



DEPARTMENT OF
ECOLOGY
State of Washington

Grays Harbor Vessel Traffic Risk Assessment (GHVTRA)

*Hazard Identification Workshop 2
Handbook*

February 2018

Publication and Contact Information

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December 29, 2017

Thank you for participating in the Grays Harbor Vessel Traffic Risk Assessment workshops! We are privileged to have this opportunity to bring tribes and stakeholders together to identify ways we can improve oil spill prevention and response preparedness in this significant waterway and ecosystem. Your participation is vital to ensure we consider all relevant information, and produce the best possible information and regionally specific recommendations from this work.

To ensure you are able to fully participate, please take time to review this handbook before the workshop. You'll find the workshop agenda, background information, instructions on what we would like participants to do ahead of time, and templates to help you capture your thoughts. The templates will be used during the workshop to structure our conversations and record everyone's contributions.

We are fortunate to live in an area with unparalleled social, cultural, economic, and environmental resources and opportunities. Our region is also unique in the robust and effective forums that exist to improve maritime safety and prevent oil from entering the water. Participants in these forums include tribes, government agencies, industry, nongovernmental organizations, and citizens, each with an important role to play and interests to safeguard. The state legislature recognizes the damage that an oil spill on our waters could cause to our resources, and they have consistently invested in a comprehensive Spills Prevention, Preparedness, and Response program to mitigate these risks. The Grays Harbor Vessel Traffic Risk Assessment is an important step in our work to protect our states sensitive resources. As a result of all of these factors, Washington has one of the lowest spill rates in the nation.

However, we all realize that a major spill could be catastrophic. In keeping with the collaborative nature of our maritime forums, we look forward to forthright and detailed conversations about how we can continue to improve spill prevention and preparedness. Thank you again for dedicating your time and energy to this important shared work.

I look forward to seeing you at the workshop.

Sincerely,

Dale Jensen
Program Manager
Spill Prevention, Preparedness, and Response

Grays Harbor Vessel Traffic Risk Assessment (GHVTRA)

Hazard Identification Workshop 2 Handbook

SPPR Program
Washington State Department of Ecology
Olympia, Washington

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Workshop Agenda

Hazard Identification Scope

Conduct a series of workshops to:

- Identify local factors associated with hazards to commercial vessel operations in Grays Harbor that could result in an oil spill
- Develop regionally specific recommendations to improve oil spill prevention and preparedness

Expected Outcomes

The workshop will produce a list of existing safeguards and high-level recommendations based on a review of local factors related to oil spill hazards for commercial cargo, passenger, towing and tank vessels greater than 300 gross tons. The workshop will also produce a list of any identified changes to safeguards or recommendations, based on potential future increases in vessel traffic.

Agenda

- 8:30 WELCOME AND INTRODUCTIONS** – Dale Jensen, Program Manager, WA State Dept. of Ecology Spill Prevention, Preparedness, and Response Program
- 8:40 SAFETY BRIEFING AND WORKSHOP OVERVIEW** – Scott Ferguson and Brian Kirk; WA State Dept. of Ecology Spill Prevention, Preparedness, and Response Program; Workshop Facilitators
- Safety procedures
 - Hazard Identification Workshop 1 Review
 - Meeting ground rules and decision making approach
- 9:00 IDENTIFY SAFEGUARDS AND RECOMMENDATIONS**
- Review local factors identified during Hazard Identification Workshop 1
 - Identify existing safeguards and high-level recommendations
 - Discuss changes to safeguards and recommendations that could be needed based on potential future increases in vessel traffic
- 10:30 BREAK**
- 10:45 IDENTIFY SAFEGUARDS AND RECOMMENDATIONS, CONTINUED**

12:00 WORKING LUNCH

- Update on Response Capability Workshop;
- Update on Commercial Fishing, Tribal Fishing, and Recreational Vessel Oil Spill Prevention and Response Workshop

12:45 IDENTIFY SAFEGUARDS AND RECOMMENDATIONS, CONTINUED

3:45 BREAK/PREPARE WORKSHOP OUTPUT

4:00 REVIEW OUTPUT FROM WORKSHOP

- Existing safeguards
- High-level recommendations
- Changes related to potential future increases in vessel traffic
- Next steps

4:30 ADJOURN

About this Handbook

This handbook is intended to provide you with all the material you will need to successfully prepare for, and participate in, the Grays Harbor Vessel Traffic Risk Assessment Hazard Identification Workshop 2.

Before the workshop, please review this handbook and complete the “Existing Safeguards” and “High-Level Recommendations” sections of the Local Factors template. Detailed instructions are on page 13.

Additional handbooks will be provided for the other workshops in this assessment, including, the Response Capability Workshop, and the Commercial Fishing, Tribal Fishing, and Recreational Vessel Oil Spill Prevention and Preparedness Workshop.

The following two sections of the handbook give background information on the Grays Harbor Vessel Traffic Risk Assessment, and describe our approach to Hazard Identification.

The Workshop Material section has a figure showing the waterway, a template of local factors, existing safeguards, and high-level recommendations that we will complete during the workshop, the 10 templates from Hazard Identification Workshop 1 with the identified local factors to support discussions during the workshop, and a summary of discussions during Workshop 1 that were out of scope for the Hazard Identification process.

A glossary and references are provided at the end of the handbook to help you prepare for the workshop, and for your use during the workshop.

Grays Harbor Vessel Traffic Risk Assessment

Background

Ecology received funding in the 2017-2019 budget to continue our oil spill prevention risk assessment work. Our current funding supports a risk assessment for oil spills from commercial vessels in Grays Harbor, and a rail traffic risk assessment. This builds on previous work, including:

- 2014 Marine and Rail Oil Transportation Study (Ecology, 2015)
- 2015 update to a vessel traffic risk assessment for Strait of Juan de Fuca, Puget Sound, San Juan Islands and connecting waterways (Van Dorp, 2017)
- 2016 Salish Sea Oil Spill Risk Reduction Workshop (Ecology, 2016)
- 2017 Columbia River Vessel Traffic Evaluation and Safety Risk Assessment (Ecology, 2017)

Goals

The goals of the Grays Harbor Vessel Traffic Risk Assessment are to:

- Assess baseline and changing oil spill risks from commercial vessels operating in Grays Harbor
- Identify measures that could help reduce the risks of oil spills
- Assess oil spill response preparedness
- Identify baseline response capability

Process

Ecology is following the International Maritime Organization (IMO) Formal Safety Assessment (FSA) process to conduct the Grays Harbor Vessel Traffic Risk Assessment (IMO, 2002). Adopted by the IMO in 2002, Formal Safety Assessments use a structured and systematic methodology to assess the risks relating to maritime safety and the protection of the marine environment, and for evaluating the costs and benefits of options for reducing these risks (IMO, 2002). The FSA process includes the following steps:

- Preparatory Step
 - Definition of Goals, Systems, Operations
- Step 1: Hazard Identification
- Step 2: Risk Analysis
- Step 3: Risk Control Options
- Step 4: Cost Benefit Assessment
- Step 5: Recommendations for Decision Making

Initial Focus

Ecology's focus during fiscal year 2018 (July 1, 2017 – June 30, 2018), is completing the preparatory step and Step 1, Hazard Identification. We are facilitating two workshops to conduct the Hazard Identification. Two additional workshops will extend the Hazard Identification process. The first will discuss oil spill response preparedness and the second will focus on commercial fishing, tribal fishing, and recreational vessel oil spill prevention and preparedness. A schedule of all workshops is shown below.

During the first Hazard Identification workshop, participants will review potential incidents that could result in oil spills from commercial vessels, with a goal of identifying any local factors that could contribute to these incidents. Examples of local factors may include a submerged jetty that could contribute to vessel grounding risks, or a sharp turn in a channel that could contribute to collision and allision risks. The list of local factors will be the primary outcome of the first workshop.

In the second Hazard Identification workshop, participants will discuss each local factor listed in the first workshop, and identify any safeguards currently in place to prevent the incident and any high-level recommendations that could improve oil spill prevention.

The Hazard Identification is centered on the discussion of local factors, rather than other risk components, such as the relative frequency of vessel incidents, or the consequence of oil spills, for two reasons.

First, commercial vessel incidents, like collisions or groundings resulting in an oil spill, are relatively rare events both globally and in the historical data available for Grays Harbor. Ecology data for 2007-2017 show only one oil spill from a large commercial vessel: a 1-gallon hydraulic oil spill from a cargo ship in 2011 (Ecology, 2017a). The last major oil spill in the vicinity of Grays Harbor was the oil barge *Nestucca* in December, 1988 (NOAA, 2017). Rather than ask participants to provide qualitative judgments about the likelihood of these relatively rare events, the workshop seeks to benefit from local knowledge and expertise about the commercially navigable waterway.

Additionally, the overall Grays Harbor Vessel Traffic Risk Assessment and the Hazard Identification workshops are intended to improve oil spill prevention and preparedness. It is beyond the scope of this assessment to model potential spill consequences in terms of the fate, transport, and effect of spilled oil.

The risk assessment process may end, or pause, after the Hazard Identification is complete. Ecology anticipates making a decision on whether to continue with Steps 2-5 of the FSA process in the spring of 2018 based on the results of the Hazard Identification, and possible changes in Agency and fiscal direction. In addition to this risk assessment, Ecology has a role in the State Environmental Policy Act (SEPA) process for any permitting decisions related to vessel traffic and oil movement.

Workshop Schedule

Date	Event
January 25, 2018	Hazard Identification Workshop 1 Port of Grays Harbor
February 28, 2018	Hazard Identification Workshop 2 Port of Grays Harbor
April 3, 2018	Response Capability Workshop Port of Grays Harbor
April 24, 2018	Commercial Fishing, Tribal Fishing, and Recreational Vessel Oil Spill Prevention and Preparedness Workshop McCausland Hall, Westport Maritime Museum
June, 2018	Hazard Identification and Response Capability Preliminary Report

Hazard Identification

Background

Hazard Identification is first step in the Formal Safety Assessment process. The purpose of this step is to identify a list of hazards and associated scenarios, prioritized through the use of screening criteria, which are specific to the problem under review (IMO, 2002). Hazard Identification can be accomplished through a variety of techniques, such as structured group brainstorming or Fault Tree Analysis (ABS, 2000).

Approach

Ecology will facilitate structured brainstorming discussions to accomplish the Hazard Identification process. The scope, expected outcomes, and process are described below.

Hazard Identification Scope

Conduct a series of workshops to:

- Identify local factors associated with hazards to commercial vessel operations in Grays Harbor that could result in an oil spill
- Develop regionally specific recommendations to improve oil spill prevention and preparedness.

Details:

- Hazards include hazards to navigation and vessel incidents that could result in an oil spill (e.g., collision, allision, grounding, flooding; fire/explosion; structural failure)
 - Includes consideration of meteorological/hydrographic condition, e.g., high winds, heavy seas, fog, and tides and currents including cyclical changes and tidal extremes
 - Does not include region wide hazards, e.g., Cascadia Subduction Zone earthquake/tsunami
- The fate and effect of spilled oil will be considered during the Response Capability Assessment workshop. In-depth consideration of the environmental, cultural, or economic impacts of the spilled oil is beyond the scope of the Hazard Identification and Response Capability Assessment.
- Geographic boundaries
 - Offshore from buoy “GH” (approximately 5nm offshore) to Weyerhaeuser Company Bay City Log Export, Berths 1 and 2
 - Workshop may include discussion of offshore vessel traffic management practices westward of buoy “GH”, as noted on templates 1 and 2
- Types of vessels:
 - Commercial cargo, passenger, towing, fishing, and tank vessels > 300 gross tons
 - Includes specific hazards for different vessel types (e.g., considerations for grain ships, car carriers, etc.)
 - Commercial and tribal fishing vessels and recreational vessels < 300 gross tons
 - Will be considered during the Hazard Identification workshops as operations that could impact a commercial cargo, passenger, towing, fishing, or tank vessel > 300 gross tons
 - Ecology is planning a workshop to discuss commercial and tribal fishing vessel and recreational vessel oil spill prevention and preparedness for vessels < 300 gross tons
- Oil spills
 - Oil as defined by the state of Washington RCW 90.56.010: "Oil" or "oils" means oil of any kind that is liquid at twenty-five degrees Celsius and one atmosphere of pressure and any fractionation thereof, including, but not limited to, crude oil, bitumen, synthetic crude oil, natural gas well condensate, petroleum, gasoline, fuel oil, diesel oil, biological oils and blends, oil sludge, oil refuse, and oil mixed with wastes other than dredged spoil. Oil does not include any substance listed in Table 302.4 of 40 C.F.R. Part 302 adopted August 14, 1989, under section 102(a) of the federal comprehensive environmental response, compensation, and liability act of 1980, as amended by P.L. 99-499

- Vessel activities and incidents
 - Definitions for vessel activities, incident types, immediate causes, and contributing factors are provided in the Glossary, and are adapted from 46 CFR, RCW 88.46, WAC 317-31, and the Pacific States/British Columbia Oil Spill Task Force Data Dictionary
- Timeframe
 - Focus on current hazards
 - Hazard Identification workshops will include qualitative discussions of potential changes in hazards or offshore vessel traffic management practices as a result of any projects that are proposed at the time of the workshops
 - BHP Potash Export Facility
 - Status: State Environmental Protection Act checklist submitted to City of Hoquiam December 14, 2017
 - Potential vessel traffic: 1-2 ships per week initially; maximum of 2-4 ships per week (assumed range 52-208 ships per year)
 - Contanda Terminal Expansion project
 - Status: Shoreline Substantial Development permit application submitted to City of Hoquiam January 25, 2018
 - Potential vessel traffic: 48 vessels per year, Panamax to tank barge

Expected outcomes

- Workshop 2:
 - For each local factor identified in Workshop 1 – A description of safeguards intended to prevent the hazard, and any high-level recommendations to reduce the likelihood or consequence of the hazard
 - Description of any identified potential changes to hazards due to changes in vessel traffic related to proposed projects
- Following Workshop 2:
 - A report documenting the Hazard Identification process, workshops, and results
 - This report will be combined with the report of the Response Capability Preparedness workshop, and the planned workshop discussing commercial fishing, tribal fishing, and recreational vessel oil spill prevention and preparedness

Process

Ecology will facilitate structured brainstorming discussions to review local factors associated with hazards to commercial vessel operations in Grays Harbor that could result in an oil spill, and identify safeguards intended to prevent the hazard, and any high-level recommendations to reduce the likelihood or consequence of the hazard.

Additional discussions during the workshop will focus on any changes that might be required to safeguards or recommendations, based on potential future increases in vessel traffic.

A template of local factors, existing safeguards, and high-level recommendations, provided in the Workshop Material section, will be used to promote a systematic consideration of the factors identified in Hazard Identification Workshop 1.

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Workshop Materials

Waterway Areas



Discussion of offshore vessel traffic management may extend westward of buoy "GH"

- Study boundary
- Waterway Area division line
- Non-designated Anchorage Areas (approximate locations)

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Local Factors, Safeguards, and Recommendations Template

Instructions

The template in this handbook will be used to review local factors identified during Hazard Identification Workshop 1, and record safeguards intended to prevent the hazard, and any high-level recommendations to reduce the likelihood or consequence of the hazard.

To aid your participation in the workshop, please follow these steps:

Before the workshop

- Review each local factor
 - Local factors have been sorted into categories for ease of reference
 - Categories are listed alphabetically
 - Local factors are listed alphabetically within each category
 - No priority is implied by the order in which local factors appear
 - The list of local factors does not provide information about the likelihood of vessel incidents or oil spills; determining likelihood of potential spill events would require quantitative analysis
 - The list does not imply a causal relationship between the identified local factors and potential oil spills
 - The numbers listed after each local factor show the template (“T”) and waterway area (“A”) that each local factor is related to
 - Waterway areas are shown on page 10
- Consider existing safeguards intended to prevent the local factor from increasing the risk of a vessel incident that could result in an oil spill
 - Examples of existing safeguards could include Harbor Safety Plan Standards of Care, or local operating practices
- Consider any high-level recommendations that could further reduce the risks of a vessel incident that could result in an oil spill
 - Examples of a high-level recommendation could include new working groups of the Harbor Safety Committee, to address issues such as aids to navigation, or coordination with commercial and tribal fishing vessels
- Write your existing safeguards and high-level recommendations on the template

During the workshop

- Use your list of existing safeguards and high-level recommendations to contribute to the discussion of the template

Local Factors, Safeguards, and Recommendations Template

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
Aids to Navigation	<p><u>Factor 1: The effectiveness of some aids to navigation have degraded over time due to a variety of factors</u>, which may influence collision, allision, and grounding risks. These factors include the use of lower intensity lights on some visual aids, a channel realignment project completed in 2015 that resulted in ranges no longer indicating when a vessel was in the center of the channel, and instances of aids to navigation that have degraded or been vandalized, and not been repaired or replaced. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)</p> <ul style="list-style-type: none"> • Bar channel range, one structure removed this year • Entrance channel range only has one working light • Day boards not being maintained • South Range A no longer being maintained 		
Aids to Navigation	<p><u>Factor 2: Recent damage to Range F at Bowerman Airport</u> may influence collision, allision, and grounding risk by reducing the effectiveness of the visual aid. (T7/A4)</p>		
Anchorage	<p><u>Factor 3: Anchorage areas may be full</u>, causing inbound/outbound vessels to stay farther south in channel to avoid anchored vessels, which may influence collision risk by reducing the available water space and</p>		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
	maneuvering options for commercial vessels (T1/A1, T5/A2)		
Anchorage	<u>Factor 4: One of three non-designated anchorage areas used by the Grays Harbor Pilots is within the Point Chehalis Reach channel</u> , which may influence allision risk. (T5/A2)		
Anchorage	<u>Factor 5: Currents are strong (up to 5 knots), and there is little depth of water under the keel of anchored vessels</u> , which may influence the risks of dragging, grounding, and allision. (T5/A2)		
Anchorage	<u>Factor 6: High wind speeds are relatively common in Grays Harbor</u> , which may influence the risks of dragging, grounding, and allision (T5/A2) <ul style="list-style-type: none"> • Car carriers and RO-RO vessels are more likely to drag anchor during high winds; these vessels do not usually anchor in Grays Harbor • Vessels drag anchor once or twice a winter 		
Background Lighting	<u>Factor 7: Background lighting from Westport</u> may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T1/A1, T2/A1, T4/A2)		
Background Lighting	<u>Factor 8: High intensity lights on crab/fishing vessels</u> may influence collision, allision, and grounding risk by making it more difficult to see aids to navigation, navigation lights on the boat with the bright lights, or		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
	on other vessels around or behind the boat with bright lights (T1/A1, T2/A1, T4/A2)		
Background Lighting	<u>Factor 9: Background lighting at Bowerman airport</u> may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T6/A3, T7/A4)		
Bar and Approaches	<u>Factor 10: A mix of vessel types, with varying ages, designs, and material conditions</u> call on Grays Harbor; older vessels or vessels that have not been well maintained may be more likely to experience structural failure or flooding casualties while crossing the bar. (T3/A1)		
Bar and Approaches	<u>Factor 11: Inbound vessel position depends on where pilot boards and weather</u> , which may influence collision risk due to commercial vessels being outside of where other vessels may expect them to be (T1/A1)		
Bar and Approaches	<u>Factor 12: Outbound vessels may transit north of the channel</u> based on conditions to avoid breaking waves across the bar, which may influence collision risk due to commercial vessels being outside of where other vessels may expect them to be (T1/A1)		
Bar and Approaches	<u>Factor 13: Rough conditions on the bar</u> can increase the risk of structural failure and flooding (T3/A1)		
Bar and Approaches	<u>Factor 14: The effects of the Grays Harbor Bar may be felt between buoys 5 and 9</u> , depending on weather		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
	conditions, tide, and current, which may influence collision, grounding, and allision risk by making ship handling more difficult and less predictable (T1/A1, T2/A1)		
Channel depth/configuration	<u>Factor 15: Channel depth</u> may influence collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)		
Channel depth/configuration	<u>Factor 16: Channel may shoal due to sedimentation</u> , which may influence collision, allision and grounding risks for commercial vessels by reducing available depth and width of the channel. Problem may be exacerbated during periods when dredging is not possible due to weather. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)		
Channel depth/configuration	<u>Factor 17: Grays Harbor is shallow, with little water deep enough for navigation outside of the channel</u> , which may influence collision and grounding risk because ships are constrained to remain within the channel, and could quickly run aground if they exit the channel (T2/A1, T4/A2, T6/A3, T7/A4)		
Channel depth/configuration	<u>Factor 18: Multiple turns in the channel</u> influences collision, allision, and grounding risk by increasing the complexity of the transit (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)		
Channel depth/configuration	<u>Factor 19: Narrow channel widths</u> influences collision, allision, and grounding risk by restricting available		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
	water space and maneuvering options for commercial vessels <ul style="list-style-type: none"> • <u>In proximity to South Jetty (T1/A1)</u> • <u>Along South Reach (T4/A2)</u> • <u>Along Crossover Channel, and North Reach (T6/A3)</u> • <u>Along North Channel, Hoquiam Reach, Cow Point Reach, and Aberdeen Reach (T7/A4)</u> 		
Channel depth/configuration	<u>Factor 20: Rocky bottom in the vicinity of the groins north of Westport and the South Jetty</u> may influence the risk of an oil spill in the event of a grounding. (T2/A1, T4/A2)		
Channel depth/configuration	<u>Factor 21: Submerged jetty extending from South Jetty poses a navigational hazard;</u> vessels transiting the entrance channel may stay north in the channel to give the submerged jetty a wide berth, this could influence collision risk with an outbound vessel (T1/A1)		
Channel depth/configuration	<u>Factor 22: Submerged jetty south of the Entrance Channel</u> may influence grounding risk due to its proximity to the channel (T2/A1)		
Channel depth/configuration	<u>Factor 23: Turning basin is relatively small (950 feet north to south, 350 feet along the southwest edge), and is surrounded by shoal water,</u> which may influence grounding risk (T7/A4)		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
Currents	<u>Factor 24: Current effects</u> may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4, T8/A4)		
Currents	<u>Factor 25: Currents can complicate the turn at buoy 21</u> , particularly for inbound ships on a flood current, which may influence collision, allision, and grounding risk. (T6/A3)		
Currents	<u>Factor 26: Current can make turns in the turning basin more challenging</u> , which may influence collision, allision, and grounding risk. (T7/A4)		
Currents	<u>Factor 27: Seven rivers flow into Grays Harbor, which can effect current flow in complex and unpredictable ways</u> , which may influence collision, allision, and grounding risk by complicating ship handling (T4/A2, T6/A3, T7/A4, T8/A4)		
Fishing vessels, fishing gear	<u>Factor 28: Commercial, tribal, and recreational fishing vessels transiting to and from Westhaven Cove</u> may influence collision, allision, and grounding risks for commercial vessels by crossing the deep draft channel at Chehalis Reach or South Reach. (T4/A2)		
Fishing vessels, fishing gear	<u>Factor 29: Fishing vessels, including relatively large boats, may not adhere to the channel</u> , and may alter their behavior based on factors that may not be		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
	apparent or predictable to commercial vessels transiting in the channel, which may influence collision risk. (T1/A1, T4/A2, T6/A3, T7/A4)		
Fishing vessels, fishing gear	<u>Factor 30: Fishing vessels may be fishing in the channel</u> , which may influence collision, allision, and grounding risk by creating potential hazards to navigation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)		
Fishing vessels, fishing gear	<u>Factor 31: Fishing nets and derelict fishing gear</u> may influence collision, allision, and grounding risk by posing a hazard to navigation that commercial vessels could have to maneuver around, and by presenting a risk that fishing gear could get caught in a commercial vessels propeller or running gear, resulting in a loss or reduction in propulsion or steering. (T4/A2, T6/A3, T7/A4)		
Fishing vessels, fishing gear	<u>Factor 32: Large concentration of fishing vessels heading in/out during season openers</u> , which may influence collision risk with commercial vessels (T1/A1, T4/A2, T6/A3, T7/A4)		
Fishing vessels, fishing gear	<u>Factor 33: Loss of a large number of crab pots in the channel</u> could influence grounding and allision risk by posing a hazard to navigation that vessels may have to maneuver to avoid. (T1/A1, T2/A1, T4/A3)		
Fishing vessels, fishing gear	<u>Factor 34: Participants in recreational fisheries may not be familiar with the area</u> , which may influence collision risks. (T1/A1, T4/A2, T6/A3, T7/A4)		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
Fishing vessels, fishing gear	<u>Factor 35: Short fishery openings, combined with predictions of when fisheries will close can encourage fishermen, some of whom may be inexperienced or unfamiliar with the area, to fish regardless of weather or visibility</u> , which may influence collision, allision and grounding risks for commercial vessels by adding traffic and complicating the navigational situation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)		
Fishing vessels, fishing gear	<u>Factor 36: There are multiple fishing seasons and activity types in Grays Harbor</u> , including commercial, tribal and recreational openings; this may influence collision risk by making it more difficult for pilots, agents, and vessels to maintain awareness of, and be prepared for, fishery openings (T1/A1, T4/A2, T6/A3, T7/A4)		
Fire/Explosion	<u>Factor 37: The nature of materials moved as cargo</u> (e.g., oil, methanol, grain, wood chips) may influence the potential for fire and explosion (T10/A4)		
Fire/Explosion	<u>Factor 38: Municipal fire departments are responsible for responding to a shipboard fire, but may have limited training and experience</u> (T10/A4)		
Oil transfers	<u>Factor 39: Winds in excess of 30 knots are common in winter and can occur throughout the year</u> , which may increase the likelihood of having to secure cargo operations at Terminal 2. (T9/A4)		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
Oil transfers	<u>Factor 40: Fatigue of vessel crew</u> following the inbound transit and during long (up to 40 hour) transfers can influence oil spill risks. (T9/A4)		
Oil transfers	<u>Factor 41: The location and material condition of ship's bunkering connections can vary</u> ; which may influence oil spill risks. (T9/A4)		
Offshore traffic	<u>Factor 42: Vessels waiting for berth may loiter offshore as close as 4nm</u> , which may influence collision risk with fishing and recreational vessels and inbound/outbound commercial traffic (T1/A1)		
Surveys	<u>Factor 43: Lack of recent, comprehensive surveys of the area</u> may influence collision and grounding risk because conditions may have changed since the last survey; commercial vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2, T6/A3, T7A/4) <ul style="list-style-type: none"> • <u>Factor 44: Including north of the South Reach channel between buoys 15-21, where vessels sometimes anchor</u> (T6/A3) 		
Tugs/towing	<u>Factor 45: No dredging is being conducted above the rail bridge</u> , which may influence grounding risk for tugs/barges. (T7/A4)		
Weather and visibility	<u>Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and</u>		

Category	Local Factor	Existing Safeguards	High-Level Recommendations (Current/future traffic)
	<u>winter</u> , which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T5/A2, T6/A3, T7/A4, T8/A4)		
Weather and visibility	<u>Factor 47: Winds sometimes exceed 20 knots in the turning basin</u> , which may influence collision, allision, and grounding risk, particularly for car carriers and RO-RO vessels. (T7/A4, T8/A4)		

Hazard Identification Workshop 1 Templates

The 10 templates completed in Hazard Identification Workshop 1 are provided for reference.

Template 1: Area 1, Underway, Collision

Area 1: Bar Channel and Entrance Channel to Point Chehalis Reach (inside buoy 11)

Vessel Activity: Underway

Incident Category: Collision

How could an incident occur?

- Contact with a fishing net or crab pot
- Difficulty crossing the bar
- Failure to maintain position in channel
- Failure to negotiate turn to entrance channel
- Failure to take action to avoid another vessel
- Incident related to vessels offshore, including areas westward of buoy “GH”

Possible immediate causes/contributing factors (examples)

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Aids to navigation

- Factor 1: The effectiveness of some aids to navigation have degraded over time due to a variety of factors, which may influence collision, allision, and grounding risks. These factors include the use of lower intensity lights on some visual aids, a channel realignment project completed in 2015 that resulted in ranges no longer indicating when a vessel was in the center of the channel, and instances of aids to navigation that have degraded or been vandalized, and not been repaired or replaced. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
 - Bar channel range, one structure removed this year
 - Entrance channel range only has one working light
 - Day boards not being maintained
 - South Range A no longer being maintained

Anchorage

- Factor 3: Anchorage areas may be full, causing inbound/outbound vessels to stay farther south in channel to avoid anchored vessels, which may influence collision risk by reducing the available water space and maneuvering options for commercial vessels (T1/A1, T5/A2)

Background lighting

- Factor 7: Background lighting from Westport may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T1/A1, T2/A1, T4/A2)
- Factor 8: High intensity lights on crab/fishing vessels may influence collision, allision, and grounding risk by making it more difficult to see aids to navigation, navigation lights on the boat with the bright lights, or on other vessels around or behind the boat with bright lights (T1/A1, T2/A1, T4/A2)

Bar and approaches

- Factor 11: Inbound vessel position depends on where pilot boards and weather, which may influence collision risk due to commercial vessels being outside of where other vessels may expect them to be (T1/A1)
- Factor 12: Outbound vessels may transit north of the channel based on conditions to avoid breaking waves across the bar, which may influence collision risk due to commercial vessels being outside of where other vessels may expect them to be (T1/A1)
- Factor 14: The effects of the Grays Harbor Bar may be felt between buoys 5 and 9, depending on weather conditions, tide, and current, which may influence collision risk by making ship handling more difficult and less predictable (T1/A1)

Channel depth/configuration

- Factor 15: Channel depth may influence collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels (T1/A1, T2/A1, T4/A2)
- Factor 16: Channel may shoal due to sedimentation, which may influence collision, allision and grounding risks for commercial vessels by reducing available depth and width of the channel. Problem may be exacerbated during periods when dredging is not possible due to weather. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 18: Multiple turns in the channel influences collision, allision, and grounding risk by increasing the complexity of the transit (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 19: Narrow channel widths influences collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels
 - In proximity to South Jetty (T1/A1)
 - Along South Reach (T4/A2)
 - Along Crossover Channel, and North Reach (T6/A3)
 - along North Channel, Hoquiam Reach, Cow Point Reach, and Aberdeen Reach (T7/A4)
- Factor 21: Submerged jetty extending from South Jetty poses a navigational hazard; vessels transiting the entrance channel may stay north in the channel to give the submerged jetty a wide berth, this could influence collision risk with an outbound vessel (T1/A1)

Currents

- Factor 24: Current effects may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2)

Fishing vessels, fishing gear

- Factor 29: Fishing vessels, including relatively large boats, may not adhere to the channel, and may alter their behavior based on factors that may not be apparent or predictable to commercial vessels transiting in the channel, which may influence collision risk. (T1/A1, T4/A2)
- Factor 30: Fishing vessels may be fishing in the channel, which may influence collision, allision, and grounding risk by creating potential hazards to navigation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 32: Large concentration of fishing vessels heading in/out during season openers, which may influence collision risk with commercial vessels (T1/A1, T4/A2)
- Factor 33: Loss of a large number of crab pots in the channel could influence grounding and allision risk by posing a hazard to navigation that vessels may have to maneuver to avoid. (T1/A1, T2/A1)
- Factor 34: Participants in recreational fisheries may not be familiar with the area, which may influence collision risks. (T1/A1, T4/A2, T6/A3)
- Factor 35: Short fishery openings, combined with predictions of when fisheries will close can encourage fishermen, some of whom may be inexperienced or unfamiliar with the area, to fish regardless of weather or visibility, which may influence collision, allision and grounding risks for commercial vessels by adding traffic and complicating the navigational situation. (T1/A1, T2/A1, T4/A2, T6/A3)
- Factor 36: There are multiple fishing seasons and activity types in Grays Harbor, including commercial, tribal and recreational openings; this may influence collision risk by making it more difficult for pilots, agents, and vessels to maintain awareness of, and be prepared for, fishery openings (T1/A1, T4/A2)

Offshore traffic

- Factor 42: Vessels waiting for berth may loiter offshore as close as 4nm, which may influence collision risk with fishing and recreational vessels and inbound/outbound commercial traffic (T1/A1)

Surveys

- Factor 43: Lack of recent, comprehensive surveys of the area may influence collision and grounding risk because conditions may have changed since the last survey; commercial vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)

Template 2: Area 1, Underway, Allision/Grounding

Area 1: Bar Channel and Entrance Channel to Point Chehalis Reach (inside buoy 11)

Vessel Activity: Underway

Incident Category: Allision/Grounding

How could an incident occur?

- Contact with a buoy, fishing net or crab pot
- Contact with jetty
- Difficulty crossing the bar
- Failure to maintain position in channel
- Failure to negotiate turn to entrance channel
- Ground outside harbor
- Ground outside of entrance channel
- Ground on submerged jetty
- Incident related to vessels offshore, including areas westward of buoy “GH”

Possible immediate causes/contributing factors (examples)

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Aids to navigation

- Factor 1: The effectiveness of some aids to navigation have degraded over time due to a variety of factors, which may influence collision, allision, and grounding risks. These factors include the use of lower intensity lights on some visual aids, a channel realignment project completed in 2015 that resulted in ranges no longer indicating when a vessel was in the center of the channel, and instances of aids to navigation that have degraded or been vandalized, and not been repaired or replaced. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
 - Bar channel range, one structure removed this year
 - Entrance channel range only has one working light
 - Day boards not being maintained
 - South Range A no longer being maintained

Background lighting

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- Factor 7: Background lighting from Westport may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T1/A1, T2/A1, T4/A2)
- Factor 8: High intensity lights on crab/fishing vessels may influence collision, allision, and grounding risk by making it more difficult to see aids to navigation, navigation lights on the boat with the bright lights, or on other vessels around or behind the boat with bright lights (T1/A1, T2/A1, T4/A2)

Bar and approaches

- Factor 14: The effects of the Grays Harbor Bar may be felt between buoys 5 and 9, depending on weather conditions, tide, and current, which may influence collision, grounding, and allision risk by making ship handling more difficult and less predictable (T1/A1, T2/A1)

Channel depth/configuration

- Factor 15: Channel depth may influence collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels (T1/A1, T2/A1, T4/A2)
- Factor 16: Channel may shoal due to sedimentation, which may influence collision, allision and grounding risks for commercial vessels by reducing available depth and width of the channel. Problem may be exacerbated during periods when dredging is not possible due to weather. (T1/A1, T2/A2, T6/A3, T7/A4)
- Factor 17: Grays Harbor is shallow, with little water deep enough for navigation outside of the channel, which may influence collision and grounding risk because ships are constrained to remain within the channel, and could quickly run aground if they exit the channel (T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 18: Multiple turns in the channel influences collision, allision, and grounding risk by increasing the complexity of the transit (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 19: Narrow channel widths influences collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels
 - In proximity to South Jetty (T1/A1)
 - Along South Reach (T4/A2)
 - Along Crossover Channel, and North Reach (T6/A3)
 - along North Channel, Hoquiam Reach, Cow Point Reach, and Aberdeen Reach (T7/A4)
- Factor 20: Rocky bottom in the vicinity of the groins north of Westport and the South Jetty may influence the risk of an oil spill in the event of a grounding. (T2/A1, T4/A2)
- Factor 22: Submerged jetty south of the Entrance Channel may influence grounding risk due to its proximity to the channel (T2/A1)
- Factor 23: The narrowness of the bar channel and entrance channel, combined with the presence of shoal water adjacent to the channel may influence grounding and allision risk because commercial vessels have limited maneuvering room. (T2/A1)

Currents

- Factor 24: Current effects may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2)

Fishing vessels, fishing gear

- Factor 30: Fishing vessels may be fishing in the channel, which may influence collision, allision, and grounding risk by creating potential hazards to navigation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 33: Loss of a large number of crab pots in the channel could influence grounding and allision risk by posing a hazard to navigation that vessels may have to maneuver to avoid. (T1/A1, T2/A1)
- Factor 35: Short fishery openings, combined with predictions of when fisheries will close can encourage fishermen, some of whom may be inexperienced or unfamiliar with the area, to fish regardless of weather or visibility, which may influence collision, allision and grounding risks for commercial vessels by adding traffic and complicating the navigational situation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)

Surveys

- Factor 43: Lack of recent, comprehensive surveys of the area may influence collision and grounding risk because conditions may have changed since the last survey; commercial vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)

Template 3: Area 1, Underway, Structural Failure/Flooding

Area 1: Bar Channel and Entrance Channel to Point Chehalis Reach (inside buoy 11)

Vessel Activity: Underway

Incident Category: Structural Failure/Flooding

How could an incident occur?

- Severe weather conditions while crossing bar

Possible immediate causes/contributing factors (examples)

- Environmental
- Equipment failure
- Human error
- Organization/maintenance failure
- Other

Local factors

Bar and approaches

- Factor 10: A mix of vessel types, with varying ages, designs, and material conditions call on Grays Harbor; older vessels or vessels that have not been well maintained may be more likely to experience structural failure or flooding casualties while crossing the bar. (T3/A1)
- Factor 13: Rough conditions on the bar can increase the risk of structural failure and flooding (T3/A1)

Template 4: Area 2, Underway, Collision/Allision/Grounding

Area 2: Point Chehalis Reach and South Reach to buoys 17/18; North Channel; Westport Marina

Vessel Activity: Underway

Incident Category: Collision/Allision/Grounding

How could an incident occur?

- Contact with a buoy
- Failure to maintain position in channel
- Failure to negotiate turn to South Reach
- Failure to take action to avoid another vessel
- Ground outside of channel

Possible immediate causes/contributing factors (examples)

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Aids to navigation

- Factor 1: The effectiveness of some aids to navigation have degraded over time due to a variety of factors, which may influence collision, allision, and grounding risks. These factors include the use of lower intensity lights on some visual aids, a channel realignment project completed in 2015 that resulted in ranges no longer indicating when a vessel was in the center of the channel, and instances of aids to navigation that have degraded or been vandalized, and not been repaired or replaced. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
 - Bar channel range, one structure removed this year
 - Entrance channel range only has one working light
 - Day boards not being maintained
 - South Range A no longer being maintained

Background lighting

- Factor 7: Background lighting from Westport may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T1/A1, T2/A1, T4/A2)

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- Factor 8: High intensity lights on crab/fishing vessels may influence collision, allision, and grounding risk by making it more difficult to see aids to navigation, navigation lights on the boat with the bright lights, or on other vessels around or behind the boat with bright lights (T1/A1, T2/A1, T4/A2)

Channel depth/configuration

- Factor 15: Channel depth may influence collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels (T1/A1, T2/A1, T4/A2)
- Factor 16: Channel may shoal due to sedimentation, which may influence collision, allision and grounding risks for commercial vessels by reducing available depth and width of the channel. Problem may be exacerbated during periods when dredging is not possible due to weather. (T1/A1, T2/A2, T4/A2, T6/A3, T7/A4)
- Factor 17: Grays Harbor is shallow, with little water deep enough for navigation outside of the channel, which may influence collision and grounding risk because ships are constrained to remain within the channel, and could quickly run aground if they exit the channel (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 18: Multiple turns in the channel influences collision, allision, and grounding risk by increasing the complexity of the transit (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 19: Narrow channel widths influences collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels
 - In proximity to South Jetty (T1/A1)
 - Along South Reach (T4/A2)
 - Along Crossover Channel, and North Reach (T6/A3)
 - along North Channel, Hoquiam Reach, Cow Point Reach, and Aberdeen Reach (T7/A4)
- Factor 20: Rocky bottom in the vicinity of the groins north of Westport and the South Jetty may influence the risk of an oil spill in the event of a grounding. (T2/A1, T4/A2)

Currents

- Factor 24: Current effects may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2)
- Factor 27: Seven rivers flow into Grays Harbor, which can effect current flow in complex and unpredictable ways, which may influence collision, allision, and grounding risk by complicating ship handling (T4/A2, T6/A3, T7/A4, T8/A4)

Fishing vessels, fishing gear

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- Factor 28: Commercial, tribal, and recreational fishing vessels transiting to and from Westhaven Cove may influence collision, allision, and grounding risks for commercial vessels by crossing the deep draft channel at Chehalis Reach or South Reach. (T4/A2)
- Factor 29: Fishing vessels, including relatively large boats, may not adhere to the channel, and may alter their behavior based on factors that may not be apparent or predictable to commercial vessels transiting in the channel, which may influence collision risk. (T1/A1, T4/A2)
- Factor 30: Fishing vessels may be fishing in the channel, which may influence collision, allision, and grounding risk by creating potential hazards to navigation. (T4/A2)
- Factor 31: Fishing nets and derelict fishing gear may influence collision, allision, and grounding risk by posing a hazard to navigation that commercial vessels could have to maneuver around, and by presenting a risk that fishing gear could get caught in a commercial vessels propeller or running gear, resulting in a loss or reduction in propulsion or steering. (T4/A2)
- Factor 32: Large concentration of fishing vessels heading in/out during season openers, which may influence collision risk with commercial vessels (T1/A1, T4/A2)
- Factor 33: Loss of a large number of crab pots in the channel could influence grounding and allision risk by posing a hazard to navigation that vessels may have to maneuver to avoid. (T1/A1, T2/A1, T4/A2)
- Factor 34: Participants in recreational fisheries may not be familiar with the area, which may influence collision risks. (T1/A1, T4/A2, T6/A3)
- Factor 35: Short fishery openings, combined with predictions of when fisheries will close can encourage fishermen, some of whom may be inexperienced or unfamiliar with the area, to fish regardless of weather or visibility, which may influence collision, allision and grounding risks for commercial vessels by adding traffic and complicating the navigational situation. (T1/A1, T2/A1, T4/A2, T6/A3)
- Factor 36: There are multiple fishing seasons and activity types in Grays Harbor, including commercial, tribal and recreational openings; this may influence collision risk by making it more difficult for pilots, agents, and vessels to maintain awareness of, and be prepared for, fishery openings (T1/A1, T4/A2)

Surveys

- Factor 43: Lack of recent, comprehensive surveys of the area may influence collision and grounding risk because conditions may have changed since the last survey; commercial vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer

hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)

Template 5: Area 2, Anchored, Allision/Grounding

Area 2: Point Chehalis Reach and South Reach to buoys 17/18; North Channel; Westport Marina

Vessel Activity: Anchored

Incident Category: Allision/Grounding

How could an incident occur?

- Allision caused by a vessel underway
- Drag anchor/Failure to maintain position in anchorage
- Swing into another vessel while at anchor

Possible immediate causes/contributing factors (examples)

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Anchorage

- Factor 3: Anchorage areas may be full, causing inbound/outbound vessels to stay farther south in channel to avoid anchored vessels, which may influence collision risk by reducing the available water space and maneuvering options for commercial vessels (T1/A1, T5/A2)
- Factor 4: One of three non-designated anchorage areas used by the Grays Harbor Pilots is within the Point Chehalis Reach channel, which may influence allision risk. (T5/A2)
- Factor 5: Currents are strong (up to 5 knots), and there is little depth of water under the keel of anchored vessels, which may influence the risks of dragging, grounding, and allision. (T5/A2)
- Factor 6: High wind speeds are relatively common in Grays Harbor, which may influence the risks of dragging, grounding, and allision (T5/A2)
 - Car carriers and RO-RO vessels are more likely to drag anchor during high winds; these vessels do not usually anchor in Grays Harbor
 - Vessels drag anchor once or twice a winter

Surveys

- Factor 43: Lack of recent, comprehensive surveys of the area may influence collision and grounding risk because conditions may have changed since the last survey; commercial

vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T5/A2, T6/A3, T7/A4, T8/A4)

Template 6: Area 3, Underway, Collision/Allision/Grounding

Area 3: South Reach from buoys 17/18, Crossover Channel, and North Channel to buoy 35; South Channel

Vessel Activity: Underway

Incident Category: Collision/Allision/Grounding

How could an incident occur?

- Contact with a buoy or fishing net
- Failure to maintain position in channel
- Failure to negotiate turns in channel
- Failure to take action to avoid another vessel
- Ground outside of channel

Possible immediate causes/contributing factors

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Aids to navigation

- Factor 1: The effectiveness of some aids to navigation have degraded over time due to a variety of factors, which may influence collision, allision, and grounding risks. These factors include the use of lower intensity lights on some visual aids, a channel realignment project completed in 2015 that resulted in ranges no longer indicating when a vessel was in the center of the channel, and instances of aids to navigation that have degraded or been vandalized, and not been repaired or replaced. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
 - Bar channel range, one structure removed this year
 - Entrance channel range only has one working light
 - Day boards not being maintained
 - South Range A no longer being maintained

Background lighting

- Factor 9: Background lighting at Bowerman airport may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T6/A3, T7/A4)

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Channel depth/configuration

- Factor 15: Channel depth may influence collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 16: Channel may shoal due to sedimentation, which may influence collision, allision and grounding risks for commercial vessels by reducing available depth and width of the channel. Problem may be exacerbated during periods when dredging is not possible due to weather. (T1/A1, T2/A2, T6/A3, T7/A4)
- Factor 17: Grays Harbor is shallow, with little water deep enough for navigation outside of the channel, which may influence collision and grounding risk because ships are constrained to remain within the channel, and could quickly run aground if they exit the channel (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 18: Multiple turns in the channel influences collision, allision, and grounding risk by increasing the complexity of the transit (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 19: Narrow channel widths influences collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels
 - In proximity to South Jetty (T1/A1)
 - Along South Reach (T4/A2)
 - Along Crossover Channel, and North Reach (T6/A3)
 - along North Channel, Hoquiam Reach, Cow Point Reach, and Aberdeen Reach (T7/A4)

Currents

- Factor 24: Current effects may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4, T8/A4)
- Factor 25: Currents can complicate the turn at buoy 21, particularly for inbound ships on a flood current, which may influence collision, allision, and grounding risk. (T6/A3)
- Factor 27: Seven rivers flow into Grays Harbor, which can effect current flow in complex and unpredictable ways, which may influence collision, allision, and grounding risk by complicating ship handling (T4/A2, T6/A3, T7/A4, T8/A4)

Fishing vessels, fishing gear

- Factor 29: Fishing vessels, including relatively large boats, may not adhere to the channel, and may alter their behavior based on factors that may not be apparent or predictable to commercial vessels transiting in the channel, which may influence collision risk. (T1/A1, T4/A2, T6/A3, T7/A4)
- Factor 30: Fishing vessels may be fishing in the channel, which may influence collision, allision, and grounding risk by creating potential hazards to navigation. (T4/A2, T6/A3, T7/A4)
- Factor 31: Fishing nets and derelict fishing gear may influence collision, allision, and grounding risk by posing a hazard to navigation that commercial vessels could have to

maneuver around, and by presenting a risk that fishing gear could get caught in a commercial vessels propeller or running gear, resulting in a loss or reduction in propulsion or steering. (T4/A2, T6/A3, T7/A4)

- Factor 32: Large concentration of fishing vessels heading in/out during season openers, which may influence collision risk with commercial vessels (T1/A1, T4/A2, T6/A3, T7/A4)
- Factor 34: Participants in recreational fisheries may not be familiar with the area, which may influence collision risks. (T1/A1, T4/A2, T6/A3, T7/A4)
- Factor 35: Short fishery openings, combined with predictions of when fisheries will close can encourage fishermen, some of whom may be inexperienced or unfamiliar with the area, to fish regardless of weather or visibility, which may influence collision, allision and grounding risks for commercial vessels by adding traffic and complicating the navigational situation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 36: There are multiple fishing seasons and activity types in Grays Harbor, including commercial, tribal and recreational openings; this may influence collision risk by making it more difficult for pilots, agents, and vessels to maintain awareness of, and be prepared for, fishery openings (T1/A1, T4/A2, T6/A3, T7/A4)

Surveys

- Factor 43: Lack of recent, comprehensive surveys of the area may influence collision and grounding risk because conditions may have changed since the last survey; commercial vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2)
 - Factor 44: Including north of the South Reach channel between buoys 15-21, where vessels sometimes anchor (T6/A3)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)

Template 7: Area 4, Underway, Collision/Allision/Grounding

Area 4: North Channel from buoy 35, Hoquiam Reach, Cow Point Reach and Aberdeen Reach to Weyerhaeuser Company Bay City Log Export, Berths 1 and 2

Vessel Activity: Underway

Incident Category: Collision/Allision/Grounding

How could an incident occur?

- Contact with a buoy
- Contact with bridge, pier, dolphin, log boom, fishing net or crab pot
- Failure to maintain position in channel
- Failure to negotiate turns in channel
- Failure to take action to avoid another vessel
- Ground outside of channel

Possible immediate causes/contributing factors

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Aids to navigation

- Factor 1: The effectiveness of some aids to navigation have degraded over time due to a variety of factors, which may influence collision, allision, and grounding risks. These factors include the use of lower intensity lights on some visual aids, a channel realignment project completed in 2015 that resulted in ranges no longer indicating when a vessel was in the center of the channel, and instances of aids to navigation that have degraded or been vandalized, and not been repaired or replaced. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
 - Bar channel range, one structure removed this year
 - Entrance channel range only has one working light
 - Day boards not being maintained
 - South Range A no longer being maintained

Background lighting

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- Factor 9: Background lighting at Bowerman airport may influence collision, allision, and grounding risk by making it more difficult to see other vessels and navigation aids, and correctly determine other vessel's behavior and intentions (T6/A3, T7/A4)

Channel depth/configuration

- Factor 15: Channel depth may influence collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 16: Channel may shoal due to sedimentation, which may influence collision, allision and grounding risks for commercial vessels by reducing available depth and width of the channel. Problem may be exacerbated during periods when dredging is not possible due to weather. (T1/A1, T2/A2, T6/A3, T7/A4)
- Factor 17: Grays Harbor is shallow, with little water deep enough for navigation outside of the channel, which may influence collision and grounding risk because ships are constrained to remain within the channel, and could quickly run aground if they exit the channel (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 18: Multiple turns in the channel influences collision, allision, and grounding risk by increasing the complexity of the transit (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 19: Narrow channel widths influences collision, allision, and grounding risk by restricting available water space and maneuvering options for commercial vessels
 - In proximity to South Jetty (T1/A1)
 - Along South Reach (T4/A2)
 - Along Crossover Channel, and North Reach (T6/A3)
 - along North Channel, Hoquiam Reach, Cow Point Reach, and Aberdeen Reach (T7/A4)
- Factor 23: Turning basin is relatively small (950 feet north to south, 350 feet along the southwest edge), and is surrounded by shoal water, which may influence grounding risk (T7/A4)

Currents

- Factor 24: Current effects may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4, T8/A4)
- Factor 26: Current can make turns in the turning basin more challenging, which may influence collision, allision, and grounding risk. (T7/A4)
- Factor 27: Seven rivers flow into Grays Harbor, which can effect current flow in complex and unpredictable ways, which may influence collision, allision, and grounding risk by complicating ship handling (T7/A4)

Fishing vessels, fishing gear

- Factor 29: Fishing vessels, including relatively large boats, may not adhere to the channel, and may alter their behavior based on factors that may not be apparent or

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predictable to commercial vessels transiting in the channel, which may influence collision risk. (T1/A1, T4/A2, T6/A3, T7/A4)

- Factor 30: Fishing vessels may be fishing in the channel, which may influence collision, allision, and grounding risk by creating potential hazards to navigation. (T4/A2, T6/A3, T7/A4)
- Factor 31: Fishing nets and derelict fishing gear may influence collision, allision, and grounding risk by posing a hazard to navigation that commercial vessels could have to maneuver around, and by presenting a risk that fishing gear could get caught in a commercial vessels propeller or running gear, resulting in a loss or reduction in propulsion or steering. (T4/A2, T6/A3, T7/A4)
- Factor 32: Large concentration of fishing vessels heading in/out during season openers, which may influence collision risk with commercial vessels (T1/A1, T4/A2, T6/A3, T7/A4)
- Factor 34: Participants in recreational fisheries may not be familiar with the area, which may influence collision risks. (T1/A1, T4/A2, T6/A3, T7/A4)
- Factor 35: Short fishery openings, combined with predictions of when fisheries will close can encourage fishermen, some of whom may be inexperienced or unfamiliar with the area, to fish regardless of weather or visibility, which may influence collision, allision and grounding risks for commercial vessels by adding traffic and complicating the navigational situation. (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 36: There are multiple fishing seasons and activity types in Grays Harbor, including commercial, tribal and recreational openings; this may influence collision risk by making it more difficult for pilots, agents, and vessels to maintain awareness of, and be prepared for, fishery openings (T1/A1, T4/A2, T6/A3, T7/A4)

Surveys

- Factor 43: Lack of recent, comprehensive surveys of the area may influence collision and grounding risk because conditions may have changed since the last survey; commercial vessels could have more or less water space available to them than is shown on the chart (T1/A1, T2/A1, T4/A2, T5/A2, T7/A4)

Tugs/towing

- Factor 45: No dredging is being conducted above the rail bridge, which may influence grounding risk for tugs/barges. (T7/A4)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4)
- Factor 47: Winds sometimes exceed 20 knots in the turning basin, which may influence collision, allision, and grounding risk, particularly for car carriers and RO-RO vessels. (T7/A4)

Template 8: Area 4, Mooring/Unmooring, Collision/Allision/Grounding

Area 4: North Channel from buoy 35, Hoquiam Reach, Cow Point Reach and Aberdeen Reach to Weyerhaeuser Company Bay City Log Export, Berths 1 and 2

Vessel Activity: Mooring/Unmooring

Incident Category: Collision/Allision/Grounding

How could an incident occur?

- Contact with a buoy
- Contact with bridge, pier, dolphin, log boom, fishing net or crab pot
- Failure to maintain position in channel
- Failure to negotiate turns in channel
- Failure to take action to avoid another vessel
- Ground outside of channel
- Hard hit by tug
- Tug miscommunication

Possible immediate causes/contributing factors

- Environmental
- Equipment failure
 - Resulting in full or partial loss of electrical power
 - Resulting in full or partial loss of propulsion
 - Resulting in loss of navigational equipment
 - Resulting in loss of steering
- Human error
- Organization/maintenance failure
- Other

Local factors

Currents

- Factor 24: Current effects may be strong and vary from day to day, which may influence collision, allision, and grounding risk by complicating ship handling, and by effecting the movements of a ship following a loss or reduction in steering or propulsion (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4, T8/A4)
- Factor 27: Seven rivers flow into Grays Harbor, which can effect current flow in complex and unpredictable ways, which may influence collision, allision, and grounding risk by complicating ship handling (T7/A4, T8/A4)

Weather and visibility

- Factor 46: There are periods of reduced visibility throughout the year due to fog (primarily in the summer) and rain (primarily in the fall through spring) as well as longer hours of darkness in the fall and winter, which may influence collision, allision, and grounding risk (T1/A1, T2/A1, T4/A2, T6/A3, T7/A4, T8/A4)

Template 9: Area 4, Moored, Oil Spill

Area 4: North Channel from buoy 35, Hoquiam Reach, Cow Point Reach and Aberdeen Reach to Weyerhaeuser Company Bay City Log Export, Berths 1 and 2

Vessel Activity: Moored

Incident Category: Oil spill during cargo/terminal operations

How could an incident occur?

- Hose/equipment failure during transfer operation
- Transfer system alignment error

Possible immediate causes/contributing factors

- Environmental
- Equipment failure
- Human error
- Organization/maintenance failure
- Other

Local factors

Oil transfers

- Factor 39: Winds in excess of 30 knots are common in winter and can occur throughout the year, which may increase the likelihood of having to secure cargo operations at Terminal 2. (T9/A4)
- Factor 40: Fatigue of vessel crew following the inbound transit and during long (up to 40 hour) transfers can influence oil spill risks. (T9/A4)
- Factor 41: The location and material condition of ship's bunkering connections can vary; which may influence oil spill risks. (T9/A4)

Template 10: Area 4, Moored, Fire/Explosion

Area 4: North Channel from buoy 35, Hoquiam Reach, Cow Point Reach and Aberdeen Reach to Weyerhaeuser Company Bay City Log Export, Berths 1 and 2

Vessel Activity: Moored

Incident Category: Fire/Explosion

How could an incident occur?

- Secondary to another accident
- Electrical fire
- Cargo fire/explosion

Possible immediate causes/contributing factors

- Environmental
- Equipment failure
- Human error
- Organization/maintenance failure
- Other

Local factors

Fire/Explosion

- Factor 37: The nature of materials moved as cargo (e.g., oil, methanol, grain, wood chips) may influence the potential for fire and explosion (T10/A4)
- Factor 38: Municipal fire departments are responsible for responding to a shipboard fire, but may have limited training and experience (T10/A4)

Additional Topics from Hazard Identification Workshop 1

The following topics were discussed during Hazard Identification Workshop 1. While out of scope for the Hazard Identification process, a summary of the discussions is provided for reference.

- Anchorage areas
 - A participant noted that the non-designated anchorage areas used by the Grays Harbor Pilots fall within waterway areas 1 and 2, as defined for the Hazard Identification.
 - A Grays Harbor Pilot participating in the workshop indicated the location of the anchorage areas he typically uses on the chart. He noted that he will normally put up to two vessels at anchor in the winter, and up to four vessels at anchor in the summer.
 - Ecology added the anchorage areas to the waterway figure for Hazard Identification Workshop 2.
- Fishing gear
 - A participant noted that derelict crab pots or nets would be unlikely to have a significant impact on vessels greater than 300 gross tons.
 - Ecology agreed, but commented that there have been instances when a single derelict pot has impacted the maneuverability of large vessels.
- Offshore vessel traffic management and monitoring
 - Vessel arrivals
 - Participants discussed whether it would be possible to have vessels time their arrival to buoy “GH” to coincide with pilot and berth availability.
 - A vessel agent noted that there are contractual issues related to when and where vessels can declare their arrival at the port and availability for loading.
 - Offshore vessel monitoring
 - Participants asked who monitors vessels that are offshore, outside of pilotage grounds and potentially outside of Coast Guard Captain of the Port Zones.
 - Pilots check Automatic Identification System information on a regular basis, for situational awareness of vessels requiring pilotage services.
 - Coast Guard Sector Columbia River has the ability to view offshore vessel traffic information.
 - Marine Exchange and Merchants Exchange operations center staff may check AIS to determine vessel status.
 - A participant noted the recommendation from the West Coast Offshore Vessel Traffic Risk Management Project Final Report (OSTF, 2002) that stated where no other management measure such as Areas to Be Avoided

(ATBAs), Traffic Separation Schemes (TSSs), or recommended tracks already exist, vessels 300 gross tons or larger transiting coastwise anywhere between Cook Inlet and San Diego should voluntarily stay a minimum distance of 25 nautical miles (nm) offshore.

- This recommendation is included in Coast Pilot 7, Chapter 3, California, Oregon, and Washington, Offshore Vessel Traffic Management Recommendations
- Testing and certifying mooring equipment
 - An Ecology participant noted that some vessel owners are testing deck fittings such as bitts to ensure they can withstand expected stresses from tugs while maneuvering and from weather, currents, and passing vessels while moored.
 - It was asked whether terminals test mooring equipment such as bollards and dolphins; participants stated terminals typically do not.
- Tsunami planning
 - A participant stated that a tsunami could cause concerns related to oil spills.
 - A participant from NOAA noted that the Coast Guard is leading an effort to develop a maritime plan for a Cascadia subduction zone earthquake/tsunami event.

Glossary and References

Glossary

Allision – vessel striking a fixed or semi-fixed object such as a pier, bridge, an anchored vessel, or buoy. (adapted from OSTF, 2014)

Anchor – to use the anchor to secure a ship to the sea floor. (National Geospatial-Intelligence Agency, 2017)

Anchorage – an area where vessels may anchor, either because of suitability or designation. (National Geospatial-Intelligence Agency, 2017)

Bulk – a material that is stored or transported in a loose, unpackaged liquid, powder, or granular form capable of being conveyed by a pipe, bucket, chute, or belt system.¹

Cargo Vessel – a self-propelled ship in commerce, other than a tank vessel or a passenger vessel, three hundred gross tons or more, including but not limited to, fishing vessels and freighters.²

Collision – vessels striking each other. (adapted from OSTF, 2014)

Covered vessel – a tank vessel, cargo vessel, or passenger vessel.³

Disabled Vessel – a vessel that needs assistance, whether docked, moored, anchored, aground, adrift, or underway. This does not mean a barge or any other vessel not regularly operated under its own power.⁴

Discharge – any spilling, leaking, pumping, pouring, emitting, emptying, or dumping.⁵

Facility - any structure, group of structures, equipment, pipeline, or device, other than a vessel, located on or near the navigable waters of the state that transfers oil in bulk to or from a tank vessel or pipeline that is used for producing, storing, handling, transferring, processing, or transporting oil in bulk.⁶

Fire/Explosion – uncontrolled ignition of gas or liquid. (adapted from OSTF, 2014)

Fishing Vessel – a vessel engaged in the commercial catching, harvesting or processing of fish, or in tendering to or from vessels that catch, harvest or process fish.⁷

Grounding – vessel striking the waterway bottom with enough force to damage the vessel. (adapted from OSTF 2014)

Flooding – water intrusion into areas on a vessel not intended to hold water. (adapted from OSTF, 2014)

¹ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

² Chapter 317-31 WAC, Cargo and Passenger Vessels--Substantial Risk

³ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

⁴ 46 CFR 10.107, Definitions in Subchapter B

⁵ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

⁶ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

⁷ Chapter 317-31 WAC, Cargo and Passenger Vessels--Substantial Risk

Hazardous Substances – both dry and liquid substances, listed Table 302.4 of 40 C.F.R. Part 302 adopted August 14, 1989, under section 102(a) of the federal comprehensive environmental response, compensation, and liability act of 1980, as amended by P.L. 99-499, including: methanol, ethanol styrene, xylene.⁸

Local Factor – Unique or specific feature of operating commercial vessels in Grays Harbor, such as the channel configuration, hydrographic features, local weather patterns and conditions, tide and current variations, aids to navigation configurations, or local operating practices. The focus for the Hazard Identification process is on local factors that could contribute to an incident resulting in an oil spill by a commercial vessel.

Loss of Electrical Power – failure of the main electrical system to provide power meeting the needs for vessel operation; stopping a vessel while underway to complete repairs of the electrical system is considered a loss of electrical power. (adapted from OSTF, 2014)

Loss of Navigational Equipment – a partial loss of propulsion, steering, electricity, or navigational equipment that results in a vessel being unable to maintain its intended track clear of navigational hazards or other vessels without assistance.⁹

Loss of Propulsion – failure of the propulsion system to propel the vessel as designed; the shutdown of a vessel's propulsion system while underway to complete repairs is considered a loss of propulsion. (adapted from OSTF, 2014)

Loss of Steering – failure of the steering system to control the vessel's heading as designed; stopping a vessel while underway to complete repairs of the steering system is considered a loss of steering. (adapted from OSTF, 2014)

Marine Facility – any facility used for tank vessel wharfage or anchorage, including any equipment used for the purpose of handling or transferring oil in bulk to or from a tank vessel.¹⁰

Mooring – the act of securing a craft to the ground, a wharf, pier, quay, etc. (adapted from National Geospatial-Intelligence Agency, 2017)

Navigable Waters of the State – those waters of the state, and their adjoining shorelines, that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport intrastate, interstate, or foreign commerce.¹¹

Nonpersistent Oil – a petroleum based oil such as gasoline, diesel or jet fuel, which evaporates relatively quickly.¹²

Nonpetroleum Oil – oil of any kind that is not petroleum-based, including but not limited to: Biological oils such as fats and greases of animals and vegetable oils, including oils from seeds, nuts, fruits, and kernels.¹³

⁸ 40 CFR 302

⁹ Vessel Incident Checklist. Washington SPPR Program Evaluation of Vessel Incidents and Emergencies

¹⁰ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

¹¹ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

¹² Adapted from Chapter 173-182 WAC, Oil Spill Contingency Plan

¹³ Adapted Chapter 173-182 WAC, Oil Spill Contingency Plan

Oil – “Oil” as defined in RCW 88.40. (RCW 88.40.011, 1990)

Passenger Vessel – a ship of three hundred or more gross tons with a fuel capacity of at least six thousand gallons carrying passengers for compensation.¹⁴

Persistent Oil – a petroleum based oil that does not meet the requirements of a nonpersistent oil.¹⁵

Severe Weather Conditions – observed nautical conditions with sustained winds measured at forty knots and wave heights measured between twelve and eighteen feet.¹⁶

Ship – any boat, ship, vessel, barge, or other floating craft of any kind.¹⁷

Spill – an unauthorized discharge of oil into the waters of the state.¹⁸

Structural Failure – failure of a structure or structural component, including tank plating or shell. (OSTF, 2014)

Tank vessel – a ship that is constructed or adapted to carry, or that carries, oil in bulk as cargo or cargo residue, and that: operates on the waters of the state, or transfers oil in a port or place subject to the jurisdiction of this state.¹⁹

Underway – vessel underway conducting normal operations. (adapted from OSTF, 2014)

Vessel Emergency – a substantial threat of pollution originating from a covered vessel, including loss or serious degradation of propulsion, steering, means of navigation, primary electrical generating capability, and seakeeping capability.²⁰

¹⁴ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

¹⁵ Adapted from Chapter 173-182 WAC, Oil Spill Contingency Plan

¹⁶ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

¹⁷ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

¹⁸ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

¹⁹ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

²⁰ Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response

References

- American Bureau of Shipping (ABS). (2000). *Guidance Notes on Risk Assessment Applications for the Marine and Offshore Oil and Gas Industries*. June, 2000.
https://ww2.eagle.org/content/dam/eagle/rules-and-guides/current/other/97_riskassessapplmarineandoffshoreoandg/pub97_riskassesment.pdf
- Grays Harbor Safety Committee. (2014). *Grays Harbor Safety Plan*. Revised October 2016.
http://www.portofgraysharbor.com/harbor-safety/downloads/archive/Harbor-Safety-Plan_Grays-Harbor.pdf
- International Maritime Organization. 2002. *Guideline for Formal Safety Assessment (FSA) for use in the IMO Rule-Making Process*. MSC/Circ. 1023, MEPC/Circ. 392. April 2002.
<http://www.safedor.org/resources/1023-MEPC392.pdf>
- International Maritime Organization. 2005. Amendments to the Guidelines for Formal Safety Assessment (FSA) for use in the IMO Rule-Making Process (MSC/Circ. 1023, MEPC/Circ. 392. MSC/Circ. 1180, MEPC/Circ. 474. August 2005.
<http://www.imo.org/en/OurWork/Safety/SafetyTopics/Documents/1180-MEPC474.doc>
- National Geospatial-Intelligence Agency (NGA). (2017) *The American Practical Navigator, Bowditch, Volume 2, 2017 Edition*. 2017. Pub 9.
https://msi.nga.mil/NGAPortal/MSI.portal?nfpb=true&pageLabel=msi_portal_page_62&pubCode=0002
- National Oceanic and Atmospheric Administration (NOAA). (2017). Incident News: T/B Nestucca. Website. Accessed December 6, 2017. <https://incidentnews.noaa.gov/incident/6641>
- National Oceanic and Atmospheric Administration (NOAA). (2017a). *Coast Pilot 7 Pacific Coast: California, Oregon, Washington, Hawaii and Pacific Islands 2017 (49th) Edition*. December 2017. <https://www.nauticalcharts.noaa.gov/publications/coast-pilot/index.html>
- National Oceanic and Atmospheric Administration (NOAA). (2017b). *Chart 18502: Grays Harbor. Westhaven Cove*. February 2017. <http://www.charts.noaa.gov/PDFs/18502.pdf>
- The Pacific States – British Columbia Oil Spill Task Force (OSTF).(2002). *West Coast Offshore Vessel Traffic Risk Management Project Report*. 2002. <http://oilspilltaskforce.org/wp-content/uploads/2013/12/2002-Offshore-Vessels-Risk-Management-Project-Report.pdf>
- The Pacific States – British Columbia Oil Spill Task Force (OSTF).(2014). *Pacific States/British Columbia Oil Spill Task Force Data Dictionary*. Revised 2014. http://oilspilltaskforce.org/wp-content/uploads/2013/08/Data-Dictionary-Revised-2014_FINAL.pdf
- United States Code (42 USC 9601). (1980). *Summary of the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)*. 1980. <https://www.epa.gov/laws-regulations/summary-comprehensive-environmental-response-compensation-and-liability-act>
- Van Dorp, Johan Rene and Merrick, Jason. (2017). *VTRA 2015 FINAL REPORT UPDATING THE VTRA 2010*. Prepared for Washington State Department of Ecology. January 2017.
http://www2.seas.gwu.edu/~dorpjr/VTRA_2015/REPORTS/VTRA%202015%20ECOLOGY%20FINAL%20REPORT%20-%202001_09_17.pdf

Washington Department of Ecology (Ecology). (2015). *Washington State 2014 Marine and Rail Oil Transportation Study*. March 2015. Publication no. 15-08-010.

<https://fortress.wa.gov/ecy/publications/SummaryPages/1508010.html>

Washington Department of Ecology (Ecology). (2016). *2016 Salish Sea Oil Spill Risk Mitigation Workshop Summary Report*. December 2016. Publication no. 17-08-005.

<https://fortress.wa.gov/ecy/publications/documents/1708005.pdf>.

Washington Department of Ecology (Ecology). (2017). *Report to the Legislature on Columbia River Vessel Traffic Evaluation and Safety Assessment (CRVTSA)*. Prepared for Washington Department of Ecology. Prepared by DNV GL. November, 2017. Publication no. 17-08-010.

<https://fortress.wa.gov/ecy/publications/documents/1708010.pdf>