a high-risk area for vessel traffic, given the strong currents, hazards to navigation, and interaction between commercial and non-commercial vessels. The Port Angeles Precautionary Area (near Admiralty Inlet Zone) has also been identified as higher risk area (U.S. Coast Guard, 2017), due to the converging of several vessel traffic lanes. However, the 2017 PAWSA also found that risk related to traffic conditions, navigational conditions, and most waterway conditions were well balanced in this region. Although the PAWSA was conducted prior to the implementation of the 2020 requirements, the risk management measures it identified remain in place. These risk management measures include the Cooperative Vessel Traffic Service, AIS requirements, one-way traffic in Rosario Strait, and CVTS and USCG notices to mariners of congested areas (U.S. Coast Guard, 2017).

Additionally, Ecology incident data does not show a significant increase in incidents involving escort and assist tugs after implementing the 2020 requirements (see Appendix C Environmental Health: Releases Discipline Report for more details) (Ecology, 2024d). These incidents are rare overall with five oil pollution or vessel casualty incidents identified between 2017-2023. Two incidents occurred within the rulemaking area for Alternative A.

Maritime experts in the OTSC did not identify other concerns with navigational safety and/or congestion under Alternative A conditions.

3.2.1.4 Waiting at Rendezvous Points:

At the start of an escort job, escort tugs meet their target vessel at the boundary of the area where escorts are required. The tug needs to be in place at these rendezvous points before the vessel arrives. This means that escort tugs spend time waiting at these rendezvous points prior to beginning the escorted transit. Under Alternative A, rendezvous points where escort tugs await their escorted vessel occur around the southern and northern ends of Rosario Strait Zone:

- Rosario Strait Zone Southern Boundary: A line from Davidson Rock light, Southeast to position Lat. 48° 24.0'N, Long. 122° 47.15'W then East to the shore of Whidbey Island at Lat. 48° 24.0'N, Long. 122° 39.9'W.
- Rosario Strait Zone Northern Boundary: A line from Pt. Thompson on Orcas Island to Puffin Island light and then to Point Migley on Lummi Island.

A higher concentration of escort tugs in these rendezvous point areas is also evident in the heat map for Alternative A. The entrance and exit areas to Rosario Strait Zone have concentrations of tug underway time ranging from 8.3 - 83 hours of underway time per year per square kilometer in this area. This is not the highest concentration of underway time on the map, but it is on the higher end of underway time. The Swinomish Indian Tribal Community has indicated that tugs waiting at the Southern rendezvous point under current (Alternative A) conditions are causing interactions with the Tribal fishing fleet and sometimes gear loss (see Appendix K Tribal Resources Discipline Report for more information). Several Tribes have treaty-reserved fishing rights near the northern boundary of the Rosario Strait Zone, where the presence of escort tugs waiting at rendezvous points may also result in negative interactions with treaty fishing vessels.

3.2.1.5 Route Switching:

A potential indirect impact of the tug escort rule is that escorted vessels could switch to the Haro Strait/Boundary Pass route, rather than using Rosario Strait, to avoid the tug escort requirements. This would increase congestion through Haro Strait and Boundary Pass, which has also been identified as a high-risk area for vessel traffic. It would also mean that target vessels carrying oil would be moving through that area without an escort tug, potentially increasing oil spill risk to Haro Strait/Boundary Pass. 2021 Synopsis of Vessel Traffic Trends studied route switching in response to the 2020 tug escort requirements for target vessels (BPC & Ecology, 2021). This report found that tankers between 5,000-40,000 DWT generally did not switch routes in response to the new escort requirements. For ATBs, five of the 79 ATB transits through Haro Strait in year 2 (September 1, 2020, to August 31, 2021) may have been affected by the new tug escort requirement. For towed oil barges greater than 5,000 DWT, transits through Haro Strait increased by 5 transits, from 11 to 16 in year 2 (September 1, 2020, to August 31, 2021).

3.2.2 Proposed Mitigation Measures

Implementation of the required and/or voluntary mitigation measures described in this subsection would further reduce the potential vessel traffic-related impacts from tug escorts under Alternative A.

Required Mitigation (Rulemaking or Other Existing Regulations)

Escort tugs are currently required to adhere to all relevant federal vessel traffic safety measures, including but not limited to use of AIS; compliance with USCG regulations, navigation rules (COLREGs), participation in vessel traffic services (VTS), traffic separation schemes, and VTS Special Areas; pilotage; and regular vessel inspections. Although any vessel traffic incident could have high consequences, these measures help ensure that the risk remains low in the EIS Study Area.

Recommended Mitigation Measures

Ecology recommends that vessels in the EIS Study Area continue to follow the Standards of Care outlined by the Puget Sound Harbor Safety Committee. We also recommend that the Puget Sound Harbor Safety Committee extend the applicable portions of the Tanker Escort Standard of Care to the escorting of target vessels.

3.2.3 Significant and Unavoidable Adverse Impacts

Under Alternative A, escort tug underway time associated with the rule represent less than 1 percent of total AIS traffic in the EIS Study Area. This was calculated based on the highest-traffic scenario simulation, so this figure is a higher-end estimate of the contribution of escort tug traffic associated with target vessels in the Study Area. Escort tug underway time associated with target vessels makes up a small portion of total historical AIS traffic in each individual zone and overall. At most, target vessel escort tug underway time accounts for 9.49 percent of all historical AIS vessel traffic in Rosario Strait Zone. It is much lower (3.35 to nearly 0 percent) in all other zones (see Table 12). Under Alternative A, escort tugs are escorting target vessels 37 percent of the time, during which their potential impact to vessel traffic is dwarfed by that of the target vessel. Our heat maps also show that escort tugs are primarily transiting within the existing shipping lanes, which are areas specifically designated and managed to support vessel traffic.

Importantly, escort tugs have different operating characteristics and spill potential than deep draft vessels. Deep draft vessels are much larger, carry more fuel (see Appendix C Environmental Health: Releases Discipline Report for more information), are less maneuverable, have longer stopping distances, are more affected by wind and current.

Although some target vessels may use the Haro Strait and Boundary Pass route rather than the Rosario Strait route in response to the requirements, the total number of these transits is relatively small. The OTSC experts did not express concerns about navigational safety and congestion associated with Alternative A. While any vessel incident could have high consequences, we expect the probability of incidents to remain low. Alternative A would not have significant or unavoidable adverse environmental impacts on vessel traffic.

Tribes have indicated that existing levels of vessel traffic impact Tribal rights and resources. The Swinomish Tribe expressed that tugs waiting to pick up their target vessels at the boundaries of the rulemaking area has interfered with treaty fishing. This is described in more detail, along with suggested mitigation, in the Tribal Resources Discipline Report (Appendix K).

3.3 Alternative B: Addition of Functional and Operational Requirements (FORs)

3.3.1 Impacts from Implementation

Alternative B adds functional and operational requirements intended to increase safety and formalize existing best practices. It makes no change to the geographic boundaries described in Alternative A. These functional and operational requirements (FORs) include 1) minimum either 2,000 or 3,000 horsepower requirements for the escort tugs based on the DWT of the escorted vessel, 2) minimum of twin-screw propulsion, and 3) a pre-escort conference between the tug and the escorted vessel.

Of the 18 tugs identified in the 2021 Vessel Traffic Trend Study (BPC & Ecology, 2021) as performing target vessel escort work, two are between 2,000 and 3,000 horsepower. Ecology reviewed the data used in this report and found that the escort tugs between 2,000 and 3,000 were only escorting target vessels under 18,000 DWT. The horsepower requirement codifies existing industry practices and ensures that tugs have sufficient power to intervene to prevent a drift grounding (and potential subsequent spill). Additionally, all 18 of the identified tugs meet the minimum twin screw propulsion requirement. These two requirements reflect today's industry practices and are therefore unlikely to result in changes to the distribution of escort tugs and their associated impacts. The FORs are intended to increase safety and formalize existing best practices. Alternative B would not be anticipated to have any impact on the type, quantity or frequency of escort tug impacts to vessel traffic relative to Alternative A.

Under Alternative B, the FORs could result in a minor but unquantified decrease in the risk of oil spills from target vessels due to drift groundings, but would not be expected to change the existing risk of a diesel fuel spill from escort tug incidents.

3.3.2 Proposed Mitigation Measures

No additional mitigation measures than those included for Alternative A in Sec. 3.2.2 (Proposed Mitigation Measures) have been identified for Alternative B. Escort tugs and target vessels would be required to continue to adhere to all federal and vessel traffic requirements. Ecology recommends that escort tugs continue to follow the applicable PSHSC Standards of Care where safe and prudent to do so. The addition of FORs will help ensure that the escort tug can safely and efficiently conduct escort work. The formalization of the pre-escort conference will support enhanced communication, predictability, and coordination between escort tugs and target vessels. Ecology also recommends that the Puget Sound Harbor Safety Committee extend the applicable portions of the Tanker Escort Standards of Care to the escorting of target vessels.

3.3.3 Significant and Unavoidable Adverse Impacts

As stated in Section 3.3.1 (Impacts), the addition of the FORs would not change types of vessel traffic impacts relative to Alternative A. Impacts would be similar to those described in Alternative A and the safety measures described above apply. While any vessel incident could have high consequences, we expect the probability of incidents to remain low. Therefore,
Alternative B would not have significant or unavoidable adverse environmental impacts on vessel traffic.

3.4 Alternative C: Expansion of Tug Escort Requirements

3.4.1 Impacts from Implementation

Alternative C maintains the tug escort requirements outlined in Alternative A and expands them northwest towards Patos Island. Alternative C would result in a 2.41 percent increase in escort tug underway time. The net increase in escort tug underway time would occur primarily within and near the expansion area (i.e., in the Strait of Georgia and the Strait of Georgia South Zones). Escort tug underway time in the rest of the EIS Study Area would decrease slightly or remain the same (see Figure 4). Alternative C also includes the FORs included in Alternative B.

We assume that the functional and operational requirements will not meaningfully affect the metrics being analyzed under the direct impacts section of this analysis. While we could see some shift in tug distribution from the addition of the FORs, as described in Sec. 3.3, this is not expected to result in significant overall changes and is covered by the selection of the higher-end simulated dataset.

3.4.1.1 Direct Impacts - Total Underway Time:

Under Alternative C, there are 3,267,573 underway minutes of escort/assist tug activity. This is an increase of 0.45 percent over the escort/assist tug traffic underway minutes from Alternative A and represents 0.99 percent of all historical AIS traffic (up from 0.96 percent in Alternative A). This includes:

- Escort Jobs Target Vessels: 624,784 underway minutes per simulated year. This is an increase of 14,677 underway minutes per simulated year over Alternative A, or a 2.41 percent change in underway minutes associated with target vessels
- Escort Jobs Non-Target Vessels: 304,106 underway minutes per simulated year
- Assist Jobs: 1,276,981 underway minutes per simulated year
- Background/Other Tug Activity: 1,061,702 underway minutes per simulated year.

For this analysis, we focus on escort jobs for the target vessels (624,784 underway minutes per simulated year). That includes:

- Active Escort Time: 245,305 underway minutes per simulated year. This is a 9.3 percent increase in active escorting underway time over Alternative A.
- Commute Time: 379,479 underway minutes per simulated year. This is a 1.61 percent reduction in overall underway minutes of commute time over Alternative A.

Time spent actively escorting represents 39.26 percent of the escort tug traffic associated with target vessel escorts, with commutes making up the remaining 60.74 percent (see Figure 23 below).



Figure 23. Target vessel escort tug underway time broken out by activity (actively escorting or commuting) for Alternative C.

3.4.1.2 Direct Impacts - Number of Commutes and Escort Jobs per Simulated Year

The number of escort jobs in Alternative C is the same as the number of escort jobs in Alternative A. Escort jobs are dependent upon target vessel movement, and the expansion is adjacent to the boundaries of the current requirements. While some escort jobs may be longer, changing commuting and actively escorting underway time, the number of transits is unchanged. Under Alternative C, we would see 1,537 individual escort jobs of target vessels in the simulated year. Each escort job includes a commute to the rendezvous point with the target vessel and a return commute from the rendezvous point at the end of the escort job. 1,537 escort jobs of target vessels is approximately 4.21 escort jobs per day.

Along with the escort tug traffic associated with target vessels in Alternative C, there is other existing escort/assist tug traffic that remains unchanged across all alternatives: 2.15 escort jobs per day (785 per simulated year) for non-target vessels and 24.93 tug assist jobs per day (9,099 per simulated year).

Under Alternative C, there are also some small changes in the distribution of vessel traffic to meet the expanded requirement (see Figure 24). Under Alternative C, we see the concentration of escort tug underway time shift north (see Figure 4), reflecting the northward expansion of the rulemaking area. There is an additional concentration of escort tug traffic between the Ferndale refinery area and the northern boundary of the rulemaking area indicating the potential increase in commutes to and from those locations at the beginning or conclusion of an escort job. We also see a slight reduction in commute activity within Bellingham Bay and between Anacortes as the northern boundary of expanded requirements. This may be because more tugs would be commuting from locations nearer to the expanded northward boundary.



Figure 24. Underway time for escort tugs associated with target vessels under Alternative C. Simulated data. Note that the scale for underway minutes per square kilometer is different than the map for Alternative A.

To complement the heat maps, a breakdown of escort and assist tug traffic for Alternative C is included in Table 13. The table is further separated into "non-target tug activity," which includes assist tug traffic, escorting of non-target vessels (oil tankers over 40,000 DWT), and background movement of escort and assist tugs; and "target vessel escort tug activity" which includes the active escort of target vessels and associated commutes. Non-target tug activity is displayed in underway hours per day and as a percentage of the total historical AIS traffic within that zone. Target vessel escort tug activity is displayed in three ways: in underway hours per day, as a percentage of the total historical AIS traffic within that zone, and as a percentage of the total escort/assist tug traffic within the individual zone. Showing the target vessel escort tug activity as a proportion of total escort/assist tug traffic shows where the implementation of the 2020 requirements has had the biggest impact on the amount of tug underway time spent in any individual zone.

The zones with the highest amount of target vessel escort underway time are the Rosario Strait, Bellingham Channel, and Guemes Channel and Saddlebags Zones. This is unchanged from Alternative A. Under Alternative C, there are increases in the Strait of Georgia South and Strait of Georgia Zones, consistent with the expanded requirements. The change in underway time just for escort tugs associated with target vessels in the Strait of Georgia South Zone is a 7,047 percent increase over Alternative A (from 340 underway minutes per year in Alternative A to 24,301 underway minutes per year in Alternative C). This is roughly equivalent from just under one minute of escort tug underway time per day to just over one hour of escort tug underway time per day. Ecology estimates that it would take an escort tug approximately an hour to transit through the expansion area in the shipping lanes. This means that in the Strait of Georgia South Zone, there was one tug transit roughly every other month under Alternative A and approximately one transit per day under Alternative C.

The percentage increase is so large because there is very little escort tug traffic in this zone under current conditions. However, there are regular target vessel transits in this zone that would require a tug escort under Alternative C. The 2023 AIS data shows 9,026 minutes of underway time from transits of ATBs and towed oil barges through the Strait of Georgia South Zone. All of these transits, a total of 9,026 minutes, would require a tug escort under Alternative C, which would be approximately 37 percent of the modeled escort tug underway time for the Strait of Georgia South Zone (24,301 minutes). If we assume that the escort tugs are actively commuting approximately one third of the time they spend in the Strait of Georgia South Zone, this means that a tug would be commuting on its own through the Strait of Georgia South Zone for an hour roughly twice every three days. Under Alternative C, 89.43 percent of all escort and assist tug time in the Strait of Georgia South Zone would be associated with the escort of target vessels. Under Alternative C, escort traffic made up 14.68 percent of the total traffic in the Strait of Georgia South Zone, a notable increase from 0.24 percent under Alternative A.

In the Strait of Georgia Zone, there is a 19.04 percent increase in underway time just for escort tugs escorting target vessels (from 41,276 escort tug underway minutes per year in Alternative A to 49,113 escort tug underway minutes per year in Alternative C). This is equivalent to a change from just under two hours (1.88 hours per day) of underway time per day in Alternative A to just over two hours (2.24 hours per day) of underway time per day in Alternative C. Under

Alternative C, only 12.26 percent of all escort/assist tug traffic in the Strait of Georgia Zone is associated with the escort of target vessels. This percentage is much smaller than for the Strait of Georgia South Zone because the expansion area only includes a small portion of the Strait of Georgia Zone. The Strait of Georgia Zone is much larger than the Strait of Georgia South Zone, and there are significantly more types of other escort/assist tug activity in the Strait of Georgia Zone.

In comparison to the Strait of Georgia South Zone, the much larger Strait of Georgia Zone experienced 351,691 underway minutes per year of other escort/assist tug traffic (only 2,871 underway minutes per year in the Strait of Georgia South Zone). The Strait of Georgia Zone also experienced 120,462 minutes of underway time from target vessels in 2023, a small portion of which transited through the expansion area. The higher level of vessel traffic in the Strait of Georgia Zone means that escorting traffic is a relatively minor contributor of vessel traffic in all alternatives.

Under Alternative C, the Rosario Strait Zone would likely see a small decrease (-2.62 percent) in underway time associated with target vessel escorts as tugs may commute from more efficient locations to and from escort jobs. Bellingham Channel, Sinclair Island, and Waters East Zone also sees a small decrease in underway time (10.67 percent). This is likely because of the northward shift in escort tug traffic under Alternative C. The same nearby zones also have meaningful underway time associated with the escort of target vessels (Admiralty Inlet, Eastern Strait of Juan de Fuca, San Juan Islands, Strait of Georgia South, and Strait of Georgia), as escort tugs are likely commuting to and from target vessel escort jobs through these zones.

Table 13. Target vessel escort tug and non-target vessel escort and assist tug underway time by hours per day for Alternative C. Includes comparison to historical AIS traffic and to total escort and assist tug traffic.

	Non-Target	Non-Target	Target Vessel	Target Vessel	Target Vessel
	Vessel Tugs:	Vessel Tugs: %	Tugs: Hours	Escort Tug	Escort Tug Activity:
Zone	Hours per Day of	of Historical AIS	per Day of	Activity: % of	% of all
	Underway Time	Vessel Traffic	Underway	Historical AIS	Escort/Assist Tug
			Time	Vessel Traffic	Activity
Strait of Georgia South	0.13	1.73%	1.11	14.68%	89.43%
Rosario Strait	5.49	5.57%	9.13	9.27%	62.46%
Bellingham Channel	4.08	2.99%	3.09	2.27%	43.11%
Admiralty Inlet	4.58	3.91%	2.86	2.44%	38.41%
Guemes Channel and		5 28%		2 2506	28 08%
Saddlebags	7.57	5.2070	4.65	5.25%	30.0070
Eastern Strait of Juan de Fuca	5.45	6.03%	1.94	2.15%	26.22%
San Juan Islands	0.08	0.03%	0.01	0.01%	14.26%
Strait of Georgia	16.06	16.00%	2.24	2.24%	12.26%
Puget Sound	52.63	7.24%	3.07	0.42%	5.52%
Western Strait of Juan de Fuca	8.19	3.53%	0.32	0.14%	3.75%
Possession Sound and Saratoga		2 6206		0 0 0 0 0 6	2 07%
Passage	2.33	2.02%	0.07	0.08%	5.07%
Port Orchard	0.10	0.45%	0.00	0.01%	1.89%
Rich Passage and Sinclair Inlet	0.60	1.14%	0.01	0.02%	1.76%
Colvos Passage	0.64	3.26%	0.01	0.03%	0.79%
Hood Canal	0.92	4.70%	0.00	0.02%	0.40%
Lake Washington Ship Canal	0.33	0.18%	0.00	0.00%	0.01%
Carr Inlet	0.00	0.04%	0.00	0.00%	0.00%
Skagit Bay	0.04	0.22%	0.00	0.00%	0.00%
South Sound to Olympia	1.03	1.86%	0.00	0.00%	0.00%
Strait of Georgia - Below 49th	1.33	3.81%	0.00	0.00%	0.00%
Haro Strait and Boundary Pass	3.24	4.64%	0.00	0.00%	0.00%

Zone	Non-Target Vessel Tugs: Hours per Day of Underway Time	Non-Target Vessel Tugs: % of Historical AIS Vessel Traffic	Target Vessel Tugs: Hours per Day of Underway Time	Target Vessel Escort Tug Activity: % of Historical AIS Vessel Traffic	Target Vessel Escort Tug Activity: % of all Escort/Assist Tug Activity
Southern Gulf Islands	5.84	1.54%	0.00	0.00%	0.00%
Grand Total	120.68	4.17%	28.53	0.99%	19.12%

Figure 25 depicts escort/assist tug underway time by zone, broken down by Non-Target/Other Tug Activity and Escort – Target Vessels.



Figure 25. Comparison of target vessel escort tug underway time and non-target escort/assist tug underway time by zone for Alternative C.

3.4.1.3 Congestion and Navigational Safety:

The expansion area covers approximately 28.9 square miles and is approximately seven miles long end-to-end following the vessel traffic lane. It includes a portion of the formally designated traffic lanes and includes a northbound and southbound lane separated by a separation zone and with a precautionary area at the southern end where the Strait of Georgia meets Rosario Strait (see Figure 26 below). Commercial traffic in this area is actively managed by the USCG VTS.



Figure 26. Map showing the traffic lanes in the expansion area with the expansion area boundary overlaid.

The zones with the largest increases in target vessel escort tug underway time under Alternative C are the Strait of Georgia South Zone and the Strait of Georgia Zone; these zones are the focus of the navigational safety and congestion discussion for this alternative.

Due to the increases in underway time in these zones, Ecology solicited input from the OTSC (and specifically the Pilots representative on the OTSC) about any potential navigational safety and congestion issues. The OTSC did not raise any specific concerns with increased vessel traffic under Alternative C.

The Pilots' representative also indicated that this increase in escort tug underway time did not raise new concerns about navigational safety or congestion. He indicated that this is not a high-traffic area but that the traffic that does exist is mostly tug and barge traffic transiting to and from Alaska. His perspective was that the rule would add a small number of escort tugs, and that he did not foresee this being a navigational safety issue, particularly for the escort tugs. He

did highlight that there are some safety concerns for target vessels in this area, but that these are unlikely to be an exceptional navigational safety risk for escort tugs. Those risks are Alden Bank and Clements Reef. Clements Reef is in a high-current area and was the site of a tank barge grounding resulting in an oil spill in 1994. This incident spilled over 27,000 gallons of oil. These existing safety risks highlight the potential benefit of escort tugs in this zone.

Beyond the safety considerations highlighted by the OTSC Pilot representative, the expansion area into the Strait of Georgia and Strait of Georgia South are not specifically identified as highrisk areas in previous planning documents. However, the San Juan Islands as a region have been identified as an area with risk of conflict between commercial and recreational vessels (U.S. Coast Guard, 2017). There is also significant seasonal variation in recreational vessel traffic in this region, with peaks in the summer months. The islands along the expansion area border, Patos, Sucia, and Matia, are designated as State Parks and National Wildlife Refuge areas. Recreation in this area is typically only accessible by boat with dispersed onshore camping. While a popular destination, recreation is more dispersed than in the core areas of the San Juan Islands (see Appendix I Recreation Discipline Report for more information). Nonetheless, the increase in tug traffic could increase the frequency of interaction between escort tugs and recreational vessels in this more remote portion of the San Juan Islands.

Ecology incident data does not show a significant increase in incidents involving escort and assist tugs after the implementation of the 2020 requirements (see Appendix C Environmental Health: Releases for more details and a discussion of changes in risk for target vessels for each alternative) (Ecology, 2024d). Overall, these incidents are infrequent, with a total of five oil pollution or vessel casualty incidents identified between 2017-2023. None of the five incidents occurred within the expansion area.

3.4.1.4 Waiting at Rendezvous Points:

At the start of an escort job, escort tugs meet their target vessel at the boundary of the area where escorts are required. The tug needs to be in place at these rendezvous points before the vessel arrives. This means that escort tugs spend time waiting at these rendezvous points prior to beginning the escorted transit. Under Alternative C, the southern boundary rendezvous point is likely to remain the same as in Alternative A. The Swinomish Indian Tribal Community has indicated that tugs waiting at the southern rendezvous point under current (Alternative A) conditions are causing interactions with the Tribal fishing fleet and sometimes gear loss (see Appendix K Tribal Resources Discipline Report for more information). Under Alternative C, these patterns at the southern boundary would likely remain the same as under Alternative A.

For the northern boundary, a shift in waiting behavior is possible. Alternative C will likely disperse where escort tugs wait for their target vessels. As shown in Figure 4, there are two places where target vessels could enter the expanded rulemaking area. One is at the northwestern boundary of the expansion area and the second is at the northern end of Rosario Strait. The heat map for Alternative C shows higher amounts of target vessel escort tug underway time at the northern boundary of the Rosario Strait Zone, but the increase at the northern boundary of the Strait of Georgia South Zone and within the Strait of Georgia Zone is also evident.

The northern end of the Strait of Georgia South Zone is described as: a line from Alden Point light on Patos Island to the North Alden Bank buoy (See Figure 26). This would be a rendezvous point for vessels transiting through the Strait of Georgia. While there may be some tugs waiting at this location, the OTSC Pilot representative suggested that it is more likely that tugs would wait in nearby but more protected areas (near Neptune Beach or in coves like Echo Bay on Sucia Island) until closer to when the target vessels arrive. While there could still be some waiting at the northern boundary, it is likely to occur for shorter durations of time.

Target vessels entering or leaving the rulemaking boundary where tug escorts are required near Rosario Strait will likely be transiting to and from the refineries in Ferndale and Cherry Point. For these vessels, the OSTC Pilot representative suggested that the escort tugs will likely either start as, or become, the target vessel's assist tug between the boundary of the rulemaking area and the dock. This would reduce waiting at rendezvous points near the northern boundary of Rosario Strait. Overall, there is likely to be more dispersed waiting at rendezvous points on the northern end of the rulemaking area boundary under Alternative C. At the southern end, there would be no change from Alternative A or a slight reduction due to a shift northward in commute locations. Several Tribes have treaty-reserved fishing rights near the northern boundary of the Rosario Strait Zone and Strait of Georgia South Zones, where escort tugs waiting at rendezvous points may result in negative interactions with treaty fishing vessels (see Appendix K Tribal Resources Discipline Report for details).

3.4.1.5 Route Switching:

Although the expansion area is relatively small, it is possible that some additional route switching, over what occurred in Alternative A, could occur. Alternative A only saw potentially meaningful route switching for towed oil barges in that Haro Strait transits increased by five transits (45 percent), from 11 in Year 1 to 16 in Year 2. (BPC & Ecology, 2021) with the 2020 requirements. The expansion area is much smaller than the geographic area covered by the 2020 requirements, so if other target vessel types (tankers and ATBs) did not make significant route changes, it seems unlikely that they would elect to do so with a minor expansion. Decisions to switch routes would be made at the level of individual companies based on economic factors. The Preliminary Regulatory Analysis covers these considerations.

3.4.2 Proposed Mitigation Measures

No additional mitigation measures other than those included for Alternative A in 3.2.2 (Proposed Mitigation Measures) have been identified for Alternative C. Escort tugs and target vessels would continue to adhere to all relevant federal vessel traffic safety measures. Ecology recommends that escort tugs and target vessels continue to follow relevant PSHSC Standards of Care. Ecology also recommends that the Puget Sound Harbor Safety Committee extend the applicable portions of the Tanker Escort Standards of Care to the escorting of target vessels. For Alternative C, this would include both the vessel size and the geographic extent of the tug escort requirements.

The addition of FORs will help ensure that the escort tug can safely and efficiently conduct escort work. The formalization of the pre-escort conference will support enhanced communication, predictability, and coordination between escort tugs and target vessels.

Alternative C extends the risk reduction benefits of escort tugs through the expansion area – mitigating oil spill risk.

3.4.3 Significant and Unavoidable Adverse Impacts

Under Alternative C, escort tug underway time still represents less than one percent of total AIS traffic in the EIS Study Area (0.99 percent). This is a 0.03 percent increase from Alternative A and is unlikely to affect vessel traffic safety. This was calculated based on the highest-traffic scenario simulation, so this figure is a higher-end estimate of the contribution of escort tug traffic associated with target vessels in the EIS Study Area. Escort tug underway time associated with target vessels still makes up a small portion of total historical AIS traffic in all zones, although there are increases in the Strait of Georgia South and Strait of Georgia Zones.

Particularly in the Strait of Georgia South Zone, there would be moderate increases in escort tug underway time. While the relative increase in escort tug underway time is dramatic, the absolute numbers are small: 14.68 percent of all historical AIS traffic, or approximately 1.1 hours of underway time per day (see Table 13). Under Alternative A, there would be approximately one escort tug transit per month in the Strait of Georgia South Zone. Under Alternative C, there would be approximately one escort tug transit per day lasting about one hour. Under Alternative C, 39 percent of all escort tug underway time is actively escorting a target vessel. From this, we extrapolate that just over every third transit would be with an existing target vessel, where the potential impact of the tug is dwarfed by the potential impact of the target vessel. Although this is not a crowded part of the waterway, regular target vessel transits do occur. It is part of the formally designated vessel traffic lanes and is set up to safely accommodate vessel traffic.

In the Strait of Georgia Zone, relative increases are less dramatic, escort/assist tugs are a much bigger part of the existing vessel traffic landscape, and this zone has much higher levels of existing vessel traffic. Under Alternative A, we estimated just under two hours of escort tug underway time per day. Under Alternative C, we estimate just over two hours of escort tug underway time per day in the Strait of Georgia Zone. Escort tugs associated with target vessels account for approximately 2.24 percent of all historical AIS vessel traffic in this zone. Some towed barges and ATBs may continue to opt to use the Haro Strait and Boundary Pass route rather than the Rosario Strait route in response to the regulations, but the total number of these transits is relatively small. Additionally, the OTSC experts did not identify any navigational safety or congestion concerns with the increased escort tug underway time in the expansion area.

Because the escort tugs are moving, the impacts described above in the expansion area would be transitory in nature. The increases in escort tug underway time are minor to moderate in these two zones. Despite the relative increase in traffic, Alternative C does not represent a meaningful increase in vessel traffic and we did not identify any navigational safety or congestion issues that are likely to result from the expansion. While any vessel incident could have high consequences, we expect the probability of incidents to remain low.

The existing safety measures and proposed mitigation measures, further reduce these impacts. The OTSC selected Alternative C for evaluation and this expansion zone specifically because it provided the highest benefit with the smallest increase in transits. It is designed to limit the impacts of additional traffic. Since we did not identify any additional mitigation measures, the only way to further reduce these impacts would be not to expand the tug escort requirements to include the expansion area. Alternative C would not have significant or unavoidable adverse environmental impacts on transportation (vessel traffic specifically).

Tribes have indicated that existing levels of vessel traffic impact Tribal rights and resources. The Swinomish Tribe expressed that tugs waiting to pick up their target vessels at the boundaries of the rulemaking area has interfered with treaty fishing. This is described in more detail, along with suggested mitigation, in Appendix K Tribal Resources Discipline Report.

3.5 Alternative D: Removal of Tug Escort Requirements

3.5.1 Impacts from Implementation

Alternative D removes the existing tug escort requirements for target vessels, eliminating escort tug underway time associated with this proposed rule. We can reasonably assume that most or all of the 18 identified escort tugs would remain within the EIS Study Area but shift to other assisting and/or escort work for larger vessels. While the individual tugs may continue to have impacts to the environment, they would be unrelated to this rulemaking and are not considered in this EIS.

3.5.1.1 Direct Impacts - Total Underway Time:

Using the simulated data, under Alternative D, there are underway minutes of escort/assist tug activity, made up of escorts of non-target vessels, assist jobs, and background activity. This represents approximately 4.22 percent of total vessel traffic, compared to 5.14 percent with target vessel escorts in Alternative A. This includes:

- Escort Jobs Target Vessels: 0 underway minutes per simulated year
- Escort Jobs Non-Target Vessels: 304,106 underway minutes per simulated year
- Assist Jobs: 1,276,981 underway minutes per simulated year
- Background/Other Tug Activity: 1,061,702 underway minutes per simulated year.

This represents a reduction of 18.76 percent in escort/assist tug activity from Alternative A, and a 0.96 percent reduction in total underway minutes for all vessel traffic.

3.5.1.2 Direct Impacts - Number of Commutes and Escort Jobs per Simulated Year

Under Alternative D, there are zero individual escort jobs of target vessels in the simulated year because the requirement would be removed. This eliminates the 1,537 individual escort jobs and their associated commutes from Alternative A.

For Alternative D, escort and assist jobs for non-target vessels would remain unchanged: 2.15 escort jobs per day (785 per simulated year) for non-target vessels and 24.93 tug assist jobs per day (9,099 per simulated year). This includes tug escorts for oil tankers over 40,000 DWT and tug assist activity. There would continue to be high concentrations of tug activity around both major refineries and the Ports of Seattle and Tacoma. As shown in the map of historical target vessel traffic (Figure 21 above), tankers typically move in and out of refinery areas. Assist tugs

are required to help large vessels dock safely, so it makes sense to see higher concentrations of tug underway time around the major port areas. There is also a high concentration of tug activity around the Discovery Island Light/New Dungeness Light, which is the westward boundary where tug escorts are required for oil tankers over 40,000 DWT, indicating that tugs spend time in these areas waiting for or finishing an escort job. This traffic exists in all four of the requirements.

Under Alternative D, we only see escort/assist tug traffic from non-target vessel escorts and other escort and assist tug traffic. This includes escorting tankers over 40,000 DWT (non-target vessels) and associated commutes, assist tug work and associated commutes, and other assist and escort tug activity. This traffic is the same background traffic that exists in all the alternatives.

Table 14 below shows escort and assist tug underway minutes per year and compares Alternative D to Alternative A. The highest reduction in escort tug underway time relative to existing levels of escort/assist activity not associated with target vessels occurs in Rosario Strait, Bellingham Channel, Guemes and Saddlebags Zones, and Admiralty Inlet. These are the areas where target vessel escort traffic is currently the highest (Alternative A). There would also be meaningful reductions in the Eastern Strait of Juan de Fuca, San Juan Islands, Strait of Georgia South, and Strait of Georgia Zones, where there is a higher proportion of target vessel escort tug commute minutes under Alternative A.

Table 14. Target vessel escort tug and non-target vessel escort/assist tug underway time by hours per day for Alternative D. Includes comparison to historical AIS traffic and change in total escort/assist tug traffic.

Zone	Non-Target Vessel Tugs: Hours per Day of Underway Time	Non-Target Vessel Tugs: % of Historical AIS Vessel Traffic	Target Vessel Tugs: Hours per Day Underway	All Escort/Assist Tug Activity: % Change from No Action
			Time	
Rosario Strait	5.49	6.14%	0	-63.08%
Bellingham Channel	4.08	3.06%	0	-45.90%
Guemes Channel and		5 /6%	0	-38.86%
Saddlebags	7.57	5.40%	0	-30.00%
Admiralty Inlet	4.58	4.01%	0	-38.41%
Eastern Strait of Juan de Fuca	5.45	6.17%	0	-26.25%
San Juan Islands	0.08	0.03%	0	-17.81%
Strait of Georgia South	0.13	2.03%	0	-10.59%
Strait of Georgia	16.06	16.37%	0	-10.50%
Puget Sound	52.63	7.27%	0	-5.53%
Western Strait of Juan de	8 19	3.53%	0	-3.75%
гиса	8.19	1		

Zone	Non-Target Vessel Tugs: Hours per Day of Underway Time	Non-Target Vessel Tugs: % of Historical AIS Vessel Traffic	Target Vessel Tugs: Hours per Day	All Escort/Assist Tug Activity: % Change from No
			Underway	Action
Possession Sound and		2 63%	11 me 0	-3 07%
Saratoga Passage Port Orchard	2.33	0.45%	0	-1.89%
Rich Passage and Sinclair	0.60	1.14%	0	-1.76%
Colvos Passage	0.64	3.26%	0	-0.79%
Hood Canal	0.92	4.70%	0	-0.40%
Lake Washington Ship Canal	0.33	0.18%	0	-0.01%
Carr Inlet	0.00	0.04%	0	0.00%
Skagit Bay	0.04	0.22%	0	0.00%
South Sound to Olympia	1.03	1.86%	0	0.00%
Strait of Georgia - Below 49th	1.33	3.81%	0	0.00%
Haro Strait and Boundary Pass	3.24	4.64%	0	0.00%
Southern Gulf Islands	5.84	1.54%	0	0.00%
Grand Total	120.68	4.22%	0	-18.76%

3.5.1.3 Congestion and Navigational Safety:

Alternative D removes all escort requirements for target vessels, reducing the target vessel escort tug underway time to zero. This represents a 0.96 percent reduction in total underway minutes for all AIS vessel traffic, and an 18.76 percent reduction in total escort and assist tug underway minutes, as escort of non-target vessels and assist work is unchanged. The reduction in escort tug underway time would be largest in the zones with current tug escort requirements for target vessels (Rosario Strait, Bellingham Channel, and Guemes Channel and Saddlebags Zones). These zones have higher relative proportions of target vessel escort tug underway time compared to other escort and assist tug traffic. Admiralty Inlet Zone also sees a meaningful reduction in escort and assist tug traffic, likely due to fewer commutes through this zone on the way to and from the rulemaking areas. Under Alternative D, there would be fewer vessels overall, with more noticeable reductions in these four zones, which could contribute to a limited reduction in congestion in these areas.

As discussed in Sec. 3.1 (Affected Environment), several areas within the boundaries of Alternative D have been identified in several studies as high-risk for vessel traffic due to strong currents, rocky shorelines, hazards to navigation, narrow channels, complex traffic patterns and interactions between commercial and recreational vessels. While the navigational

considerations associated with congestion may be slightly reduced, removing escort tugs for target vessels does remove a safety measure intended to mitigate these navigational safety concerns. However, the PAWSA was conducted prior to the implementation of the 2020 requirements. Even without the requirements, navigational safety and congestion concerns were identified as well-managed with existing systems. While there may be a limited decrease in navigational safety associated with Alternative D, it would not remove measures that were in place during the PAWSA process, and the impact is likely to be small. See the Oil Pollution Section for a detailed discussion of oil spill and drift grounding risks under each alternative.

Ecology incident data does not show a significant increase in incidents involving escort and assist tugs after the implementation of the 2020 requirements (see the Section 4.2 Environmental Health: Releases of the EIS and Appendix C) for more details and a discussion of changes in risk for target vessels for each Alternative) (Ecology, 2024d). These incidents are rare overall, with five oil pollution or vessel casualty incidents identified between 2017-2023. Two of the five identified incidents occurred within Alternative D boundary. With the reduced total escort and assist tug underway time in Alternative D Boundary, incidents like these would likely be reduced.

Maritime experts in the OTSC did not identify other concerns with navigational safety and/or congestion under the conditions of Alternative D.

3.5.1.4 Waiting at Rendezvous Points:

Because Alternative D removes all escort requirements for target vessels, there would be no rendezvous points associated with the target vessels near the rulemaking area. Rendezvous points for assist tug jobs and for the tankers over 40,000 DWT would still occur as they do in all four alternatives.

3.5.1.5 Route Switching:

Because Alternative D removes all escort requirements for target vessels, there is no risk of route switching for target vessels driven by the rule. Under Alternative D, it is possible that some vessels could switch back to Rosario Strait, slightly increasing the number of target vessels in this waterway.

3.5.2 Proposed Mitigation

Under Alternative D, there would be a decrease of 0.96 percent in all AIS vessel traffic with the removal of the requirements. This would minimally reduce any potential congestion, but would leave areas identified as high-risk without the additional navigational safety measure of an escort tug. Although there may be other ways to provide a similar benefit to navigational safety, those are outside the limited scope Chapter 363-116 WAC to implement.

The conditions described in the 2017 PAWSA Study (U.S. Coast Guard, 2017) most closely resemble Alternative D Conditions. In that study, maritime experts concluded that most risks associated with navigational conditions, congestion, waterway conditions, and traffic conditions are currently well managed with existing measures.

3.5.3 Significant and Unavoidable Adverse Impacts

Alternative D would see a less than 1 percent reduction in total AIS traffic in the EIS Study Area. This was calculated based on the highest-traffic scenario simulation, so this figure is a higherend estimate of the reduction under the Alternative D. Rosario Strait, Bellingham Channel, Guemes Island and Saddlebags, and Admiralty Inlet Zones would see the largest reductions relative to existing escort and assist tug traffic. This may be a small benefit for overall navigational safety and congestion. However, Alternative D could cause a slight increase in the number of towed barges and ATBs using the Rosario Strait route, as an Ecology study indicated that some vessel may have switched to the Haro Strait and Boundary Pass route in response to the implementation of the 2020 tug escort requirements. The total number of transits that were observed switching was small and this is not likely to significantly affect the navigational safety or congestion conditions in the Study Area.

The OTSC experts did not express concerns about navigational safety and congestion associated with Alternative D. Alternative D would not have significant or unavoidable adverse environmental impacts on vessel traffic.

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