

## 3.17 Vessel Traffic

This section describes vessel traffic in the study area, including characteristics of Grays Harbor and the Grays Harbor Navigation Channel; vessel types, uses, and destinations; vessel traffic; and traffic management. It then describes impacts on vessel traffic that could result under the no-action alternative or as a result of the construction and routine operation<sup>1</sup> of the proposed action. Finally, this section presents any measures identified to mitigate impacts of the proposed action and any remaining significant and unavoidable impacts.

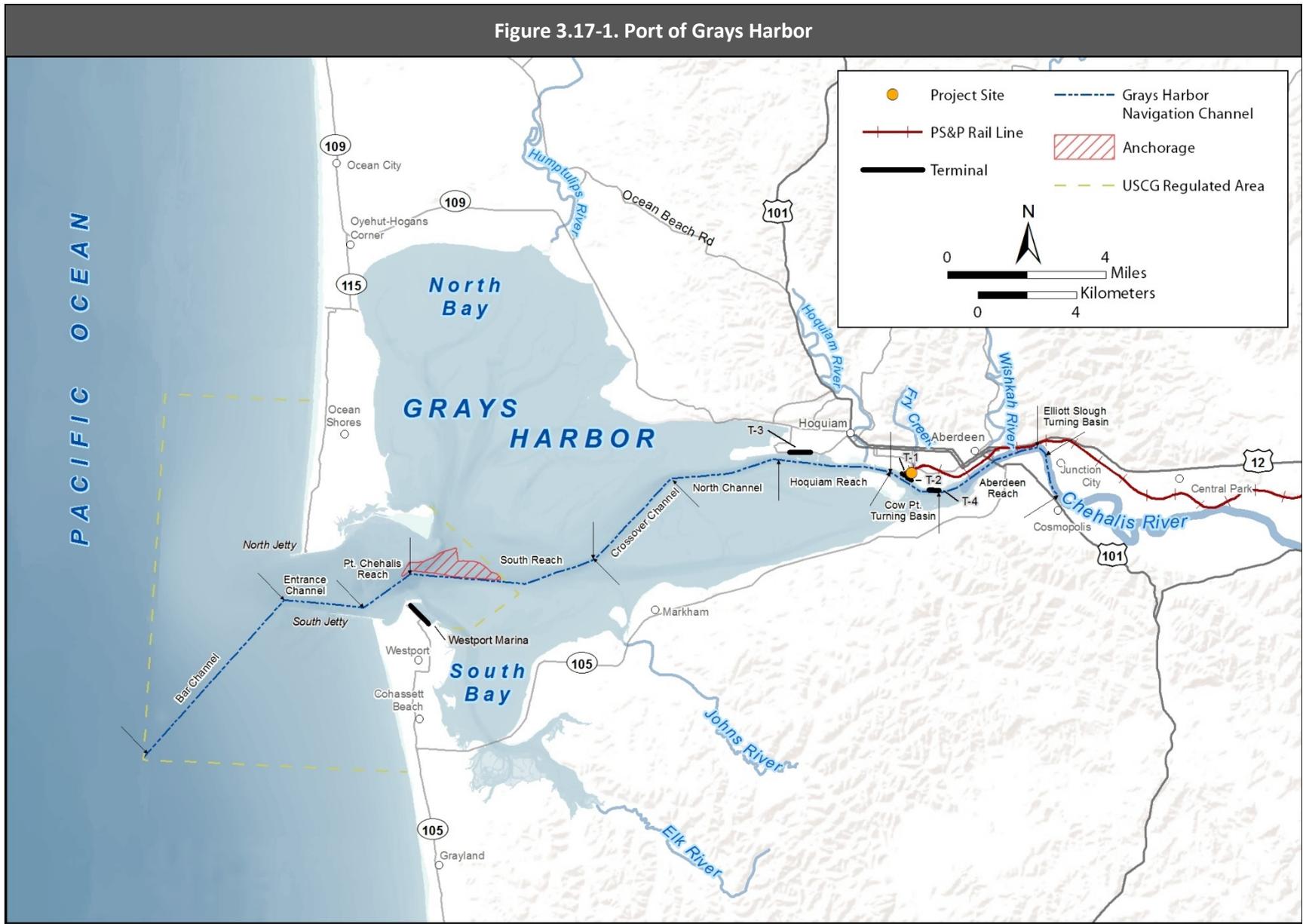
### 3.17.1 What is the study area for vessel traffic?

The study area for vessel traffic consists of the Terminal 1 berth and the entirety of Grays Harbor, including the navigation channel<sup>2</sup> into and out of the harbor out to 3 nautical miles from the mouth of the harbor (Figure 3.17-1). Chapter 5, *Extended Rail and Vessel Transport*, addresses impacts related to vessel transportation beyond this study area.

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<sup>1</sup> Chapter 4, *Environmental Health and Safety*, addresses the potential impacts from increased risk of incidents (e.g., storage tank failures, train derailments, vessel collisions) and related consequences (e.g., release of crude oil). Chapter 4 also addresses impacts related to vessel safety.

<sup>2</sup> The Grays Harbor Navigation Channel provides access for deep-draft vessels to Port of Grays Harbor facilities in the harbor. Nearly 23 nautical miles long, it begins approximately 4 miles offshore, runs in a predominantly easterly direction past Westport, Hoquiam, and Aberdeen, and ends at Cosmopolis near the mouth of the Chehalis River. The depth of the channel is maintained by the U.S. Army Corps of Engineers.



### 3.17.2 What laws and regulations apply to vessel traffic?

Laws and regulations for determining potential impacts on vessel traffic are summarized in Table 3.17-1. More information about these laws and regulations is provided in Appendix B, *Laws and Regulations*.

**Table 3.17-1. Laws and Regulations for Vessel Traffic**

Laws and Regulations	Description
<b>Federal</b>	
Ports and Waterways Safety Act of 1972 (31 U.S.C. 1221 et seq.)	Authorizes the U.S. Coast Guard to provide for navigation and vessel safety; protect the marine environment; and protect life, property, and structures in, on, or immediately adjacent to the navigable waters of the United States.
Port and Tanker Safety Act of 1978 (33 U.S.C. 1221 et seq.)	Grants the U.S. Coast Guard broad and extensive authority to supervise and control all types of vessels, foreign and domestic, operating in U.S. navigable waters.
Navigation and Navigable Waters, Subchapter E: Inland Navigation Rules (33 CFR 83-90)	Apply to all vessels on the inland waters of the United States and complement the International Regulations for Preventing Collisions at Sea 1972, which are applicable in International Waters.
Federal Pilotage Requirements (46 CFR 15.610 and 15.812)	Identifies the type of vessels that require a federally licensed master or mate and identifies federal pilotage requirements for U.S.-inspected vessels on coastwise voyages. <sup>a</sup>
<b>State</b>	
Washington State Pilotage Act (RCW 88.16)	Establishes requirements for compulsory pilotage provisions in certain waters of the state, including Grays Harbor.
<b>Local</b>	
No local laws or regulations apply to vessel traffic.	
<p><sup>a</sup> A coastwise voyage by sea is a voyage in which a U.S.-flagged vessel proceeds from one port or place in the United States to another port or place in the U.S. while engaged in trade (46 CFR 46.05-15). U.S.C. = United States Code; CFR = Code of Federal Regulations; RCW = Revised Code of Washington</p>	

### 3.17.3 How were impacts on vessel traffic evaluated?

This section describes the sources of information and methods used to evaluate impacts.

#### 3.17.3.1 Information Sources

Information about vessel traffic in the study area, including characteristics of Grays Harbor and the navigation channel; vessel types, uses, and destinations; vessel traffic; and traffic management was obtained from the following sources.

- *Vessel Traffic Impact Analysis for Westway and Imperium* (WorleyParsons 2014).
- Nautical charts and data on observed water levels at tidal station 9441102 in Westport, Washington (National Oceanic and Atmospheric Administration 2014a).
- National Oceanic and Atmospheric Administration. 2014b. *U.S. Coast Pilot 7 Pacific Coast*. 2014 (46th Edition). August 31, 2014.
- U.S. Army Corps of Engineers (USACE) Waterborne Commerce Statistics Center (U.S. Army Corps of Engineers 2014b).

- *Navigation Improvement Project General Investigation Feasibility Study, Grays Harbor, Washington* (U.S. Army Corps of Engineers 2014).
- *Washington State 2014 Marine and Rail Oil Transportation Study* (Washington State Department of Ecology 2014, 2015).
- Laws and regulations granting the U.S. Coast Guard authority to provide for navigation and vessel safety in navigable waters of the United States.
- *Harbor Safety Plan for Grays Harbor* (Grays Harbor Safety Committee 2014).
- Personal communication with Port of Grays Harbor (Port) pilots and staff.
- Information on commercial, recreational, and tribal fishing obtained from the Washington Department of Fish and Wildlife and the Quinault Indian Nation.
- Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment Final Report (Pacific Northwest Rail Coalition 2011).

### 3.17.3.2 Impact Analysis

The vessel traffic analysis evaluated the capacity of the navigation channel, Terminal 1 berth, and pilot and escort tugs relative to the increase in large commercial vessel trips<sup>3</sup> under the proposed action, and potential conflicts of these vessels with smaller recreational and fishing vessels in the harbor.

- **Channel capacity.** The channel capacity analysis was completed by first determining existing and future traffic related to large commercial vessels<sup>4</sup> (2017 and 2037) without the proposed action. Future vessel traffic was determined by applying moderate compound annual growth rates to vessel trips associated with the present commodity volumes shipped from the Port. The growth rates used for commercial product forecasts were 1.2% for forest products (including wood chips), 0.7% for food and farm products, 3.9% for manufactured equipment (machinery and auto), and 6.8% for chemicals (e.g., methanol). Forecast volumes of vegetable oil and biofuels were kept constant.

The channel capacity analysis compared forecast vessel trips to the navigable windows available for these vessels to assess whether the capacity of the navigation channel would be exceeded on an annual basis with the addition of traffic anticipated under the proposed action. The channel capacity analysis considered a mix of vessel types for transport of crude oil under the proposed action and channel capacity constraints under three channel depth scenarios.

- **Berth capacity.** The berth capacity analysis compared berth occupancy at Terminal 1 under the proposed action to berth availability. Berth occupancy times for tank barges and tankers, 24 and 48 hours, respectively, account for vessel/barge docking, preloading activities (e.g., Declaration of Security, Declaration of Inspection, possible U.S. Coast Guard inspections, oil spill prevention measures, vessel inspection by surveyor), loading<sup>5</sup> of product, gauging of vessel holds by

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<sup>3</sup> In the EIS, a trip also means a pilotage assignment or job.

<sup>4</sup> The channel capacity analysis considers the large commercial vessels, which are restricted to the navigation channel due to the depth of their drafts.

<sup>5</sup> Loading rates, as identified in the applicant's Notice of Construction Application (Trinity Consultants 2015), would vary between 10,000 and 20,000 barrels per hour. Based on these loading rates, a tank barge with a 150,000-barrel capacity would require between 7.5 and 15 hours to load; a tanker with a 360,000-barrel capacity would require between 18 and 36 hours to load.

surveyor, and preparation for departure (e.g., hose retraction, taking on of stores). Additionally, the tanker estimate accounts for time that may be needed to wait for an ideal tidal window for transit.

- **Pilot and tug capacity.** The pilots and tug analysis was completed by qualitatively assessing whether the potential increase in demand for state-licensed pilots and escort tugs could be met with the pilots and tugs currently under contract with the Port.
- **Conflicts with recreational and fishing vessels.** Potential conflicts of large commercial vessels with smaller recreational and fishing vessels in the harbor were evaluated by determining the extent of traffic related to these smaller vessels in the harbor (number of vessels, nature, geographic extent, and timing of operations) and qualitatively assessing the extent of the disruption to these vessel operations because of large commercial vessel traffic within the navigation channel.

### 3.17.4 What vessel traffic currently occurs in the study area?

Vessel traffic in the study area includes a mix of large commercial vessels and smaller fishing (commercial, tribal, and recreational) and recreational vessels. Depending on the type of operation, the vessel traffic in the study area varies in intensity, both geographically and seasonally. This section describes existing vessel traffic and navigational considerations, including the vessel traffic management system.

#### 3.17.4.1 Grays Harbor

Grays Harbor is a large, naturally formed bay on the west coast of Washington State. It is an estuary fed by multiple rivers and creeks, the most significant being the Chehalis River. Offshore, extending approximately 2 miles from the mouth of the bay is an entrance bar<sup>6</sup> composed of sand and silt, which is subject to the effects of tide, current, and ocean forces. The bay enclosed in Grays Harbor is filled by many shoals<sup>7</sup> and flats, some of which are bare at low water and are cut by numerous channels. Grays Harbor experiences semidiurnal tides, meaning that it has two uneven tidal cycles each day (two high tides and two low tides). The harbor has two jetties at its entrance approximately 1.17 nautical miles (7,120 feet) apart (Figure 3.17-1). The two jetties were originally constructed from 1889 to 1913 for harbor navigation.

The entrance bar, coupled with strong and sometimes erratic currents, can present a navigational challenge to vessels entering or leaving Grays Harbor. Periods of limited visibility due to fog, rain, or darkness can add to this challenge. Submerged sections of the north and south jetties at the harbor entrance extend seaward about 0.2 and 0.9 mile, respectively. Hazardous breakers can occasionally be present near these jetties, especially during periods of heavy weather (National Oceanic and Atmospheric Administration 2014b:459).

Figure 3.17-1 shows the navigation channel through Grays Harbor and out to the Pacific Ocean, identifying individual reaches and Port terminals.

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<sup>6</sup> A bar is a large mass of sand or earth, formed by the surge of the sea. Bars located at the entrance of a harbor often render navigation extremely dangerous, but confer tranquility once inside.

<sup>7</sup> Shoals are an accumulation of sand and silt that reduce the depth of the navigation channel for transiting vessels.

### 3.17.4.2 Large Commercial Vessels

Large commercial vessels traveling in Grays Harbor call at facilities maintained by the Port or at privately owned wharfs located farther east (Figure 3.17-2). Bulk exports (especially shipments of grain, soybeans, and other agricultural products) are the largest volume of commodity handled at Port facilities (Washington State Department of Ecology 2015). The Port terminals, terminal operators, vessels, and products transported are described below (Grays Harbor Safety Committee 2014:9; National Oceanic and Atmospheric Administration 2014b:462; U.S. Army Corps of Engineers 2012:74, 156).

- Terminal 1 is a bulk liquid storage and marine and rail transfer facility. It has one deepwater berth and access to the Puget Sound & Pacific Railroad (PS&P) rail line. The applicant and Imperium Terminal Services receive tank vessels transporting bulk liquids.
- Terminal 2 is a loading facility for both dry and bulk liquid products and is served by the Port's loop track. Ag Processing, Inc. receives dry-cargo vessels transporting bulk agricultural materials (e.g., grain).
- Terminal 3 is a 150-acre industrial site with vessel and rail access. This terminal is currently unoccupied; it the proposed site of a Grays Harbor Rail Terminal development. Willis Enterprises receive dry-cargo vessels transporting wood products.
- Terminal 4 is the largest of the four terminals. It is a storage and transfer facility with two deepwater berths and on-dock rail service. Terminal 4 serves as the primary terminal for automobiles, logs, and bulk cargo.

Most of the large commercial vessels operating in Grays Harbor comprise the following types of vessels.

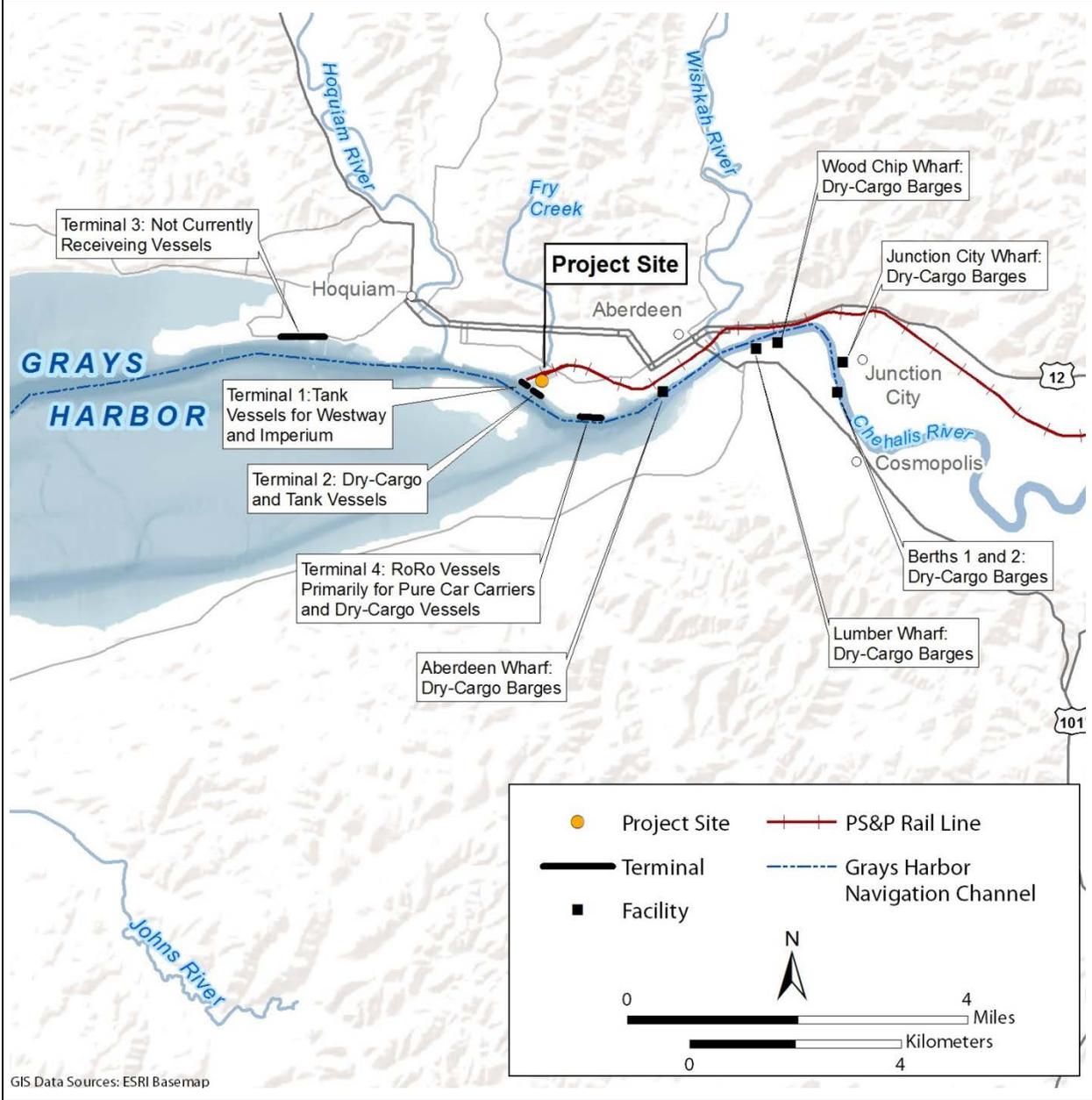
- **Tank vessels** carry bulk liquids, including oil, methanol, nontoxic vegetable oils, and biodiesel. They consist of self-propelled **tankers** and **tank barges** that require an escort tug.
- **Cargo vessels** carry grain, wood, and other dry projects. They consist of self-propelled **cargo ships**, **cargo barges** that require a tug, and **RoRo vessels** (roll-on/roll-off) that carry wheeled vehicles (Figure 3-17-3). In this document, the term *cargo vessel* refers to vessels carrying dry cargo only (not liquid cargo).

All of the large commercial vessels, except for the cargo barges, are considered deep-draft<sup>8</sup> vessels. Because of their draft depths, these vessels are restricted in their ability to maneuver in Grays Harbor area and are limited to transit in the navigation channel and at the Port terminal berths. The shallower-draft cargo barges are not restricted to the navigation channel and can travel to locations at the mouth of the Chehalis River and further upstream (see Section 3.17.5.2, *Proposed Action*, for further discussion of typical tank vessels and their design drafts).

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<sup>8</sup> Vessel draft is the vertical distance between the water line and the bottom of the vessel.

Figure 3.17-2. Sources of Large Commercial Vessel Activity in the Study Area



**Figure 3.17-3. Typical Large Commercial Vessels Using Grays Harbor**



**Tanker**

Primary use: bulk liquid transfer  
Deadweight tonnage: 53,100 metric tons  
Capacity: 320,000 barrels  
Length: 612 feet; Breadth: 106 feet



**Tank Barge**

Primary use: bulk liquid transfer  
Deadweight tonnage: 20,000 metric tons  
Capacity: 155,000 barrels  
Length: 604 feet; Breadth: 75 feet



**Cargo Ship**

Primary use: dry bulk cargo  
Deadweight tonnage: 43,000 metric tons  
Length: 656 feet; Breadth: 105 feet



**Cargo Barge**

Primary use: dry bulk cargo  
Deadweight tonnage: 11,000 metric tons  
Length: 512 feet; Breadth: 85 feet



**RoRo Vessel (Cargo Ship)**

Primary use: automobiles  
Deadweight tonnage: 11,760 metric tons  
Length: 600 feet; Breadth: 103 feet



**Commercial Fishing Vessel**

Primary use: fishing  
Deadweight tonnage: 100–2,000 metric tons  
Length: 82–262 feet; Breadth: 20–40 feet

Source: WorleyParsons 2014

## Large Commercial Vessel Operations

This section describes the operational considerations relevant to large commercial vessels in the study area.

### Vessel Operator and Crew Responsibilities

The vessel operator is responsible for scheduling—in advance of the vessel arriving at the Port—all activities associated with navigation, berthing, vessel safety, and security while in Grays Harbor. The vessel operator procures the state-licensed pilot through the Port consistent with applicable federal and state regulations, if required (Federal Pilotage Requirements 46 Code of Federal Regulations [CFR] 15.610 and 16.812 and Washington State Pilotage Act Revised Code of Washington [RCW] 88.16). The role of the Port, pilots, and the Port's tenants and vessel agents in facilitating large commercial vessel traffic in Grays Harbor is further described in Section 3.17.4.4, *Vessel Traffic Management*.

The vessel operator also contracts with an approved ship's stevedore<sup>9</sup> to handle the vessel side of the operations during vessel loading and unloading. The ship's crew handles all of the underway tasks, including berthing and departure activities, under the direction of the pilot and or ship's master. The crew is also responsible for maintaining the anchor watch when a vessel is anchored in Grays Harbor. When the incoming or outgoing vessel is a laden tank barge, it is escorted by a tug according to harbor safety guidelines; the escort tug's captain brings the vessel all the way to the terminal (WorleyParsons 2014).

### Tug Services

The Port provides various services such as pilotage, ship assistance (with tugs), line handling, and terminal stevedoring (WorleyParsons 2014) to large commercial vessels operating in the study area. The Port has a contract with Brusco Tug & Barge through 2016 for tug escorting and docking services; the contract specifies requirements for bollard strength and engine capacity.

Brusco Tug & Barge has three harbor tugs stationed in Grays Harbor that are exclusively available for commercial vessel assistance in the harbor. These three tugs manage the escorts required for the current numbers and types of commercial vessels transiting Grays Harbor. One of the tugs is a highly maneuverable Z-drive tug<sup>10</sup> with a towing power of more than 100,000 pounds and a fire monitor. It has an installed tank to carry foam for spraying from the fire monitor, if necessary. The other two tugs are highly maneuverable ship-assist tugs. An additional Z-drive tug with the same capabilities that belongs to Grays Harbor is currently operating on the Columbia River. Should operations change to require the second Z-drive tug to remain on standby within the harbor, it would be transferred to Grays Harbor (Campbell pers. comm. [A]).

The Z-drive tug is capable of leaving Grays Harbor to assist a disabled or damaged vessel at sea and to provide fire-fighting support. The Z-drive tug currently operating on the Columbia River could provide the same assistance; travel time would be approximately 12 hours from its current station on the Columbia River. Additionally, the emergency response towing vessel at Neah Bay, located at the far northwest corner of Washington State, is available to assist vessels off the coast of

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<sup>9</sup> Stevedores (longshore workers) connect hoses for bulk liquid transfer operations and provide assistance for vessels at the terminal.

<sup>10</sup> A Z-drive tug is so named because of the appearance of the mechanical transmission used to connect the driving energy to the thruster device.

Washington and in Puget Sound. It could assist with vessels in a difficult situation in or near Grays Harbor. Under normal weather conditions, it could take an average of 12 hours to reach the harbor. Under adverse weather conditions, transit time to Grays Harbor could be as much as 18 hours.

### **Anchorage Areas**

Incoming vessels may be anchored near the entrance to Grays Harbor while awaiting a vessel to leave Terminal 1 or to transit through the navigation channel. Vessels may also be anchored after loading if entrance bar conditions are not suitable for immediate transit seaward. Vessel anchorage areas are located just inside the harbor, as shown on Figure 3.17-1.

Anchorage areas available in Grays Harbor for commercial vessels are frequently reevaluated and assigned through a joint effort assessment by the pilots, the U.S. Coast Guard, and USACE. The pilots and the U.S. Coast Guard monitor conditions at the anchorage areas based on their daily observations while navigating Grays Harbor and the continuously updated sounding data for Grays Harbor and its navigation channel, which they receive from USACE (WorleyParsons 2014). The current deep-draft vessel anchorage areas can accommodate three large deep-draft vessels with adequate capacity for the vessel to swing on the anchor in response to wind or currents (D'Angelo pers. comm.). The Grays Harbor Safety Plan includes standards of care for anchorage operations (Grays Harbor Safety Committee 2014).

### **Grays Harbor Navigation Channel**

The navigation channel provides access for deep-draft vessels to Port facilities in the harbor. Nearly 23 nautical miles long, it begins approximately 4 miles offshore, runs in a predominantly easterly direction past Westport, Hoquiam, and Aberdeen, and ends at Cosmopolis near the mouth of the Chehalis River. The bar area outlined by yellow lines in Figure 3.17-1 is the Regulated Navigation Area established by the U.S. Coast Guard. Grays Harbor has a complex navigation route due to the bar at the entrance, a constrained channel, and limited depth. Constrained by shoals and flats, the navigation channel narrows to 0.6 mile wide with a number of turns where course changes are required (Washington State Department of Ecology 2015). USACE is responsible for maintaining the navigation channel by periodically dredging and removing obstructions. The depths at which USACE maintains the channel reaches are referred to as project depths. Because of shoaling, actual channel depths may vary considerably from project depths between maintenance dredging. Shoaling in the middle of the channel restricts a vessel's draft, while shoaling along the edges of the channel can affect vessel squat<sup>11</sup> and the ability of vessels to pass in the channel. The following sections describe the terms used for channel depths in this analysis.

The following navigation rules (Inland Navigation Rules, Rules 9, 13, and 18) apply to the navigation channel, which gives tankers and tank barges the right-of-way within the channel (WorleyParsons 2014).

- A vessel of less than 20 meters in length, a sailing vessel, or a vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.
- A vessel shall not cross a narrow passage or fairway if such crossing impedes the passage of a vessel that can safely navigate only within such channel or fairway.

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<sup>11</sup> Vessel squat is the tendency of a vessel to draw more water astern (i.e., behind or toward the rear of the vessel) when it is moving through a water body. The streamlines of return flow are speeded up under the ship. This causes a drop in the pressure, resulting in the ship dropping vertically in the water and, effectively, increasing draft.

- In a narrow channel or fairway, any overtaking has to be permitted by the vessel being overtaken.
- All sailing, fishing vessels and power-driven vessels shall keep out of the way of a vessel restricted in her ability to maneuver.

### **2014 Controlling Depths**

The National Oceanic and Atmospheric Administration is responsible for maintaining navigational charts. Periodic surveys by USACE and the National Oceanic and Atmospheric Administration determine the actual or *controlling* depth of water in the navigation channel at the time of the survey. Controlling depths are the depths that dictate the maximum draft of vessels (based on the minimum depths of the water). Controlling depths for each reach (section) of the navigation channel, based on surveys from December 2013 and corrected through August 2014, are presented in Table 3.17-2. According to the latest surveys, there is a substantial difference between the project or design depth (described below) of the navigation channel and the actual surveyed depth, referring to as controlling depth, in some reaches.<sup>12</sup> Based on the latest surveys, the Crossover Channel Reach, with a controlling depth of 27 feet mean lower low water (MLLW), is currently limiting vessel draft in Grays Harbor. Therefore, 27 feet MLLW represents the 2014 controlling depth.

### **2014 Project Depth**

Each reach (section) of the navigation channel has project dimensions (depth, width, height), as authorized by Congress. Project dimensions for each reach of the navigation channel are presented in Table 3.17-2. Project depths range from 46 feet MLLW in the Bar Channel Reach to 36 feet MLLW in the North Channel, Hoquiam, and Cow Point Reaches. Vessels traveling between the Bar Channel Reach and terminals are limited by the shallowest reach of the navigation channel. Therefore, 36 feet MLLW represents the 2014 project depth.

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<sup>12</sup> For example, a controlling channel depth of 27 feet mean lower low water (MLLW) in the middle half of the Crossover Channel Reach of the navigation channel (Table 3.17-2) is 9 feet less than the federally authorized project depth of 36 feet MLLW. Controlling depths in the middle half of the North Channel and Hoquiam Reaches of the navigation channel (Figure 3.17-1) are 6 feet and 4 feet less than the project depth, respectively.

**Table 3.17-2. Port of Grays Harbor Navigation Channel Controlling Depths and Project Dimensions**

Channel Reach	Controlling Depths at MLLW (feet)			Project Dimensions		
	Left Outside Quarter	Middle Half	Right Outside Quarter	Width (feet)	Length (nautical miles)	Depth MLLW (feet)
Bar Channel	45	46	46	1,000	4.6	46
Entrance Channel	35	41	30	900-600	1.8	42
Pt. Chehalis Reach	37	35	28	600	1.2	40
South Reach	29	35	35	600-350	4.1	36
Crossover Channel	22	27	23	350-450	2.5	36
North Channel	27	30	23	450-350	2.4	36
Hoquiam Reach	19.	32	26	350	1.9	36
Cow Point Reach	24	36	33	350-900	1.8	36
Aberdeen Reach	18	22	26	550-200	2.6	32
Turning Basin	30	29	23	200-550	0.3	32
Thence to Cosmopolis	23	25	27	200	0.8	32

MLLW = mean lower low water

**2017 Project Depth**

The USACE Seattle District recently completed a General Investigation Feasibility Study (U.S. Army Corps of Engineers 2014a:21) at the request of the Port to investigate deepening the navigation channel to a legislatively authorized depth of 38 feet MLLW. The project would deepen the navigation channel to a new project depth of 38 feet MLLW between South Reach and Cow Point Reach. Dredging for channel deepening is anticipated to occur between 2016 and 2017. Upon completion of the project, the limiting depth for the transit between the Bar Channel Reach and Port terminals would be 38 feet MLLW. Therefore, 38 feet MLLW represents the 2017 project depth.

**Channel Depth Constraints**

Channel depth constraints must be considered when large commercial vessels navigate the channel. Pilots are responsible for knowledge of local conditions, including channel depth and tides, and must account for changes in conditions when guiding vessels through the harbor. Vessel operators planning to transit Grays Harbor must consider many factors when planning arrival times to ensure there is sufficient water under the ship’s keel<sup>13</sup> at all times to keep the vessel from touching the bottom. To prevent vessel grounding, the pilot and vessel operator must know the vessel’s maximum draft (accounting for vessel squat), margins of safety for under-keel clearance, and the anticipated depth of the water in the navigation channel (based on charted depths and tidal corrections). Each of these considerations is discussed further below.

**Vessel Draft**

Vessel draft is the vertical distance between the water line and the bottom of the keel (Figure 3.17-4). Drafts for large commercial vessels vary depending on the vessel and degree that

<sup>13</sup> The keel runs in the middle of the ship, from the bow to the stern and serves as the primary source of structural strength of the hull.

the vessel is loaded or in ballast.<sup>14</sup> Cargo vessels tend to have a deeper draft than cargo barges. Tankers such as the Panamax-size vessels accommodated in Grays Harbor tend to have a deeper draft than tank barges. In addition to vessel type, vessel loading is a primary determinant of vessel draft, with fully or partially loaded vessels having deeper drafts than empty vessels.

### ***Vessel Squat***

Vessel squat describes the tendency of a ship to sink vertically toward the seabed when it is moving through shallow water or a channel. Vessel squat increases the draft of the vessel and reduces under-keel clearance. Figure 3.17-4 shows that at 0 feet of tide height, a deep-draft vessel actually has less under-keel clearance due to squat as the vessel moves through the navigation channel. The effect of squat in the figure is represented by a 1-foot vertical drop and an overall reduction in under-keel clearance by that same amount. Ship speed is a main factor for vessel squat.

### ***Under-Keel Clearance***

Under-keel clearance is the vertical distance between the deepest point of the vessel's hull and the seabed (Figure 3.17-4). When entering Grays Harbor, an under-keel clearance of 10% after squat is recommended to ensure sufficient water under the keel and reduce the risk of vessel grounding (D'Angelo pers. comm.). For example, if the vessel's maximum draft is 33 feet, an additional 3.3 feet of water should be maintained under the keel, meaning the channel depth would need to be no less than 36.3 feet deep to accommodate safe passage of the vessel.

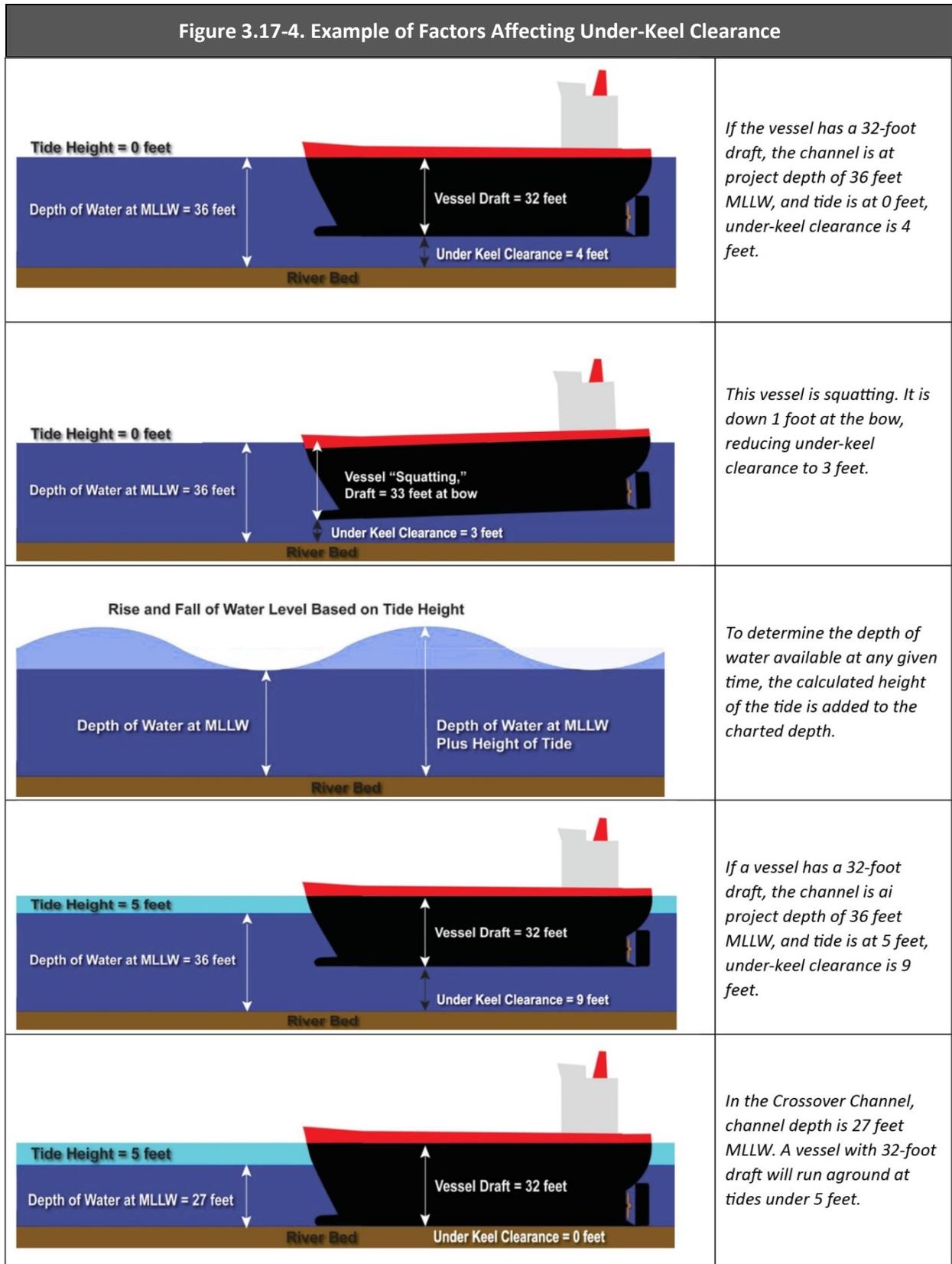
### ***Tidal Influences on Channel Depth***

Grays Harbor experiences two high tides and two low tides each day of different heights. Water depth on the charts (nautical maps) and surveys for the west coast is referenced in terms of MLLW.<sup>15</sup> To determine the depth of water available at any given time, the calculated height of the tide is added to the number listed on the chart. For example, if the chart lists the depth at 36 feet and the current height of the tide is 5 feet, the depth of water at that time and place would be 41 feet. Figure 3.17-4 shows that when a vessel with 32 feet of draft transits a channel that is 36 feet deep during a tide height of 5 feet, there are 9 feet of clearance under the keel. Because the tide is in a near-constant state of ebb and flow, the pilot and vessel operator must plan the vessel transit with knowledge of the level of the tide at all points along the intended route.

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<sup>14</sup> Vessels *in ballast* have had their tanks loaded with seawater to increase vessel stability.

<sup>15</sup> Mean lower low water (MLLW) is the average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch. The number of navigable windows available at a tidal elevation equal to or more than 8 feet includes windows available at tidal elevations equal to or more than 9 and 10 feet. Therefore, the number of navigable windows declines with increasing tidal elevation. While an estimated 1,627 navigable windows per year occur when the tide is 4 or more feet MLLW, only an estimated 21 navigable windows per year occur when the tide is 10 or more feet MLLW.



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## Navigable Windows and Maximum Vessel Draft

Entry into Grays Harbor by large commercial vessels is scheduled and arranged by the Port and pilots. Pilots consider factors such as tides, weather, channel depth, pier availability, and vessel type when preparing to enter a port. It takes approximately 2 hours for vessels to transit the navigation channel between the entrance buoy (3 nautical miles from the mouth of the harbor) and Terminal 1. Grays Harbor experiences two high tides and two low tides each day of different heights. According to the U.S. Coast Pilot 7, the mean rise of the tide in Grays Harbor is about 9 feet (National Oceanic and Atmospheric Administration 2014b:259).<sup>16</sup>

Transit by deep-draft vessels through the navigation channel is typically planned when tidal elevations are close to high tides. This provides an additional measure of safety because the distance between the bottom of the ship and the bottom of the channel is greater. Pilots scheduled most deep-draft vessel transits (between 74 and 94% over 8 years, from 2005 to 2012) through the navigation channel when tidal elevations were at 5 feet or above MLLW (U.S. Army Corps of Engineers 2014a:21).

Table 3.17-3 summarizes the number of 2-hour windows, referred to as navigable windows, available at tidal elevations between 4 and 10 feet, based on monthly tidal data for 2012 for the Westport tidal station (National Oceanic and Atmospheric Administration 2014c).

**Table 3.17-3. Number of Navigable Windows per Year by Tidal Elevation**

	Tidal Elevation (feet MLLW)						
	≥4	≥5	≥6	≥7	≥8	≥9	≥10
Navigable windows per year <sup>a</sup>	1,627	1,274	904	593	298	102	21

<sup>a</sup> Navigable (2-hour) windows are cumulative. For example, the number of navigable two-hour windows available at a tidal elevation of ≥8 feet, includes windows available at tidal elevations ≥9 feet and ≥10 feet. MLLW = mean lower low water

Table 3.17-4 describes limitations on vessel draft during transit through the navigation channel at tidal elevations between 4 and 10 feet, under three channel depth scenarios.

- 2014 controlling depth: 27 feet MLLW
- 2014 project depth: 36 feet MLLW
- 2017 project depth: 38 feet MLLW

Channel depth is the primary limitation for transiting deep-draft vessels, because it establishes the maximum depth of water available within the range of tidal elevation. For each combination of tidal elevation and channel depth, the depth of water available in the channel is calculated, as well as the maximum vessel draft that could transit the channel. The estimated maximum vessel draft able to transit the channel is conservative, and accounts for tidal influences, vessel squat, and a 10% margin of safety for under-keel clearance, as described in *Channel Depth Constraints*. Actual maximum vessel draft able to navigate the channel at each channel depth and tidal elevation may vary from

<sup>16</sup> To estimate the frequency that vessels with varying drafts would be able to navigate the channel under different channel conditions, the number of navigable windows and maximum vessel draft were estimated for each tidal elevation between 4 and 10 feet above MLLW, using 2012 tidal heights.

what is described in Table 3.17-4, depending on actual channel conditions at the time of transit and specifications of the transiting vessel.

**Table 3.17-4. Maximum Vessel Draft by Tidal Elevation and Channel Depth**

Channel Condition	Tidal Elevation (feet)						
	≥4	≥5	≥6	≥7	≥8	≥9	≥10
<b>2014 Controlling Depth (27 feet MLLW)</b>							
Water depth (feet) <sup>a</sup>	31	32	33	34	35	36	37
Maximum vessel draft (feet) <sup>b</sup>	27	28	29	29.5	30	31	32
<b>2014 Project Depth (36 feet MLLW)</b>							
Water depth (feet) <sup>a</sup>	40	41	42	43	44	45	46
Maximum vessel draft (feet) <sup>b</sup>	35	36	37	38	39	39.5	40
<b>2017 Project Depth (38 feet MLLW)</b>							
Water depth (feet) <sup>a</sup>	42	43	44	45	46	47	48
Maximum vessel draft (feet) <sup>b</sup>	37	38	39	39.5	40	41	42

<sup>a</sup> Water depth equals the channel depth at MLLW + tidal elevation.

<sup>b</sup> Maximum vessel draft accounting for vessel squat and a 10% margin of safety for under-keel clearance.

MLLW = mean lower low water

These tables show that as vessel draft increases, the number of navigational windows available for transiting Grays Harbor decreases. For example, at the current controlling depth, vessels with a 32-foot draft require a tidal elevation of 10 feet or more. This amount of water is available only 21 times a year. However, pilots may find greater flexibility at the time of navigation, based on current conditions and expert knowledge of local waters.

Under the 2014 project depth of 36 feet MLLW or 2017 project depth of 38 feet MLLW, maximum vessel draft at each tidal elevation increases (Table 3.17-4), providing more navigable windows for deeper-draft vessels.

### Large Commercial Vessel Traffic

Recent trends in large commercial vessel traffic at the Port were considered over a 5-year period from 2008 to 2012 (U.S. Army Corps of Engineers 2014b). Over this period, there were 1,448 cargo vessel trips and 67 tank vessel trips.<sup>17</sup>

Table 3.17-5 details annual cargo vessel trips by vessel draft. Over this 5-year period, cargo barge trips declined by 77%, while cargo ships trips roughly doubled.

<sup>17</sup> A trip represents one-way travel; in other words, an inbound trip and an outbound trip are counted as two trips.

**Table 3.17-5. Distribution of Cargo Vessel Trips by Vessel Draft (2008–2012)**

Vessel Draft (feet)	Cargo Barge Trips						Cargo Ship Trips <sup>a</sup>					
	2008	2009	2010	2011	2012	Total	2008	2009	2010	2011	2012	Total
0–5	209	103	89	145	37	583	0	0	0	0	0	0
6–9	16	3	0	3	5	27	2	0	0	0	12	14
10–12	37	30	28	15	16	126	3	0	0	0	27	30
13–14	18	6	9	10	10	53	26	8	0	0	10	44
15–17	12	2	0	0	0	14	2	0	1	0	0	3
18–20	0	0	0	0	0	0	12	8	19	12	6	57
21–23	0	0	0	0	0	0	18	22	27	12	28	107
24–26	0	0	0	0	0	0	2	13	24	32	31	102
27–29	0	0	0	0	0	0	7	6	15	28	40	96
30–32	0	0	0	0	0	0	10	6	20	10	14	60
33–35	0	0	0	0	0	0	18	12	15	13	11	69
36–38	0	0	0	0	0	0	5	10	10	6	15	46
39–40	0	0	0	0	0	0	0	1	1	2	13	17
<b>Total</b>	<b>292</b>	<b>144</b>	<b>126</b>	<b>173</b>	<b>68</b>	<b>803</b>	<b>105</b>	<b>86</b>	<b>132</b>	<b>115</b>	<b>207</b>	<b>645</b>

Source: U.S. Army Corps of Engineers 2014b

<sup>a</sup> This source uses the term *dry-cargo*; includes RoRo vessels.

Table 3.17-6 summarizes annual tank vessel trips by vessel draft. Over the 5-year period, 65 of the 66 trips were made by tankers.

**Table 3.17-6. Distribution of Tank Vessel Trips by Vessel Draft (2008–2012)**

Vessel Draft (feet)	Tank Barge Trips						Tanker Trips					
	2008	2009	2010	2011	2012	Total	2008	2009	2010	2011	2012	Total
15–17	0	0	0	1	0	1	0	0	0	2	0	2
18–20	0	0	0	0	0	0	1	1	0	7	0	9
21–23	0	0	0	0	0	0	3	3	1	3	0	10
24–26	0	0	0	0	0	0	5	0	1	6	0	12
27–29	0	0	0	0	0	0	4	1	1	5	4	15
30–32	0	0	0	0	0	0	4	1	0	4	0	9
33–35	0	0	0	0	0	0	3	2	0	0	2	7
36–38	0	0	0	0	0	0	0	1	0	1	0	2
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>20</b>	<b>9</b>	<b>3</b>	<b>28</b>	<b>6</b>	<b>66</b>

Source: U.S. Army Corps of Engineers 2014b

Table 3.17-7 summarizes annual vessel trips by vessel type and ranges of vessel draft over the 5-year period. Vessel data were summarized for three ranges of vessel drafts: less than 21 feet, 21 to 32 feet, and more than 32 feet. These ranges in vessel draft represent different levels of navigational flexibility. Under current channel conditions, vessels that have drafts under 21 feet have minimal navigational constraint; vessels that have drafts between 21 and 32 feet are likely to find navigable windows, especially at higher tidal elevations; and vessels that have drafts deeper than 32 feet would be highly constrained.

An average of 290 trips were made by cargo vessels each year, compared to an average of 13 trips annually by tank vessels. Cargo vessels typically had a shallower draft than tank vessels. Approximately 66% of cargo vessels had drafts less than 21 feet, but 69% of tank vessels had drafts between 21 and 32 feet. There were an average of 26 trips per year by cargo vessels with drafts more than 32 feet, and an average of only two tank vessel trips per year with drafts more than 32 feet.

Overall, 1,515 trips were recorded over the 5-year period: 96% cargo vessel trips and 4% tank vessel trips. Of all vessel trips, approximately 64% were by vessels with drafts less than 21 feet, 27% by vessels with drafts between 21 and 32 feet, and 9% by vessels with drafts over 32 feet.

Comparing the actual number of trips (Table 3.17-7) to the estimated number of navigable windows by vessel draft confirms that the assumptions of this analysis are conservative. For example, 41 trips were made by vessels with drafts of more than 32 feet in 2012 compared to an estimated 21 navigable windows per year.

**Table 3.17-7. Vessel Trips by Year, Vessel Type, and Vessel Draft (2008–2012)**

Vessel Type or Draft	Trips by Year					Total	Avg/yr
	2008	2009	2010	2011	2012		
<b>Cargo Vessels by Type<sup>a</sup></b>							
Barge	292	144	126	173	68	803	161
Ship	105	86	132	115	207	645	129
<b>Total</b>	<b>397</b>	<b>230</b>	<b>258</b>	<b>288</b>	<b>275</b>	<b>1,448</b>	<b>290</b>
<b>Cargo Vessels by Draft</b>							
<21 feet	337	160	146	185	123	951	190
21–32 feet	37	47	86	82	113	365	73
> 32 feet	23	23	26	21	39	132	26
<b>Tank Vessels by Type</b>							
Tank barge	0	0	0	1	0	1	<1
Tanker	20	9	3	28	6	66	13
<b>Total</b>	<b>20</b>	<b>9</b>	<b>3</b>	<b>29</b>	<b>6</b>	<b>67</b>	<b>13</b>
<b>Tank Vessels by Draft</b>							
< 21 feet	1	1	0	10	0	12	2
21–32 feet	16	5	3	18	4	46	9
> 32 feet	3	3	0	1	2	9	2
<b>All Vessels by Type</b>							
Cargo barges and tank barges	292	144	126	174	68	804	161
Cargo ships and tankers	125	95	135	143	213	711	142
<b>Total</b>	<b>417</b>	<b>239</b>	<b>261</b>	<b>317</b>	<b>281</b>	<b>1,515</b>	<b>303</b>
<b>All Vessels by Draft</b>							
< 21 feet	338	161	146	195	123	963	193
21–32 feet	53	52	89	100	117	411	82
> 32 feet	26	26	26	22	41	141	28

Source: U.S. Army Corps of Engineers 2014b

<sup>a</sup>This source uses the term *dry-cargo*; includes RoRo vessels.

### 3.17.4.3 Fishing and Recreational Vessels

Fishing and recreational vessels are much smaller than the large cargo ships and tank vessels already discussed and can move about the harbor without being restricted to the navigation channel because of their shallower drafts. Recreational and tribal fishing are addressed in more detail in Section 3.10, *Recreation*, and Section 3.12, *Tribal Resources*, respectively.

#### Commercial Fishing Operations

Commercial fishing in the study area includes gillnetting<sup>18</sup> and crabbing. Commercial salmon gillnetters harvest an average of 4,700 coho and 2,000 chum annually (Scharpf pers. comm.). For Grays Harbor and Chehalis River, state regulations set strict rules and fishing schedules on commercial gillnetting. Commercial fishers are restricted to drift gillnet use where the fisher deploys the net from the bow or stern of the fishing vessel perpendicular to the navigation channel.

<sup>18</sup> Drift nets only.

Fishers attempt to deploy gillnets to cover as much of the channel as possible to maximize catch. The net is allowed to drift with the currents, sweeping the channel for fish. Fishers need to actively monitor the net and need to be prepared to adjust the net position in the channel to avoid known hazards (e.g., logs, shallow bars, and potentially other vessels).

Commercial regulations for Grays Harbor limit gillnet soak times (from when the net first enters water to when it is completely removed) to less than 45 minutes (Washington Department of Fish and Wildlife 2014a). At the end of a drift, the fisher retrieves the net, removing fish at the same time. As reference, information from the Quinault Indian Nation (2015:11) reports time to retrieve a net between 5 minutes at the quickest to 2 hours if the net is loaded with fish.

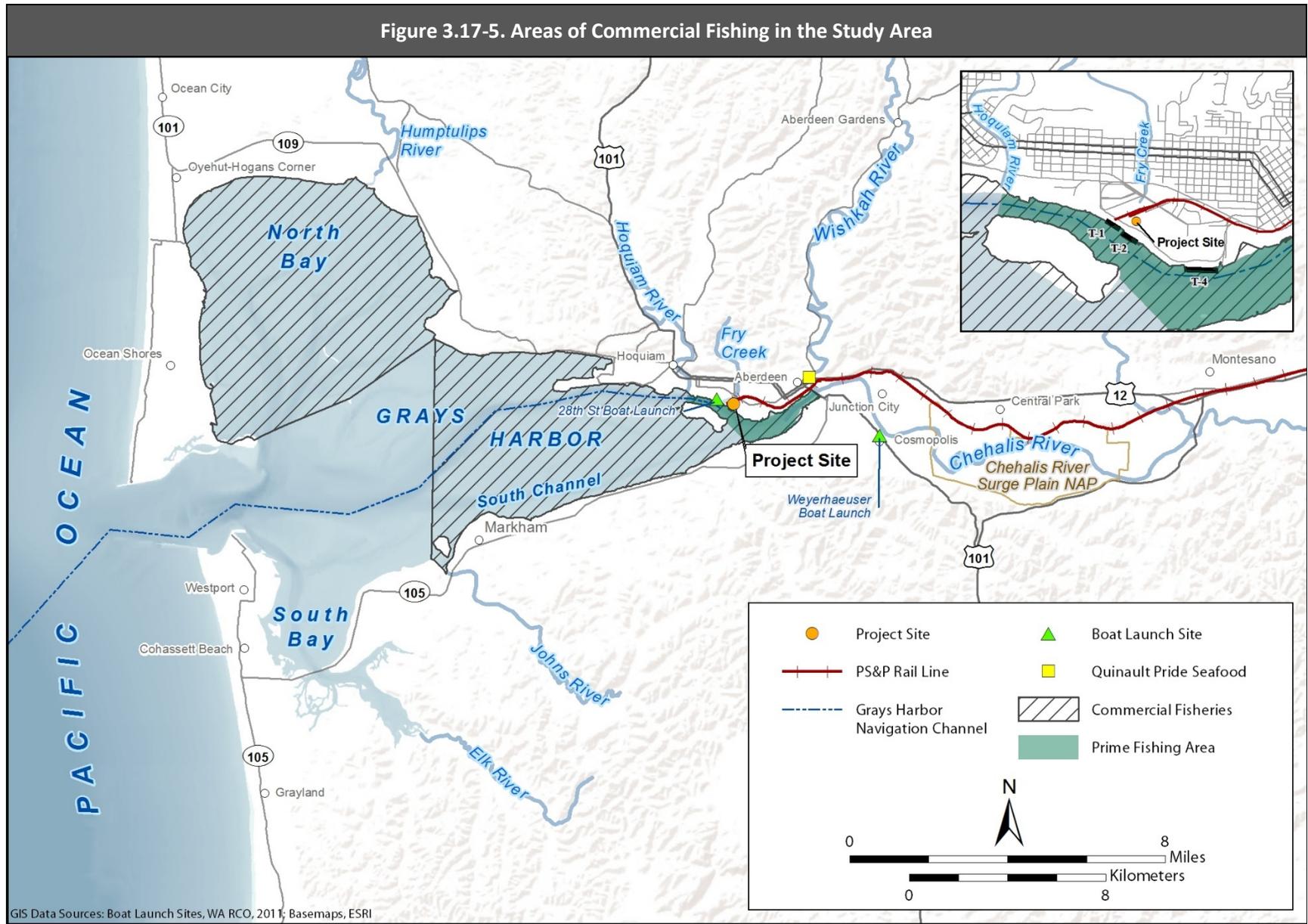
The commercial gillnet fishing period occurs in the fall (September through November) on permissible days and times in designated areas in the harbor and river (Salmon—Grays Harbor Fall Fishery, WAC 220-36-023). Approximately 15 to 25 boats participate each year up to 5 days per week during the open season (Scharpf pers. comm.) During the open season, permitted areas for commercial gillnetting in the harbor include North Bay and the eastern half of Grays Harbor (Figure 3.17-5). Permitted commercial gillnetting in the Chehalis River occurs from the harbor to the extent shown on Figure 3.17-5, during the same open fishing season as Grays Harbor. However, most commercial fishing occurs in the navigation channel from the Hoquiam River east (Scharpf pers. comm.). The South Bay and central portion of the harbor have been closed to commercial gillnetting since 2005 because of its impacts on Grays Harbor chum and Chehalis River-origin fall Chinook (Washington Department of Fish and Wildlife 2013). Although this area has been closed to commercial fishing for years and is not anticipated to be reopened in the near future, this area could be reopened if salmon stocks increase in numbers (Scharpf pers. comm.).

Commercial crabbing occurs along the Washington coast and in Grays Harbor. Over 200 licensed Washington commercial crab fishers participate during the crabbing season (Washington Department of Fish and Wildlife 2015), which is managed by the state. In Grays Harbor, the commercial crabbing season typically runs from December 1 through September 15 (Washington Department of Fish and Wildlife 2015). Unlike gillnetting, all areas of Grays Harbor are permitted for commercial crabbing. Nontreaty commercial crab harvests in Grays Harbor vary annually and have averaged approximately 91,000 pounds per year between 1997 and 2014 (Washington Department of Fish and Wildlife 2014b).

### **Commercial Fishing Boat Launches and Marinas**

The following marinas and public boat launches at the harbor service commercial fishing vessels. The Westport Marina, on the southern peninsula near the entrance to Grays Harbor (Figure 3.17-5), houses more than 200 commercial fishing vessels, including 26 tribal fishing boats, and numerous recreational boats. The marina consists of 21 floats with moorage space for 650 charter, commercial, and sport-fishing vessels (for vessels up to 200 feet). The marina is known as Washington State's largest fish-landing port and, in addition to mooring, provides many boating and fishery services, including loading and fuel docks, a public boat launch, boat manufacturing and repair services, shore-side seafood processing, support service facilities, and fishing supplies.

The Ocean Shores Marina is located on the northern peninsula near the entrance to Grays Harbor but is not currently maintained or open to the public. Additionally, commercial fishing vessels access the harbor via the 28th Street Boat Launch (adjacent to the project site) and the Weyerhaeuser Boat Ramp in Cosmopolis (along the Chehalis River).



## Commercial Fishing and Recreational Vessel Traffic

Although there can be as many as 400 or more commercial, tribal and recreational vessels in the harbor during peak fishing times (Scharpf pers. comm.), fishing activities are highly seasonal and occur primarily in the fall with the highest point in September. Commercial and recreational boaters are not limited to the navigation channel and must obey the navigational rules (Inland Navigation Rules 33 CFR 83) to give way to the larger commercial vessels that are limited in their ability to maneuver. All vessels fishing in the navigation channel may have to move gillnets out of the way or risk damage or loss. Under existing conditions, this disruption occurs primarily in the fall during the fall salmon run. In addition, ocean-fishing vessels may use the navigation channel to transport their catch to the harbor. Fishing and recreational vessels move throughout the harbor differently than large commercial vessels. To lessen the danger of hazardous conditions during incoming or outgoing tides, bar crossings are often timed during slack high or low tides, whereas large commercial vessels tend to navigate through the channel when tidal elevations are more than 5 feet.

### 3.17.4.4 Vessel Traffic Management

The Port, pilots, and the U.S. Coast Guard are responsible for vessel traffic management in Grays Harbor. Currently, the Port uses an informal vessel management and tracking system for Grays Harbor. The Port monitors and controls vessel movements by routinely communicating with the vessel operators, pilots, and terminals to schedule berths, pilots, and other resources for all arriving and departing vessels. The U.S. Coast Guard is responsible for establishing navigation rules and for vessel safety in U.S. waters.

The Port, the pilots, the Board of Pilotage Commissioners (state), the U.S. Coast Guard, and port tenants work together to manage large commercial vessels. There are federal requirements for notification to the U.S. Coast Guard and state requirements for notification to state agencies in the case of any commercial vessel problems that could lead to accidents (46 CFR 4.05-1 and 4.05-2 and WAC 173-303 and 173-182).

U.S. Coast Guard and Washington state inspectors board commercial vessels regularly to check for documentation and certificates, and to inspect the material condition of the vessel to identify problems. When a vessel, domestic or foreign, is in waters of the United States, the Ports and Waterways Safety Act (33 U.S.C. 1221-1232) bestows significant authority on the Coast Guard Captain of the Port to provide for the protection and security of vessels, harbors, and waterfront facilities. Under 33 CFR 6.04-1 and 6.04-8 the Captain of the Port is authorized to control the movement of vessels within the Captain of the Port zone whenever such action is necessary to prevent damage or injury to a vessel, waterfront facility, or waters of the United States.

Within Grays Harbor, the Port, pilots, and port tenants communicate daily by radio and in regular stakeholder meetings to manage large commercial vessel traffic. Pilots, escort tugs, and captains of commercial vessels and barges inside Grays Harbor communicate using radio channels or sound signals. Commercial vessels and barges are required to maintain watch and carry a properly working radio with backup, in addition to understanding and having the capability to produce sound signals and tones to communicate different meanings.

An automatic identification system antenna is in place at Westport and is used by the Merchant Exchange of Puget Sound, Merchant Exchange of Portland, Pacific Merchant Shipping Association, and the Columbia River Steamship Association to receive data about vessel movements. Members of

these organizations, including pilots, can receive real-time information about vessel movements in Grays Harbor for their use. The Port of Grays Harbor and the applicant are not listed as members (Marine Exchange of Puget Sound 2016). The Port of Grays Harbor does not have a formal vessel traffic management system that monitors the vessel traffic picture in Grays Harbor in real time.

### **Port of Grays Harbor and Washington State Pilots**

The Port is involved when vessels call at berths owned and operated by the Port. The Port and Washington State-licensed pilots work closely together when managing vessel movements. The Port's tenants and vessel agents are responsible for providing safe and operationally reliable vessels and commodity information to the Port that directly affects both of the Port's and pilot's traffic management decision-making (WorleyParsons 2014).

Federal and state regulations identify pilotage requirements for vessels in Grays Harbor. The pilot is responsible for supporting the vessel's captain and itinerary to and from the entrance to Grays Harbor, requesting adequate escort tug services, and navigating the vessels in the channel.

- For foreign-flagged vessels, including oil tankers, a state-licensed pilot is required.
- For U.S.-flagged vessels there is a requirement for either a federal- or state-licensed pilot. For U.S.-flagged oil tankers operating between U.S. ports, a federally licensed pilot is required. While a state-licensed pilot is typically used in Grays Harbor for these vessels, it is not required.<sup>19</sup> U.S.-flagged tank barges (including articulated tank barges) operating between U.S. ports also require a federally licensed pilot but not a state-licensed pilot.

The vessel's agent contacts the Port's on-duty pilot. There are two state-licensed pilots at the Port. The vessel's agent provides the pilot with information on vessel characteristics such as size, condition, and the cargo being transported. The pilot then makes an initial assessment of the vessel to schedule the vessel movements and escort tug assistance. The assessment is based on the vessel's physical characteristics and condition, propulsion, commodity type, other known vessel calls, escort tug requirements and availability, forecasted weather, and environmental and tidal conditions, among other factors (WorleyParsons 2014). The pilot announces vessel arrivals and departures on VHF Channels 13 and 16 after boarding an inbound vessel near the entrance buoy and an outbound vessel at the terminal respectively; these calls are made each time a pilot moves a vessel, including when departing anchor and shifting berths. Unless a state pilot is requested by the vessel agent, the captain of a U.S.-flagged barge traveling along the coast is authorized to fulfill these functions. Pilots and ship captains continually reassess environmental conditions and equipment needs before bringing a vessel into Grays Harbor. When approaching Grays Harbor, the vessel calls the pilot over a designated VHF radio channel. Even as the pilot is transported to board the vessel, the pilot assesses the environment and vessel and decides if conditions are safe to bring the vessel in or if additional tug assistance is needed (WorleyParsons 2014). The pilot is responsible for managing tugs.

### **U.S. Coast Guard**

The local the U.S. Coast Guard station in Grays Harbor (Coast Guard Station Grays Harbor) has authority over the area ranging from Queets River on the Washington coast south to the Long Beach

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<sup>19</sup> RCW 88.16 requires a state-licensed pilot on any registered U.S. flagged oil tanker of 5,000 gross tons or greater operating between U.S. ports for Puget Sound and the Columbia River.

Peninsula, including Willapa Bay. The station has four vessels that perform search-and-rescue missions and has the capability and authority to carry out law enforcement activities within its jurisdiction (U.S. Coast Guard 2015). The station is under the direction of the Captain of the Port for Sector Columbia River, a unit located in Warrenton, Oregon and part of the Thirteenth Coast Guard District.

The Captain of the Port has the authority to close the bar at Grays Harbor if the weather conditions are too severe for vessels to transit. If the entrance to the Port is closed due to weather conditions, the Port, the U.S. Coast Guard, and state-licensed pilots coordinate ship logistics until the Captain of the Port reopens the entrance (WorleyParsons 2014).

The U.S. Coast Guard is also responsible for establishing and enforcing Inland Navigation Rules (33 CFR 83), which applies to all vessels in Grays Harbor and off the coast of the U.S. The Rules of the Road are meant to facilitate safe maritime travel. All vessels, including recreational and commercial, are required to understand and comply with the Rules of the Road. The U.S. Coast Guard works with USACE to determine the navigation channel's physical characteristics, which dictate local rules such as speed, passing clearances, and anchorage locations.

### 3.17.5 What are the potential impacts on vessel traffic?

This section describes the impacts on vessel traffic that could occur in the study area. Potential impacts of the no-action alternative are described first as a baseline for comparing the potential impacts of the proposed action.

#### 3.17.5.1 No-Action Alternative

Under the no-action alternative, the applicant would continue to operate its existing facility as described in Chapter 2, Section 2.1.3.2, *Existing Operations*. Although the proposed action and related vessel traffic would not occur, it is assumed that growth in the region would continue under the no-action alternative. Large commercial vessel traffic is projected to increase over time in response to anticipated growth. The impacts of this projected increase (unrelated to the proposed action) on berth capacity, channel capacity, and commercial fishing are discussed below. The potential impacts on recreational and tribal fishing are discussed in Section 3.10, *Recreation*, and Section 3.12, *Tribal Resources*, respectively.

#### Channel Capacity

Under the no-action alternative, large commercial vessel trips are projected to increase between 2017 and 2037 due to increased trade of commodities, as shown in Table 3.17-8. Cargo vessel trips are projected to increase from 292 to 368 between 2017 and 2037, while tank vessel trips are projected to increase from 46 to 68 over the same period. Total large commercial vessel trips are projected to increase from 338 in 2017 to 436 in 2037 (Table 3.17-8).

**Table 3.17-8. Forecast Number of Large Commercial Vessel Trips through Grays Harbor—  
No-Action Alternative**

Type of Vessel	Trips <sup>a</sup>	
	2017	2037
Cargo vessels		
Ship	220	276
Barge	72	92
Tank vessels		
Tankers and tank barges	46	68
<b>Total</b>	<b>338</b>	<b>436</b>

<sup>a</sup> A trip represents one-way travel; in other words, an inbound trip and an outbound trip are counted as two trips.

Similar to current conditions, a mix mainly cargo vessels and some tank vessels (tankers and tank barges) would be the likely vessel types transporting cargo to the Port terminals and further inland along the Chehalis River.

Cargo barges traveling to destinations at the mouth of the Chehalis River or further inland are forecast to account for approximately 21% of total large commercial vessel trips through Grays Harbor in 2017 (Table 3.17-8). These vessels would likely have drafts between 0 and 17 feet, consistent with vessel data reported between 2008 and 2012 (Table 3.17-5).

Up to half of the cargo ships and tank vessel trips would be made by vessels in ballast, assuming that they are in ballast on either the inbound or the outbound trip. Vessels transiting in ballast would have a shallower draft than vessels laden with cargo. Using vessel data (U.S. Army Corps of Engineers 2014a), ballasted vessels are expected to operate at a draft of less than 27 feet.

Based on these assumptions, it is estimated that a substantial proportion (approximately 61%) of the vessel trips under the no-action alternative would be made by vessels that draft less than 27 feet. As described for existing conditions, these vessels are minimally constrained by tidal elevations at any of the three channel depths considered in this analysis.

The remaining vessel trips (approximately 39%) are projected to be laden cargo ships and tank vessels (with drafts between 27 and 39 feet). Pilots schedule most transits of these vessels when tidal elevations are at 5 feet or above MLLW (U.S. Army Corps of Engineers 2014a:21). As described for existing conditions, 1,274 navigable windows are available each year at these tidal elevations, which far exceeds the total number of annual vessel trips projected for the no-action alternative in 2017 (338 trips) and 2037 (436 trips).

Although navigational windows become more restricted at drafts of 30 feet and more under the 2014 controlling depth (or 39 and 40 feet under the 2014 and 2017 project depths, respectively), vessel operators are able to make choices that influence vessel draft to increase navigational opportunities. For example, a vessel operator may choose to use a shallower-draft vessel to ensure greater navigational flexibility or use a larger vessel (or a more heavily laden vessel) for economic or other reasons and time the trip according to accommodate the more restricted opportunities.

Because the number of navigable windows when tidal elevations are at 5 feet (1,274) or more far exceeds the total number of forecast vessel trips in 2017 (338 trips) or 2037 (436 trips), the channel capacity would not be exceeded under the no-action alternative.

## Berth Capacity

Berth capacity at Terminal 1, or its availability for vessel calls, is a function of operational downtime, facility storage and production, ideal tidal conditions for vessel movement, adverse weather conditions, and maintenance. Berth availability is distinct from berth utilization. Berth utilization is the amount of time the berth is actually occupied by a vessel, while berth availability refers to the amount of time that the berth is available for occupancy. Consistent with standard industry best practices for bulk liquid terminals, the average annual operational berth downtime when a berth is unavailable for use is around 10%. In other words, a berth is available up to 90% of the time. This equates to 328 days per year that the Terminal 1 berth would be available to receive vessel calls. As long as the anticipated number of vessel calls to Terminal 1 do not require more than 90% berth availability, the Terminal 1 berth capacity is more than adequate for growth under the no-action alternative (WorleyParsons 2014).

Vessels calling at Terminal 1 to load bulk liquids would be either tank barges or tankers. The operational assumption is that a tank barge would occupy the berth for 24 hours, accounting for plant start-up, prebooming,<sup>20</sup> production, and closedown, before the berth becomes available again. A tanker would occupy the berth for 48 hours (conservatively), accounting for the same berthing conditions but a longer berth occupancy time, which would include waiting for an appropriate tide window for turning and exiting (WorleyParsons 2014). Under the no-action alternative, up to approximately 34 vessels would call at the Terminal 1 berth, which would result in approximately 58 days of berth occupancy<sup>21</sup> of the available 328 days. Therefore, berth capacity would not be exceeded under the no-action alternative.

## Pilot and Tug Capacity

Under the no-action alternative, the total number of trips by large commercial vessels is forecast to reach 338 trips in 2017 and 436 trips in 2037. The Port currently employs three state-licensed pilots, which allows two pilots to be on duty at any given time. Foreign-flagged ships and U.S. vessels engaged in foreign trade are required to use a state-licensed pilot by law. While not required, many U.S. vessels engaged in coastwise trade also use a state-licensed pilot on a voluntary basis, or as a matter of company policy because of the state-licensed pilot's expertise and experience guiding vessels in local waters.

Even if all large commercial vessels hired a state-licensed pilot to navigate to and from the Port under the no-action alternative, this would result in a maximum of 436 annual assignments, or approximately 145 annual assignments for each of the three state-licensed pilots employed by the Port. Under this scenario, each state-licensed pilot would pilot vessels to or from the Port a maximum of 145 days out of 365 days, which would not exceed the capacity of state-licensed pilots to pilot large commercial vessels in Grays Harbor.

Brusco Tug & Barge has three harbor tugs stationed in Grays Harbor that are exclusively available for commercial vessel assistance within the harbor. These three tugs are sufficient to escort the projected large commercial vessel traffic transiting Grays Harbor. Therefore, the availability of

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<sup>20</sup> Deploying containment booming equipment or alternative measures.

<sup>21</sup> Assumes 16 tankers related to 2017 activities (32 days), and 1 tanker (2 days) and 10 tank barges (10 days) related to 2037 activities, and 7 tankers related to 2017 activities (14 days) at the adjacent Imperium Terminal Services facility.

state-licensed pilots and tugs is not anticipated to limit the number of vessels transiting the navigation channel under the no-action alternative.

### Conflicts with Commercial Fishing

Under the no-action alternative, large commercial vessel trips in the navigation channel are projected to increase from 338 in 2017 to 436 in 2037 (Table 3.17-8). This traffic could slightly increase the potential for impacts on commercial fishing compared to existing conditions. However, as noted in Section 3.17.4.3, *Fishing and Recreational Vessels*, and shown in Figure 3.17-5, no major access points for fishing and recreational vessels would be close enough to be affected by large commercial vessel traffic under the no-action alternative. Additionally, although vessels would occupy the berth more frequently, the potential impacts related to vessel traffic would be limited to the time required for a vessel to move through the navigation channel (approximately 2 hours one way).

### 3.17.5.2 Proposed Action

This section describes the impacts that could occur in the study area as a result of construction and routine operation of the proposed action. First, this section describes impacts from construction of the proposed action. It then describes impacts of routine operation at the project site and of routine vessel transport to and from the project site.

#### Construction

Construction of the proposed action would involve no in-water work and no transport of materials by vessel. Therefore, it would have no impact on vessel traffic.

#### Operations

Under the proposed action, the maximum throughput of crude oil at would be 17.9 million barrels annually. Specifications of the typical vessels that could be used to transport crude oil, including tank barges and tankers, are summarized in Table 3.17-9. The table shows how many vessels would be needed for the proposed annual throughput amounts of crude oil based on vessel capacity.

**Table 3.17-9. Typical Vessels Used for Transport of Crude Oil and Number of Calls or Trips Necessary to Transport Proposed Throughput—Proposed Action**

Vessel Type	Capacity (barrels)	Design Draft (feet)	Number of Vessels to Transport Proposed Throughput <sup>a</sup>	
			Individual Vessels Calls at Terminal 1 Dock	Vessel Trips <sup>a</sup>
Crowley 550-Class tank barge	150,000	27.5	119	238
Crowley 650-Class tank barge	185,000	30	96	192
Crowley 750-Class tank barge	330,000	35	54	108
Panamax tanker <sup>b</sup>	350,000	39.5	51	102

<sup>a</sup> At maximum throughput; number assumes transport of total throughput is undertaken by a single vessel type.  
<sup>b</sup> Capacity can range from 300,000 to 600,000; however, larger Panamax class tankers are typically loaded in the 350,000-barrel range.

Any combination of tank barges and tankers, including those listed in Table 3.17-9, could be used to transport bulk liquids from Terminal 1. While the type of ship is expected to be determined by the applicant’s customer, the ships would be identified in advance and would be required to meet all vessel regulations for U.S. and Washington waters. The type of ship used will also be based on the controlling depth of the navigation channel. While vessels with a larger capacity tend to be more economical, their deeper drafts may limit their opportunities to transit the navigation channel, causing waiting periods and inefficiencies. Because of the channel depth limitations, the Panamax tanker (965 feet long, 106 feet wide, with a 39.5-foot draft) would be the largest vessel expected to enter Grays Harbor.

Barges have a smaller capacity and more flexibility to transit the navigation channel due to their shallower draft, but more vessel trips are required to transport the same volume of bulk liquids that the larger tankers could transport (Table 3.17-9).

This analysis assumes that tank barges such as the Crowley 550-Class tank barge, or similar vessel, would be used to transport crude oil from Terminal 1. The Crowley 550-Class tank barge has a length of 605 feet, width of 78 feet and draft of 27 feet 6 inches. This barge is designed for an escort tug to fit into a specially articulated notch in the stern of the barge to allow the tug and barge to move together.

Using this type of tank barge for the analysis results in the most vessel trips and is the most likely scenario under current channel conditions (controlling depth of 27 feet MLLW). Under this scenario, operation of the proposed action at maximum throughput would result in an additional 119 annual vessel calls at Terminal 1 or an additional 238 vessel trips through the navigation channel. This annual vessel traffic would correspond to an average of 0.7 trip on a daily basis or an average of 4.6 trips on a weekly basis (Table 3.17-10). If vessels with a higher capacity call at Terminal 1, the number of vessel trips would be reduced.

**Table 3.17-10. Vessel Trips—Proposed Action**

<b>Average Daily</b>	<b>Average Weekly</b>	<b>Maximum Annual</b>
0.7	4.6	238

<sup>a</sup> Assumes highest level of vessel traffic using Crowley 550-Class tank barges.

Table 3.17-11 presents increases in tank vessel trips under the proposed action in the context of forecast increases in baseline trips of large commercial vessels in 2017 and 2037. Between 2017 and 2037, under the no-action alternative, cargo vessel trips are forecast to increase from 292 to 368 per year due to annual growth in trade of commodities, and tank vessel trips are forecast to increase from 46 to 68 per year. Adding the proposed action trips to forecasted growth in vessel traffic would increase the total number of trips to 576 in 2017 and 674 trips in 2037. This equals approximately 1.6 vessel trips a day in 2017 and 1.8 vessel trips a day in 2037.

**Table 3.17-11. Forecast Number of Large Commercial Vessel Trips—Proposed Action (2017–2037)**

Type of Vessel	2017	2037
<b>Baseline</b>		
Cargo ships	220	276
Cargo barges	72	92
Tank vessels <sup>a</sup>	46	68
<b>Proposed Action</b>		
Tank vessels	238	238
<b>Total trips</b>	<b>576</b>	<b>674</b>

<sup>a</sup> Number includes existing vessels (assumed tankers) and future growth (assumed 1 tanker and 10 barges).

### Channel Capacity

Approximately 56% of the trips would be cargo barges traveling to locations along the Chehalis River or unladen vessels in ballast. As described for the no-action alternative, these vessels would likely draft less than 27 feet and would be minimally constrained by tidal elevations at any of the three channel depths considered in this analysis.

The remaining vessels trips (approximately 44%) are projected to be laden cargo ships and tank vessels (with drafts between 27 and 39 feet). As described for the no-action alternative, pilots typically schedule transits of these vessels when tidal elevations are at 5 feet or above MLLW (U.S. Army Corps of Engineers 2014a:21). At these tidal elevations, 1,274 navigable windows are available each year, which exceeds the total number of trips in 2017 and 2037 (576 to 674).

Although navigational windows become more restricted at drafts of 30 feet and more under the 2014 controlling depth (or 39 and 40 feet under the 2014 and 2017 project depths, respectively), vessel operators are able to make choices that influence vessel draft to increase navigational opportunities. For example, a vessel operator may choose to use a shallower-draft vessel to ensure greater navigational flexibility or use a larger vessel (or a more heavily laden vessel) for economic or other reasons and time the trip according to accommodate the more restricted opportunities.

Because the number of navigable windows exceeds the total number of vessel trips, the channel capacity would not be exceeded under the proposed action.

### Berth Capacity

Berth capacity at Terminal 1, as discussed for the no-action alternative, is adequate as long as the total days of occupation do not exceed 328 days per year. When tank vessels call at the Terminal 1 berth, they are estimated to occupy the berth for 24 hours (tank barges) to 48 hours (tankers). If only tank barges call at Terminal 1, the 119 vessels per year for the proposed action at maximum throughput would result in 119 days of berth occupancy, out of 328 days that the berth would be available. If tankers call at Terminal 1 instead of tank barges, the berth occupancy time would increase, but the number of vessel calls would decrease. For example, if only Panamax tankers call at Terminal 1, approximately 51 vessel calls per year would be required (Table 3.17-9), and the berth would be occupied for 102 out of 328 days.

Adding days of Terminal 1 berth occupancy related to the proposed action (a maximum of 119 days) to the number of days of berth occupancy by vessels related to existing and forecast methanol

operations (44 days<sup>22</sup>) at the project site and to the existing biodiesel operations at the adjacent Imperium facility (14 days<sup>23</sup>), the berth would be occupied for a maximum of 177 days. This occupancy level is well below the 328 days of estimated berth availability. Therefore, the proposed action would not have a substantial impact on berth capacity.

## **Pilot and Tug Capacity**

### ***State-Licensed Pilots***

As discussed for the no-action alternative, only foreign-flagged vessels and U.S. vessels engaged in foreign trade are required to use a state-licensed pilot by regulation. However, many U.S. vessels engaged in coastwise calling at Washington State ports seek the assistance of a state-licensed pilot on a voluntary basis, or as a matter of company policy, even though it is not required by regulation. The Port currently employs three state-licensed pilots and two pilots are on duty at any given time.

Under the proposed action, the total number of trips (proposed action and baseline) by large commercial vessels is forecast to reach 576 trips in 2017 and 674 trips in 2037. If all large commercial vessels hire a state-licensed pilot to navigate to and from the Port, this would result in a maximum of 674 annual assignments in 2037, or approximately 225 annual assignments for each of three state-licensed pilots employed by the Port. Under this scenario, each state-licensed pilot would pilot vessels to or from the Port a maximum of 225 days out of 365 days, which would not exceed the capacity of state-licensed pilots currently employed by the Port.

Additionally, pilots may pilot more than one vessel per day. Pilot trips in Grays Harbor are approximately 2 hours. Because Grays Harbor has a semidiurnal tidal cycle (two high tides per day), there is more than one navigable window each day to pilot a vessel to or from the Port.

The Puget Sound Pilot Commission is responsible for Washington State licensed pilots and evaluates the need for pilots regularly. If additional pilots were needed, they could be hired and trained. It takes approximately 9 months for a new pilot to obtain a state license to handle smaller vessels and approximately 2.5 years to get fully qualified. If necessary, due to an unanticipated pilot shortage, the Puget Sound Pilot Commission could provide support to the Port by temporarily reassigning a qualified state-licensed pilot from Puget Sound to Grays Harbor (Larson pers. comm.).

Based on interviews with the Port, the Pilotage Commission, and a Grays Harbor state-licensed pilot and on forecasted vessel numbers under the proposed action, the current number of state-licensed pilots available for Grays Harbor<sup>24</sup> is adequate for the pilotage services required by the Port under current and foreseeable vessel traffic conditions.

### ***Tugs***

Brusco Tug & Barge has three harbor tugs stationed in Grays Harbor that are exclusively available for commercial vessel assistance in the harbor. During normal operations, two tugs (one at the bow

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<sup>22</sup> Assumes 16 tankers related to existing activities (32 days), and 1 tanker (2 days) and 10 tank barges (10 days) related to projected activities.

<sup>23</sup> Assumes seven tankers related to existing activities (14 days) at the adjacent Imperium Terminal Services facility.

<sup>24</sup> Allowing for reassignment of pilots from Puget Sound.

and one at the stern) assist large commercial vessels (cargo ships and tank vessels) with docking and undocking maneuvers at the terminal berths.

Tugs are also used to escort vessels through the harbor to reduce the potential for a vessel incident such as loss of steering or propulsion that could affect vessel traffic and pose a safety risk. Existing regulations do not require tank vessels to be accompanied by escort tugs through Grays Harbor. However, it is standard practice for large commercial vessels transiting Grays Harbor<sup>25</sup> to use one or two tugs, depending on the weather conditions and vessel-specific factors (e.g., the amount of vessel infrastructure above water, or steering or propulsion problems). With larger car carriers and big bulk cargo vessels, a third tug may be used to assist with docking, undocking, or transiting when conditions warrant, such as when there are high winds (D'Angelo pers. comm.).

The Harbor Safety Plan for Grays Harbor has a standard of care (similar to a best management practice) that recommends escort tugs for all laden tank vessels carrying oil. The standards recommend the following practices, subject to pilot determination.

- At least one escort tug will meet an arriving laden tank vessel or barge carrying oil at the Grays Harbor entrance and escort it to the Hoquiam River where two tugs will assist the vessel during mooring procedures.
- At least one escort tug will accompany a departing laden tank vessel carrying oil from the terminal to the entrance of Grays Harbor.

Chapter 4, Section 4.6.3, *What mitigation measures would reduce impacts related to vessel transport?* includes proposed mitigation measures related to use of escort tugs through Grays Harbor to reduce potential risk of incident under the proposed action.

Including vessels under the proposed action at maximum throughput, large commercial vessel trips through Grays Harbor are forecast to reach 576 in 2017 and 674 in 2037, approximately two vessel trips per day on average. Based on the projected traffic levels and the fact that tugs can be moved between the Port terminals to assist with docking and undocking, the three tugs currently stationed in the harbor are adequate to support vessel operations at the Port under the proposed action.

### **Conflicts with Commercial Fishing**

Increased vessel traffic related to the proposed action could affect commercial fishing activities by restricting access to certain areas in the harbor. Because vessel traffic under the proposed action would be limited to the navigation channel and Terminal 1 berth, impacts on commercial fishing in the harbor but outside the channel are not expected.

Adding proposed action vessels to baseline vessels would result in occupancy of the Terminal 1 berth up to approximately 177 days per year compared to 58 days per year under the no-action days per week compared to an average of 1 day per week without the proposed action. Additionally, operation of the proposed action at maximum throughput would add 238 tank vessel trips per year (0.7 trip per day on average) along the navigation channel to projected large commercial vessel trips under the no-action alternative—between 338 and 436 large commercial vessel<sup>26</sup> trips per year in 2017 and 2037, respectively, or approximately one trip per day on average.

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<sup>25</sup> Transit time for tug(s) escorting a laden tank vessel to the entrance buoy is approximately 2 hours. The tug (or tugs) takes just 1 hour to return to the dock after escorting a tank vessel (Campbell pers. comm. [B]).

<sup>26</sup> The term *large commercial vessels* refers collectively to tank and cargo vessels.

As noted in Section 3.17.4.3, *Fishing and Recreational Vessels*, one of the prime commercial fishing areas for salmon is located in the navigation channel east of the Hoquiam River. Access to this area would be restricted during vessel loading and tank vessel transits. During periods of maximum catch for Chinook, coho, or chum salmon, the fall fishery may be open 2 to 4 days per week and for limited periods (e.g., 8:00 a.m. to 12:00 noon). Approximately 15 to 20 boats may participate each year and the fishery is open is approximately 7 days (Scharpf pers. comm.). Commercial fisheries do not occur during other times of the year; therefore, vessel traffic at other times of the year would not affect commercial fisheries in Grays Harbor.

Assuming a 24-hour maximum berth occupancy and vessels evenly dispersed over the week, it is likely a vessel would be at the dock or traveling through the navigation channel during a portion of the open fishing season. Depending on the specific circumstances of each interaction (e.g., chance of a vessel calling during an open fishing window, distribution of the fish within the channel, number of fishers on any given day), it is difficult to predict whether increased occupancy at Terminal 1 would significantly affect any single fisher's daily catch. However, if a vessel is at berth during the fall fishery, fishers would have the option to fish longer (complete more drifts) or may choose to fish other preferred locations in Grays Harbor (such as other portions of the navigation channel, farther away from the shoreline or farther upstream). However, opportunities to relocate during intense fishing periods may be limited if the other areas are occupied by fishers. Although it is difficult to predict whether the increased vessel traffic would result in an overall inability of a fisher to reach their limit, increased traffic could limit access to commercial fishing areas.

As noted in Section 3.17.4.3, *Fishing and Recreational Vessels*, ocean-fishing vessels may use the navigation channel to transport their catch to the harbor. To lessen the danger of hazardous conditions during incoming or outgoing tides, bar crossings are often timed during slack high or low tides, whereas large commercial vessels tend to navigate through the channel when tidal elevations are more than 5 feet. Additionally, as noted previously, commercial fishers can navigate around larger vessels limited to the navigation channel to avoid potential impacts.

Implementation of mitigation measures described in Section 3.17.7.1, *Applicant Mitigation*, to provide advance notice of arrivals and departures would reduce impacts on commercial fishing.

An analysis of impacts from increased risk of incidents (e.g., vessel collisions) and related consequences (e.g., release of crude oil) is provided in Chapter 4, *Environmental Health and Safety*.

### **3.17.6 What required permits apply to vessel traffic?**

No required permits or plans apply to vessel traffic.

### **3.17.7 What mitigation measures would reduce impacts on vessel traffic?**

This section describes the applicant mitigation that would reduce impacts on vessel traffic from construction and routine operation of the proposed action. Mitigation measures to address risks related to vessel transport of crude oil in the study area are presented in Chapter 4, Section 4.6.3, *What mitigation measures would reduce impacts related to vessel transport?*

### 3.17.7.1 Applicant Mitigation

The applicant will implement the following mitigation.

- To improve vessel management and situational awareness and to reduce potential risk of incident of vessel collision or allision in Grays Harbor, the applicant will fund and work with U.S. Coast Guard, Ecology, Port of Grays Harbor, and Grays Harbor Safety Committee to propose, develop, and implement a formalized vessel management system. The vessel management system will include the ability to schedule, track, and monitor vessel movements in the harbor and off the entrance to the harbor. The vessel management system will be active prior to the applicant beginning the proposed operations. If a rule is adopted under RCW 88.16, Pilotage Act, prior to beginning operations, the requirements of the new rule would be followed.

The vessel management system will assist in the following actions.

- Ensure vessel traffic is limited while a laden tank vessel is in the navigation channel.
- Prohibit the transit of any other deep-draft vessels within the south channel reach (just off Westport) to Terminal 1 in both directions whenever a laden tank vessel is transiting within the same channel.
- Include real-time automatic identification system tracking and monitoring.
- To improve vessel management and reduce the risk of an incident, the applicant will coordinate with the Port of Grays Harbor and as a member of the Grays Harbor Safety Committee, work to develop and implement specific procedures for escorting, tethering, refueling and emergency maneuvering to control laden tank vessels. The procedures must be drafted prior to the proposed operations beginning. These procedures should be included in the Grays Harbor Safety Plan. At a minimum, these must include the following elements.
  - Escort configurations and maneuvering characteristics of escorted tankers and tank barges.
  - Specific emergency connection and tethering procedures for connection of escort tugs to tankers and tank barges.
  - Specific maneuvers necessary for the escort tug to maintain control of the tanker while transiting Grays Harbor waters specifically during incidents of loss of propulsion or steering or in bad weather.
  - Appropriate safe speed of transit in Grays Harbor when escort tugs are tethered.
  - Guidelines for tanker or tank barge bridge team to rapidly recognize and respond to a loss of power or steering. By improving recognition and reaction time, the escort tugs can more effectively steer the vessel through the navigation channel upon incident.
  - Requirement for a pretransit conference.
  - Requirements for refueling of the vessel.
- While commercial fishing boats are required to follow the U.S. Coast Guard navigation rules, to improve awareness of vessel traffic in the navigation channel, the applicant will work with the Grays Harbor Safety Committee, including the U.S. Coast Guard and Port of Grays Harbor, to establish procedures to announce project-related vessel traffic arrivals and departures over a designated VHF marine radio channel at least 1 hour before arrival and departure.

### **3.17.8 Would the proposed action have unavoidable significant adverse impacts on vessel traffic?**

Under existing fishing conditions, increased vessel traffic could cause a disruption when commercial fishers are in the navigation channel. This conflict is most likely to occur related to harvest of salmon (Chinook, chum, and coho) during the fall fishery. Although vessel operations related to the proposed action are reasonably certain, it is not possible to determine how the proposed action could affect a commercial fisher's daily catch because of other unpredictable factors (number of fishers, fish distribution, timing, and duration of fishing window on any given day of any given week). Potential impacts related to increased risk of vessel incidents and related consequences are addressed in Chapter 4, *Environmental Health and Safety*.