

May 19, 2020

COLUMBIA RIVER PILOTAGE STUDY

PREPARED FOR



TABLE OF CONTENTS

Table of Contents	i
Executive Summary	1
1. Introduction and Background	4
1. 1. Study Purpose & Organization	4
1. 2. Pilotage Overview	4
2. Columbia River Pilotage Costs	7
2. 1. Study Vessel Types	7
2. 2. Oregon Tariff	8
2. 3. Columbia River Pilotage Costs	9
2. 4. Columbia River Pilotage Cost Trends	11
3. Pilotage Costs at Other Ports	13
3. 1. Benchmark Ports	13
3. 2. Pilotage Cost Comparisons	14
3. 3. Pilotage Cost Trends	14
4. Cargo Sensitivity Analysis	17
4. 1. Background	17
4. 2. List of Cargos	18
4. 3. Sensitivity Analysis by Cargo	19
Appendix A: Ratemaking Process	27
Regulatory Background	27
Revenue Target	27
Automatic Tariff Adjustments	30
Length Charge	31
Appendix B: Vessel Trends	32
Columbia River Vessel Transits and Vessel Size	32
U.S. West Coast Vessel Transits and Vessel Size	36
Attachments	38

COLUMBIA RIVER PILOTAGE STUDY



List of Tables

Table 1: Study Vessel Types (Sorted by GRT)	8
Table 2: Columbia River Pilotage Cost Calculation Example, Small Container Vessel	10
Table 3: Selected Ports and Pilotage Areas	13
Table 4: Comparison of Pilotage Costs, 2010 to 2020, Small Container Vessel	15
Table 5: List of Cargos Evaluated in the Sensitivity Analysis	18
Table 6: Responsiveness of Cargo to Changes in Port Cost	19
Table 7: Columbia River Vessel Activity – 2018.....	32

List of Figures

Figure 1: Columbia River Map.....	5
Figure 2: Key Pilotage Rates & Charges (effective as of January 15, 2020)	8
Figure 3: Columbia River Pilotage Cost per Transit	11
Figure 4: Columbia River Pilotage Cost Trend, Selected Vessel Types.....	12
Figure 5: Pilotage Cost per Transit, Small Container Vessel	14
Figure 6: Comparison of Pilotage Cost per Voyage, Small Container Vessel	15
Figure 7: Columbia River Vessel Transits and Pilotages	33
Figure 8: Columbia River Gross Registered Tons, Total and Average per Transit	33
Figure 9: Columbia River Average GRT per Transit by Ship Type, 2004 - 2018	34
Figure 10: Length Charges per Transit per Vessel Type (Estimated), 2010 and 2018.....	35
Figure 11: Percentage of Vessel Calls by Vessel Length (Estimated), 2010 and 2018	35
Figure 12: Columbia River Vessels, Average Draft, 2007 - 2018	36
Figure 13: U.S. West Coast Vessel Transits, GRT per Transit, and Total GRT	37
Figure 14: U.S. West Coast Average GRT per Transit by Ship Type, 2004 - 2018	37

List of Attachments

Attachment 1: Oregon Administrative Rule (OAR) 856-030-000038

Attachment 2: Pilotage Cost Per Transit, Port Comparison (in US \$).....39

Attachment 3: Pilotage Cost Calculation Examples.....40

Attachment 4: Top 10 Columbia River Exports and Imports (Thousands of Metric Tons)48

Attachment 5: Columbia River Domestic Coastwise Shipments – 2018 (Metric Tons).....48

Attachment 6: Cargo Value per Metric Ton, 2018.....49

Attachment 7: Length Charge Analysis, 2018 versus 201050

Attachment 8: Tariff Page, Automatic Adjustments.....51

Attachment 9: Cargo Information Table.....52

Attachment 10: Cargo Information Table - Additional Calculations53

Attachment 11: Columbia River Vessel Transits by Vessel Type, 2004-2018.....54

Attachment 12: Columbia River GRT per Transit by Vessel Type, 2004-201855

Attachment 13: Columbia River Total GRT by Vessel Type, 2004-2018.....56

Attachment 14: Port Areas, Major Ports Included.....57

Attachment 15: Vessel Transits, GRT, and GRT per Transit, U.S. West Coast Ports, 2004-18.....58

Attachment 16: Vessel Transits, Major U.S. West Port Areas, 2004 -18.....59

Attachment 17: Average Gross Registered Ton per Transit, USWC Port Areas, 2004 -18.....60

Attachment 18: Total Gross Registered Tonnage, Major U.S. West Port Areas, 2004 -18.....61

Attachment 19: U.S. West Coast Total GRT by Vessel Type, 2004 -2018.....62

List of Abbreviations

Board..... Oregon Board of Maritime Pilots

CAGR Compound Annual Growth Rate

COLRIP Columbia River Pilots

CPI Consumer Price Index

CRBP Columbia River Bar Pilots

FTE Full-Time Equivalent

GRT Gross Registered Tons

OBMP..... Oregon Board of Maritime Pilots

ORS Oregon Revised Statutes

OAR..... Oregon Administrative Rules

PCC Pure Car Carrier

PNW Pacific Northwest

TEU..... Twenty-foot Equivalent Unit

TGI..... Target Gross Income

TNI..... Target Net Income

USWC United States West Coast

EXECUTIVE SUMMARY

BACKGROUND

Coastal states, including Oregon, regulate pilotage of foreign-flag vessels and vessels carrying foreign cargo or passengers.

- In Oregon, the Oregon Board of Maritime Pilots is responsible for the regulation of pilotage, including setting pilotage rates.

Vessels that call Portland terminals transit through two pilotage grounds – the Columbia River Bar ("Bar"), and the Columbia and Willamette River ("River") – and must take a pilot for each ground.

- The Columbia River Bar Pilots provide pilots for the Bar, and the Columbia River Pilots provide pilots for the River.

COLUMBIA RIVER PILOTAGE COSTS

The study estimates Columbia River pilotage costs for eight different vessel types (ES Figure 1).

ES Figure 1: Columbia River Pilotage Cost per Transit



The total pilotage cost per transit for a Small Container vessel – representative of the ships used by SM Line – is \$20,301.

- The cost per transit is \$7,666 for the Bar pilot, \$12,635 for the River pilot

The pilotage cost per transit for a Small Container vessel increased from \$13,107 in June 2010 to \$20,301 in January 2020.

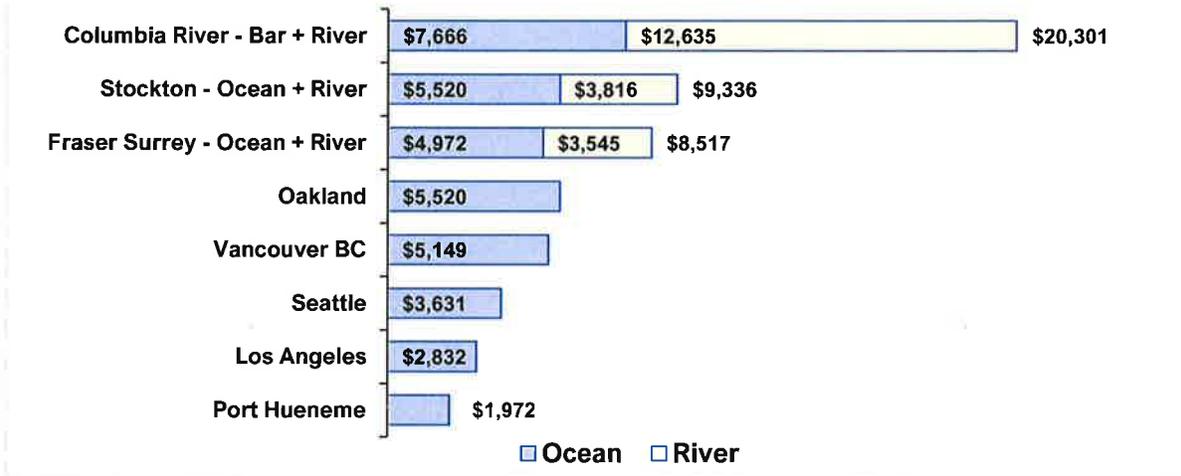
- This is an overall increase of 55 percent (4.7 percent compound annual growth rate).
- Over the same period, the Consumer Price Index increased by 20 percent (1.9 percent compound annual growth rate).

PILOTAGE COSTS AT OTHER PORTS

The study compares pilotage costs for the Columbia River to those for selected ports in Puget Sound, California, and British Columbia.

- Columbia River pilotage costs for a Small Container vessel are more than five times the pilotage costs for Seattle (**ES Figure 2**). Columbia River costs are more than twice to cost of other West Coast ports requiring double pilotage (Fraser Surrey and Stockton).

ES Figure 2: Pilotage Cost per Transit, Small Container Vessel



Over the past ten years (2010 – 2020), while Columbia River pilotage costs for a Small Container vessel have increased by 55 percent, Seattle pilotage costs increased by 8 percent.

The per voyage (in and out) cost for weekly container service using a Small Container vessel is \$40,602 for the Columbia River and \$7,262 for Seattle, a difference of \$33,340 per voyage (**ES Figure 3**).

ES Figure 3: Comparison of Pilotage Cost per Voyage, Small Container Vessel



As of 2020, the annual pilotage cost for a weekly container service using a Small Container vessel is \$2.111 million for the Columbia River as compared to \$0.378 million for Seattle, a difference of \$1.7 million.

CARGO SENSITIVITY ANALYSIS

Pilotage cost is rarely, if ever, the sole determinant of port selection, but high port and pilotage costs can impact the choice of a port and the volume of cargo.

Of the different types of cargos carried by Columbia River vessels, container cargo is the most sensitive to pilotage costs (**ES Table 1**).

ES Table 1: Responsiveness of Cargo to Changes in Port Cost

Most Responsive	Responsive	Least Responsive
Medium Container	Automobiles	Cement
Small Container	Bentonite	Fertilizers
	Corn	Gypsum
	Copper Concentrate	Steel (Kalama)
	Logs	Liquid Bulks
	Soda Ash	Potash
	Soybeans	Steel Slab
	Steel (Vancouver)	Wheat
		Wind Energy

Factors affecting the increased responsiveness of container cargo to changes in pilotage and other port costs include:

- Strength of competing Puget Sound ports in the local market,
- Relatively small local market size,
- Depth constraint of the Columbia River navigation channel,
- Portland geographic location relative to the typical PNW service routing, and
- The sensitivity of liner services to port costs dues to the frequency of calls.

1. INTRODUCTION AND BACKGROUND

1.1. STUDY PURPOSE & ORGANIZATION

The purpose of the study is to assess the impact of pilotage costs on the ability of Oregon and the Port of Portland to attract and retain port investment and service to Oregon shippers.

The study covers four topics:

1. Pilotage overview.
2. Columbia River pilotage costs.
3. Pilotage costs at other port areas.
4. Cargo sensitivity analysis.

The study also includes two appendixes. **Appendix A** describes the ratemaking process used by the Oregon Board of Maritime Pilots. **Appendix B** summarizes the trends in vessel transits and size for the Columbia River and the U.S. West Coast.

1.2. PILOTAGE OVERVIEW

Pilotage Law

Under U.S. federal law, the 24 coastal states have the exclusive role in regulating vessel pilotage, except for U.S. flag vessels that are not on a foreign voyage or are not carrying foreign cargo or passengers.

Chapter 776 of the Oregon Revised Statutes ("**ORS**") regulates maritime pilots and pilotage. [ORS Chapter 776](#), established the Oregon Board of Maritime Pilots ("**OBMP**" or "**Board**") under the Oregon Public Utility Commission. The Board's major responsibilities include:

- Regulating and limiting the number of licensees and trainees.
- Establishing license fees, qualifications, and training standards.
- Setting pilotage rates.
- Conducting investigations into maritime incidents involving piloted vessels.

Oregon Pilotage Grounds

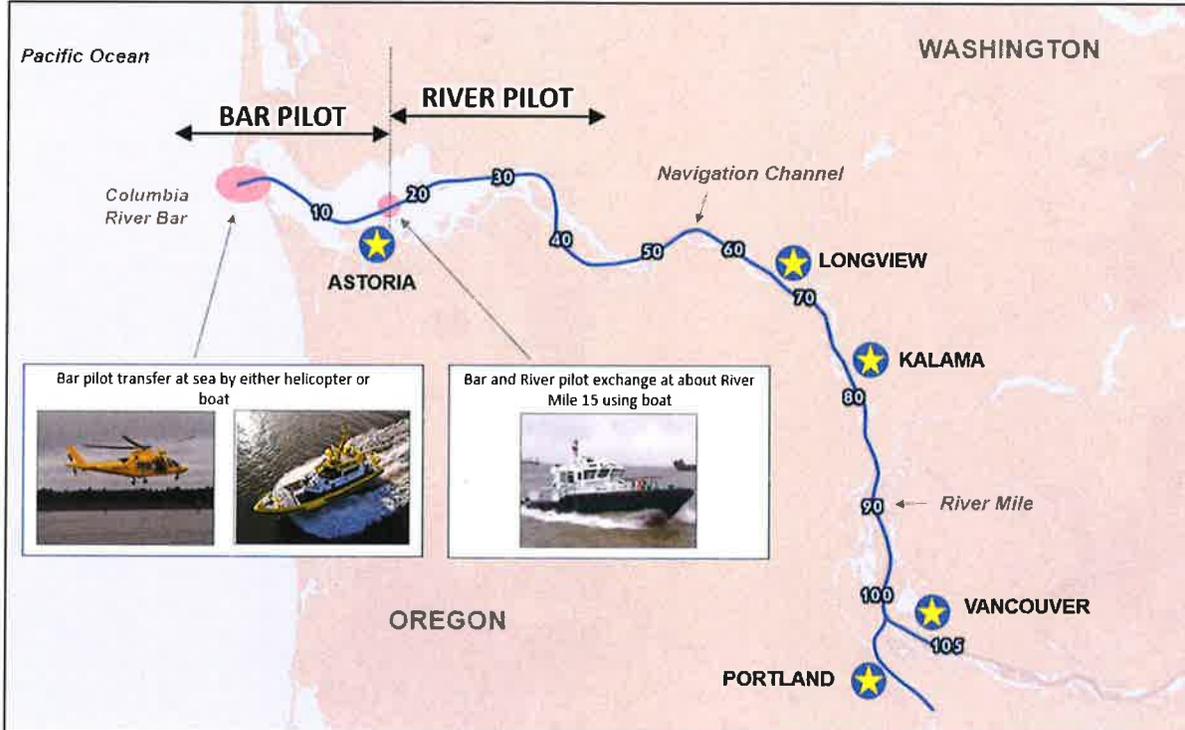
The Board regulates four Oregon pilotage grounds: the Columbia River Bar ("**Bar**"), the Columbia and Willamette River ("**River**"), Coos Bay, and Yaquina Bay. Vessels traveling between the Pacific Ocean and Portland, Oregon, must cross two of these grounds – the Bar and the River – and thus must take on two pilots on each transit.

The Columbia River Bar Pilots ("**CRBP**"), based in Astoria, Oregon, provides Bar pilots. Bar pilot license requirements include experience as a master of ocean-going vessels. There were 15 licensed Bar pilots in 2019.¹

¹ OBMP Annual Report, p. 14.

The Columbia River Pilots ("COLRIP"), based in Portland, Oregon, provides River pilots. River pilot license requirements include experience as captain of towing vessels on the Columbia River and its tributaries. There were 45 licensed River pilots in 2019.²

Figure 1: Columbia River Map



Typical Columbia River Vessel Transit

On an inbound vessel transit, the Bar pilot takes the vessel from the sea, across the Columbia River bar, to Astoria. Bar pilots typically use a helicopter to travel to or from the vessel at sea. Other times, depending on weather and other factors, the Bar pilots use a high-speed, all-weather pilot boat for the transfer at sea. The Bar pilot is typically on the bridge for two to three hours.

In the case of vessels destined for an upriver port or upriver anchorage (a destination other than Astoria or the Astoria anchorage area), the Bar pilot is exchanged with a River pilot at a point off Astoria near River Mile 15. The pilots use a launch to perform the exchange.

The River pilot's time on the bridge will range from about 4.5 hours (Longview on the Columbia River) to up to 9 hours (Portland Inner Harbor, Willamette River). The time to Portland's Terminal 6 on the Columbia River is usually about 7 hours.

Inbound vessels that are initially anchored at Astoria by the Bar pilot will be taken upriver by a River pilot at a later date.

² OBMP Annual Report, p. 14.

For outbound vessel transits, the pilots generally reverse the sequence of transfers used on inbound transit.

In addition to performing bar and river transits, pilots also perform harbor moves, which most often consist of shifting vessels between an anchorage and a berth or between two different berths.

Ratemaking

CRBP and COLRIP are private contractors that collect fees directly from vessels that use their services. The Board sets the rates the pilots may charge via a public tariff.

Oregon law ([ORS 776.115](#)) directs the Board to "Fix, at reasonable and just rates, pilotage fees..." and that "the board shall give due regard to the following factors:

- The length and net tonnage of the vessels to be piloted.
- The difficulty and inconvenience of the particular service and the skill required to render it.
- The supply of and demand for pilotage services.
- The public interest in maintaining efficient, economical and reliable pilotage service.
- Other factors relevant to the determination of reasonable and just rates."

Oregon Administrative Rule (OAR) [856-030-0000](#) addresses the substantive elements of ratemaking in more detail (**Attachment 1**).

Appendix A describes the Board's ratemaking process in more detail.

2. COLUMBIA RIVER PILOTAGE COSTS

This chapter of the study examines the cost to a vessel for pilotage between the Pacific Ocean and Portland.

SUMMARY OF FINDINGS

- The study estimates Columbia River pilotage costs for eight different vessel types, including container, dry bulk, and car carrier.
- Pilotage costs are determined by a combination of fees per transit and by fees based on the size of the vessel.
- The total pilotage cost per transit for a Small Container vessel – representative of the vessels used by SM Line – is \$20,301.
 - The cost per transit for each pilotage ground is \$7,666 for the Bar Pilot, \$12,635 for the River pilot
- The pilotage cost per transit for a Small Container vessel increased from \$13,107 in June 2010 to \$20,301 in January 2020.
 - This is an overall increase of 55 percent (4.7 percent CAGR).
 - Over the same period, the Consumer Price Index increased 20 percent (1.9 percent CAGR).

2.1. STUDY VESSEL TYPES

The study estimates pilotage costs for eight different vessel types that represent the majority of overall Columbia River vessel traffic (**Table 1**).

- **Dry Bulk** vessels carry a variety of products to and from Columbia River ports, most notably wheat, corn, soybeans, potash, and soda ash. **Panamax Dry Bulk** vessels typically carry corn, soybeans, and gypsum. **Handymax and Handy Dry Bulk** vessels transport soda ash, potash, cement, and an assortment of other cargoes. Wheat is transported on all three Dry Bulk vessel types.
- The **Liquid Bulk** vessel represents a typical tanker used to carry liquid chemical and petroleum products.
- The **Pure Car Carrier** is typical of the 6,000-unit roll-on roll-off vessel that is now commonly used to carry vehicles.
- The **Handymax – General Cargo** vessel is representative of ships carrying steel products, wood pulp, logs, wind energy, and other breakbulk cargoes.

- The **Small Container** vessel is the size of a 4,000-TEU Panamax ship currently being used by SM Line on its Portland call.³
- The **Medium Container** vessel is the same size as the Hanjin 5,500-TEU Post-Panamax ship that once called Portland.

Table 1: Study Vessel Types (Sorted by GRT)

Study Vessel Type	Gross Registered Tons (GRT)	Length Overall (meters)	Beam (meters)	Inbound Draft (meters)	Outbound Draft (meters)	Roundtrip Average Draft (meters)
Medium Container	66,687	279	40.30	11.90	12.50	12.20
Pure Car Carrier	59,440	200	32.26	8.80	8.40	8.60
Small Container	41,000	260	32.26	10.30	11.30	10.80
Panamax Dry Bulk	40,000	225	32.26	7.00	12.80	9.90
Handymax - General Cargo	35,000	200	32.26	10.00	10.00	10.00
Handymax Dry Bulk	26,500	190	32.26	7.00	11.50	9.90
Liquid Bulk Carrier	22,028	183	28.20	11.00	9.75	10.00
Handy Dry Bulk	21,178	180	28.20	6.49	10.36	8.43

Some vessel types used on the Columbia River that the study does not analyze include tug/barges, navy vessels, service vessels, and cruise ships.

2. 2. OREGON TARIFF

Columbia River pilotage rates for both the Bar and the River are regularly updated and published by the Board in the Oregon Pilotage Tariff No. A-10.⁴ Item 1 lists the key rates in each respective section for the Bar and River. **Figure 2** provides excerpts from the tariff.

Figure 2: Key Pilotage Rates & Charges (effective as of January 15, 2020)

COLUMBIA RIVER BAR PILOTAGE GROUND 503-325-2641			
ITEM	SERVICE	RATES & CHARGES	MINIMUM
1	Inbound or outbound between Astoria and the sea	\$ 15.8308 per draft foot and \$ 0.0820 per gross registered ton	
	Transportation Surcharge	\$ 2,803.82	
	Pilot Boat Surcharge	\$ 304.00	
	Fuel Surcharge	\$ 185.89	
	Traffic Adjustment	\$ 359.38	
	Continuing Professional Development Charge	\$ 65.41	

³ SM Line started weekly container service between Portland and Asian ports in January 2020.

⁴ Oregon Pilotage Tariff No. A-10, effective January 15, 2020.

COLUMBIA AND WILLAMETTE RIVER PILOTAGE GROUND 503-289-9922			
ITEM	SERVICE	RATES & CHARGES	MINIMUM
1	Inbound from Astoria or Outbound to Astoria Transit Fee: Continuing Professional Development Charge: Pension Assessment:	\$ 35.8225 per draft foot and \$ 0.2005 per gross registered ton \$ 636.53 \$ 71.21 \$ 321.96	500 gross registered tons or less, \$ 696.70 over 500 gross registered tons, \$ 870.80
1a	Length charge	\$ 348.37 each 50 feet. or fraction thereof, more than 599' LOA. inbound or outbound	

Source: Excerpts from Oregon Pilotage Tariff No. A-10, effective January 15, 2020

The tariff also includes rates for various other services and situations related to pilotage. For example, and there are specific rates for shifting vessels between anchorages and berths.

2.3. COLUMBIA RIVER PILOTAGE COSTS

The tariff assesses pilotage fees by the transit and by a combination of vessel characteristics: gross registered tons ("GRT"), length overall, and actual vessel draft.⁵ **Table 2** provides an example of a cost calculation using the Small Container vessel type.

GRT is the most critical vessel dimension in terms of pilotage cost calculation.

- The vessel's GRT accounts for about 57 percent of the pilotage fees charged to a Small Container vessel.
- In total, vessel size (GRT, length, and draft) generates 76 percent of a Small Container vessel's pilotage cost.

Appendix B provides detail on the size and number of vessels calling the Columbia River and other U.S. West Coast ports.

⁵ Gross registered tons, a measure of the volume of all the ship's enclosed spaces, is commonly used to indicate vessel size and as a basis for pilotage charges.

Table 2: Columbia River Pilotage Cost Calculation Example, Small Container Vessel

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Feet)	853
Breadth (Feet)	106
Draft - Roundtrip Avg (Feet)	35.4

	Quantity	Unit Price	Amount
Bar Pilot Costs			
Per Draft Foot	35.4	\$15.83080	\$561
Per Gross Registered Ton	41,000	\$0.08200	\$3,362
Transportation Surcharge	1	\$2,803.82	\$2,804
Professional Development	1	\$65.41	\$65
Pilot Boat Surcharge	1	\$304.00	\$304
Fuel Surcharge	1	\$185.89	\$186
Traffic Adjustment	1	\$359.38	\$359
Board Operations Fee	1	\$50.00	\$50
Subtotal Bar Pilot Costs			\$7,691
River Pilot Costs			
Per Draft Foot	35.4	\$35.82250	\$1,269
Per Gross Registered Ton	41,000	\$0.20050	\$8,221
Transit Fee	1	\$636.53	\$637
Professional Development	1	\$71.21	\$71
Pension Assessment	1	\$321.96	\$322
Each 50' Foot of Length > 599'	6	\$348.37	\$2,090
Board Operations Fee	1	\$0.00	\$0
Subtotal River Pilot Costs			\$12,610
Total Pilotage Costs			\$20,301

Board Operations Fee: \$50 on inbound Bar; \$50 on outbound River.
Oregon Pilotage Tariff No. A-10 Effective January 15, 2020

Figure 3 summarizes the Bar and River per transit pilotage costs for each particular vessel type.

- The total Columbia River pilotage cost for a vessel call, transit in and transit out, would be double the amounts shown in Figure 3.
- The Medium Container vessel has the highest cost per transit. The cost for the Pure Car Carrier is second highest. The lowest pilotage cost per vessel is for the Handy Dry Bulk vessel.⁶

Figure 3: Columbia River Pilotage Cost per Transit



2. 4. COLUMBIA RIVER PILOTAGE COST TRENDS

The trend in Columbia River pilotage costs has been upwards over the past ten years (Figure 4).⁷

- The pilotage cost per transit for a Small Container vessel increased from \$13,107 in June 2010 to \$20,301 in January 2020
- This is an overall increase of 55 percent and a compound annual growth rate ("CAGR") of 4.7 percent.
- Over the same period, the Consumer Price Index ("CPI") increased by 20 percent (1.9 percent CAGR).⁸

⁶ Pilotage costs for barges and other smaller vessels – not provided by this study – would be less than the costs for the vessel types shown.

⁷ The rates and charges used to calculate the 10-year cost history are taken from the Oregon pilotage tariff in effect on January 15 of each year.

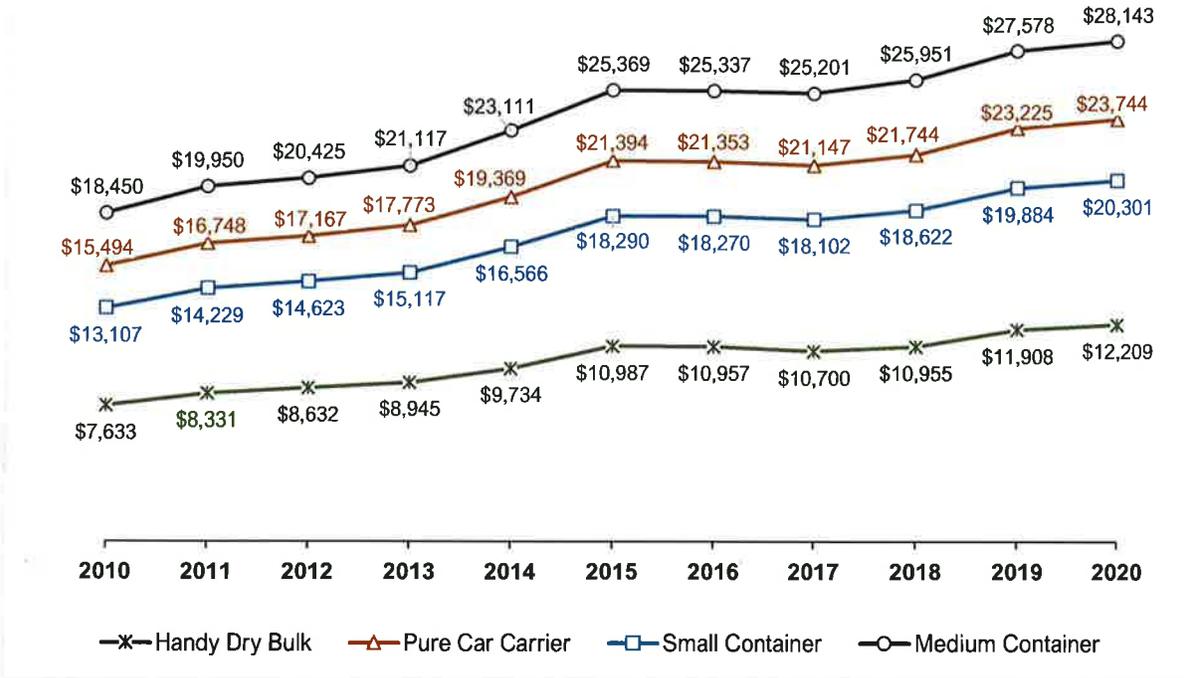
⁸ CPI-U for all items West urban, from June 2010 (228.075) to January 2020 (273.340).

COLUMBIA RIVER PILOTAGE STUDY



Figure 4: Columbia River Pilotage Cost Trend, Selected Vessel Types

Total Pilotage Cost, Bar + River, per Transit



3. PILOTAGE COSTS AT OTHER PORTS

This chapter of the study compares the cost of Columbia River pilotage to the cost of pilotage at other West Coast North American ports.

When comparing pilotage costs, it is important to understand that the length and difficulty of a pilotage will vary among ports, so differences in pilotage costs are expected. Also, many ports require only one pilot per transit, whereas other ports such as Portland require two pilots per transit.

SUMMARY OF FINDINGS

- The study compares pilotage costs for Columbia River pilotage costs to those for selected ports in Puget Sound, California, and British Columbia.
- At \$20,301 per transit for a Small Container vessel, Columbia River pilotage costs are more than five times the pilotage costs for Seattle – \$3,621 per transit – and more than twice to cost of other West Coast ports requiring double pilotage, Fraser Surrey – \$8,517 per transit – and Stockton – \$9,335 per transit.
- Over the past ten years (2010 – 2020), the increases in Columbia River pilotage costs for a Small Container vessel have increased 55 percent (4.7 percent CAGR). By comparison, over the same period, Seattle pilotage costs increased 8 percent (0.8 percent CAGR).
- The annual pilotage cost for a weekly container service using a Small Container vessel is \$2.111 million for the Columbia River (Portland) as compared to \$0.378 million for Seattle, a difference of \$1.7 million.

3.1. BENCHMARK PORTS

Table 3 shows the ports and pilotage areas used for the cost comparisons.

Table 3: Selected Ports and Pilotage Areas

Port / Pilotage Area	Pilot Group	Oversight Body
Columbia River - Bar	Columbia River Bar Pilots	Oregon Board of Maritime Pilots
Columbia River - River	Columbia River Pilots	
Seattle / Tacoma	Puget Sound Pilots	State of Washington Board of Pilotage Commissioners
Port Hueneme	Port Hueneme Pilots Association	Port of Hueneme
Los Angeles	Los Angeles Pilot Service	Port of Los Angeles
Oakland	San Francisco Bar Pilots	Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun
Stockton - Ocean + River		
Vancouver BC	British Columbia Coast Pilots	Pacific Pilotage Authority Canada
Fraser Surrey - Ocean		
Fraser Surrey - River	Fraser River Pilots Association	

3. 2. PILOTAGE COST COMPARISONS

The pilotage tariffs available on January 15, 2020, were used to calculate the costs for each respective port.⁹

The study uses the Small Container vessel type for comparison between ports. **Figure 5** illustrates the differences in costs for each port using the Small Container vessel type.

Figure 5: Pilotage Cost per Transit, Small Container Vessel



3. 3. PILOTAGE COST TRENDS

As noted above, pilotage costs for a Small Container vessel have increased 55 percent since 2010 (4.7 percent CAGR).¹⁰ As shown in **Table 4**, pilotage costs at other ports have risen more slowly. For example, Seattle pilotage costs have increased by 8 percent since 2010 (0.8 percent CAGR).

⁹ **Attachment 2** summarizes the results of the cost calculations for each port and vessel type. **Attachment 3** provides an example of a pilotage cost calculation for each port.

¹⁰ June 1, 2010 tariff compared to January 15, 2020 tariff

COLUMBIA RIVER PILOTAGE STUDY



Table 4: Comparison of Pilotage Costs, 2010 to 2020, Small Container Vessel

	2010	2020	Change	Percent Change	Compound Annual Growth Rate
CPI ¹¹	228.075	273.340	45.265	20%	1.9%
Columbia River	\$13,107	\$20,301	\$7,194	55%	4.7%
<i>River</i>	\$8,338	\$12,635	\$4,296	52%	4.4%
<i>Bar, Excluding Transportation System</i>	\$2,902	\$4,373	\$1,471	51%	4.4%
<i>Bar, Transportation System</i>	\$1,866	\$3,294	\$1,427	76%	6.1%
Seattle	\$3,349	\$3,631	\$282	8%	0.8%
Oakland	\$5,306	\$5,520	\$214	4%	0.4%
Stockton	\$9,122	\$9,336	\$214	2%	0.2%
Fraser Surrey (Can\$)	\$8,648	\$11,061	\$2,413	28%	2.6%
Fraser Surrey (US\$) ¹²	\$8,216	\$8,517	\$301	4%	0.4%

Figure 6 charts the total Columbia River and Seattle pilotage cost for a Small Container vessel from 2010 to 2020. In 2020, the Columbia River cost was \$40,602 per voyage versus a Seattle pilotage cost of \$7,952, a difference of \$33,340.

Figure 6: Comparison of Pilotage Cost per Voyage, Small Container Vessel



¹¹ CPI for All Urban Consumers (CPI-U), West Region, 1982-84=100, June 2010 and January 2020.

¹² 0.95 US\$/Can\$ in 2010, 0.77 US\$/Can\$ in 2020.

COLUMBIA RIVER PILOTAGE STUDY



A Small Container on a weekly service would make 52 voyages to Portland each year. The annual Columbia River pilotage cost for that service would be \$2,111,304 (\$40,602 per voyage times 52 voyages). The same service would incur \$377,624 in annual pilotage costs on a weekly Seattle call – \$1.7 million less per year compared to Portland. The difference between Portland and Seattle has increased by 71 percent over the past ten years. In 2010, the annual pilotage cost for a Portland call exceeded the pilotage cost for a Seattle call by \$1.0 million.

4. CARGO SENSITIVITY ANALYSIS

SUMMARY OF FINDINGS

- Cargos are sensitive in varying degrees to changes in pilotage costs.
- Factors affecting the responsiveness of a cargos to changes in pilotage and other port costs include proximity to cargo production and consumption, shipper capital investments in terminals, and the strength of competing ports.
- Pilotage cost is rarely, if ever, the sole determinant of port selection.
- Of the different types of cargos carried by Columbia River vessels, container cargo is the most sensitive to pilotage costs due to the:
 - Strength of competing Puget Sound ports in the local market,
 - Relatively small local market size,
 - Depth constraint of the Columbia River navigation channel,
 - Portland geographic location relative to the typical PNW service routing, and
 - The sensitivity of liner services to port costs dues to the frequency of calls.

4.1. BACKGROUND

This chapter of the study examines different Columbia River cargos to assess which are the most responsive or sensitive to changes in port costs. All cargos are sensitive to some degree to changes in pilotage and other port costs. The responsiveness of a particular cargo to cost changes depends on a variety of factors, including:

- Strength of Competing Ports
- Proximity to Cargo Production and Consumption (Local Market Size)
- Vessel Size and Channel Depth
- Location Relative to Preferred Ocean Routings (Liner Services)
- Inland Transportation Systems – Truck, Rail, and Barge
- Shipper Investment in Terminal Infrastructure
- Availability of Competitive Cargo Sources

Pilotage is just one of many port costs a ship will incur during a call to a port on the Columbia River. Along with pilotage, port costs can include tug assist, linesmen, dockage, agency fees/expenses, terminal handling charges, and assorted other fees.

A study by the United Nations of ports throughout the world shows that pilotage costs ranged from 0 percent to 8 percent of the total port cost.¹³ Although this study is decades old, it underscores the

¹³ United Nations Conference on Trade and Development, "Port Pricing", 1975, p. 68, Annex III.

COLUMBIA RIVER PILOTAGE STUDY



fact that pilotage cost can comprise a relatively small share of total port cost. Pilotage cost is rarely, if ever, the sole determinant of a port's selection. Other port costs are likely to carry equal or more weight in the selection of the port.

Pilotage costs can nevertheless be a key consideration in port selection. For example, pilotage cost accounts for approximately 16 percent of the port costs for a Small Container vessel calling Portland.¹⁴ As described above, the annual pilotage cost for a Small Container vessel calling Portland is \$1.7 million more than the cost for the same vessel calling Seattle.

4. 2. LIST OF CARGOS

The Columbia River is a major export gateway for grain, mineral products, automobiles, and wood pulp.¹⁵ The Columbia River is also a major hub for imported automobiles. Other imports include cement, steel slab, and fertilizers – most of which are for regional consumption and remanufacturing.

Before 2015, container cargo also comprised a significant component of the Columbia River port and vessel activity. However, the amount of container activity has been minimal in recent years. SM Line initiated a weekly transpacific service to Portland in January 2020, the first such service to call the Columbia River since Hanjin Shipping withdrew in 2015.

In addition to international imports and exports, domestic coastwise cargos also move in and out of the Columbia River system. The domestic cargos are mostly inbound petroleum products, shipped in tanker vessels and barges.¹⁶

The study evaluates 16 cargos for their sensitivity to changes in pilotage (**Table 5**).

Table 5: List of Cargos Evaluated in the Sensitivity Analysis

Cargo	Vessel Type	Pilotage Cost per Transit	2018 Columbia River Tons	2018 Cargo Value per Ton	Typical Shipment Size (Tons)	Cargo Value per Shipment
Auto Import / Export	Pure Car Carrier	\$47,146	692,900	\$14,279	5,600	\$82,071,467
Bentonite Clay / Copper Conc.	Handymax Dry Bulk	\$28,336	434,000	\$1,061	24,000	\$25,469,826
Cement	Handy Dry Bulk	\$24,145	677,500	\$45	31,000	\$1,402,893
Container	Container Medium	\$55,926	< 10,000	\$3,033	21,600	\$65,512,154
Container ¹⁷	Container Small	\$40,290	< 10,000	\$3,033	7,200	\$21,837,385
Corn	Panamax Dry Bulk	\$37,333	13,701,574	\$188	65,000	\$12,209,568
Fertilizers	Handymax Dry Bulk	\$28,336	412,000	\$264	40,000	\$10,572,816
General Breakbulk	Handymax - General Cargo	\$33,854	520,000	\$767	10,000	\$7,667,308
Gypsum	Panamax Dry Bulk	\$37,333	389,000	\$13	48,000	\$624,000
Liquid Bulks	Liquid Bulk Carrier	\$25,851	~2,000,000	\$699	20,000	\$13,980,000
Logs	Handymax - General Cargo	\$33,854	1,960,319	\$217	35,000	\$7,583,598

¹⁴ Assumes Small Container vessel type, \$40,000 in pilotage cost, \$160,000 in terminal charges (400 containers handled), and \$50,000 in other port costs.

¹⁵ See **Attachment 4: Top 10 Columbia River Exports and Imports (Thousands of Metric Tons)**.

¹⁶ See **Attachment 5: Columbia River Domestic Coastwise Shipments – 2018 (Metric Tons)**.

¹⁷ Container value per ton based on Seattle/Tacoma in 2018. "Container Small" assumes 200 inbound and 200 outbound containers. "Container Medium" assumes 600 import and 600 export containers.

Cargo	Vessel Type	Pilotage Cost per Transit	2018 Columbia River Tons	2018 Cargo Value per Ton	Typical Shipment Size (Tons)	Cargo Value per Shipment
Potash	Handy Dry Bulk	\$24,145	3,642,552	\$254	30,000	\$7,624,468
Soda Ash	Handy Dry Bulk	\$24,145	4,197,947	\$202	30,500	\$6,154,787
Soybeans	Panamax Dry Bulk	\$37,333	5,334,783	\$369	65,999	\$24,354,373
Steel Slab	Handymax - General Cargo	\$33,854	632,000	\$552	35,000	\$19,320,000
Wheat	Handymax Dry Bulk	\$28,336	12,383,460	\$247	45,000	\$11,101,187

4.3. SENSITIVITY ANALYSIS BY CARGO

Based on a qualitative analysis, and in the opinion of this study's author, the study groups Columbia River cargos by the degree of responsiveness: Most Responsive, Responsive, and Least Responsive (Table 6).

Table 6: Responsiveness of Cargo to Changes in Port Cost

Most Responsive	Responsive	Least Responsive
Medium Container Small Container	Automobiles Bentonite Corn Copper Concentrate Logs Soda Ash Soybeans Steel (Vancouver)	Cement Fertilizers Gypsum Steel (Kalama) Liquid Bulks Potash Steel Slab Wheat Wind Energy

Of the different types of cargos carried by Columbia River vessels, the study concludes that container cargo is the most sensitive to pilotage costs due to the:

- Strength of competing Puget Sound ports in the local market,
- Small local market size,
- Depth constraint of the Columbia River navigation channel,
- Portland's geographic position relative to the typical PNW container service routing, and
- Sensitivity of liner services to higher port costs dues to the frequency of calls.

The following analysis describes the factors that make each cargo less sensitive or more sensitive to changes in pilotage cost.

Container

Summary. The market position of the Columbia River is very weak compared to other major U.S. port areas.

- ⊕ **Barge.** Portland has access to the upriver container market through by barge service.
- ⊕ **Drayage Cost.** Overland transportation to the Puget Sound ports, over congested rails lines and highways, can be costly for shippers.
- ⊕ **Shipper Preference.** Local-area importers and exporters prefer direct Portland service, in part to avoid drayage costs to more distant ports.
- ⊕ **Terminal.** Portland possesses a large, modern, fully equipped container terminal that has on-dock rail.
- ⊖ **Channel Depth.** A significant disadvantage in the container market is the 43-foot depth of the Columbia River channel, which is a constraint to most of the container vessels deployed to the West Coast of North America. This constraint limits Portland to container services with Panamax and smaller Post-Panamax (approximately 6,500-TEU capacity or smaller) vessels.
- ⊖ **Local Market.** The size of the local market also constrains the ability of Portland to attract container service. Portland has a relatively small population and local import market compared to other U.S. container ports. It has access to a more sizable export market, but routing decisions by transpacific carriers are based more on the availability of import cargo. On average, an import container generates two to three times more freight revenue than an export container.
- ⊖ **Hinterland.** Container cargo has a high value per ton, especially for import cargo, and can support inland transport over long distances. It is thus feasible for container carriers to serve the Portland local market from container terminals in Seattle and Tacoma. The Seattle/Tacoma container hinterland overlaps much of the Portland container hinterland.
- ⊖ **Ocean Routing.** Portland's geographic position and the Columbia River transit are also viewed as disadvantageous by some container carriers. Many transpacific container services call facilities in both British Columbia and Puget Sound. Adding a Portland call can add two or more days to a typical PNW service rotation.



Photo Source: Port of Portland

- ➖ **Port Costs.** Port costs, including pilotage, are repeated with frequency on scheduled vessel calls. This repetition of high costs can be of greater concern to operators of liner services as these costs. This concern is especially important for weekly container services.

Automobiles

Summary. Although Columbia River ports currently enjoy hub status for the import and export of automobile cargo, existing Columbia River vehicle imports and exports are nonetheless susceptible to capture by competing ports.

- ➕ **Market Share.** Portland and Vancouver are long-established vehicle trade hubs with 91 percent of the PNW's and 54 percent of the USWC's combined import and export market.
- ➕ **Rail.** Approximately 65 percent of all the vehicles shipped through Columbia River ports are distributed to or from the U.S. Midwest, making rail connectivity is a critical factor in port selection. The Portland area is also a major domestic automobile distribution hub, which, in combination with the import/export activity, creates a critical mass for vehicle distribution by rail.
- ➕ **Land.** The ports of Portland and Vancouver have been able to provide the large tracts of land for the automobile storage required by automobile importers and exporters. Potential port competitors cannot easily offer these large tracts of land.¹⁸

- ➕ **Vessel Draft.** Even though vehicle carriers are large in terms of GRT, they rarely draft more than 35 feet and thus are easily accommodated by the Columbia River's 43-foot navigation channel.



Photo Source: Port of Portland

- ➖ **Liner Service.** Automobile ocean carriers operate much like liner services, calling multiple West Coast ports on a regular schedule on each voyage. The additional transit time and pilotage cost associated with a Columbia River call is an obstacle to attracting and retaining automobile cargos. Port costs, including pilotage, can be of greater concern to operators of liner services as these costs are repeated with frequency on scheduled vessel calls.
- ➖ **High-Value Cargo.** Automobiles are a high value per ton cargo that can support inland distribution over long distances. Some automakers import their vehicles to the Portland area through Puget Sound and California ports. There are terminals in Tacoma and Grays Harbor that compete with Columbia River ports for automobile cargo.

Potash and Soda Ash

Summary. Columbia River ports currently have a strong market position in both soda ash and potash due mainly to superior rail access to the sources of production. This strong market position

¹⁸ In 2018, Wallenius Wilhelmsen Solutions (WWS) signed a 30-year lease with the Port of Tacoma to develop a 90-acre automobile import terminal. WWS is relocating a facility from Los Angeles that had become land constrained.

makes shipments relatively inelastic to changes in port costs in the short run. However, in the long run, high port costs could drive the cargo to other port areas. This risk may be greatest with soda ash, where shippers have not made any significant investments in Columbia River facilities.

⊕ **Rail.** Both cargos enjoy excellent rail connectivity to the origin mining areas – Wyoming (soda ash) and Saskatchewan (potash) – along the water-grade Columbia River rail route. Columbia River ports are the closest U.S. ports to the sources of production.

⊕ **Significant Investments.** Canpotex has made significant investments in its Portland export facility.

⊖ **ANSAC Changes.** Ciner has terminated its membership in ANSAC, a joint venture soda ash producer that serves as a marketing and logistics company for its members. ANSAC is the primary shipper through the Portland soda ash terminal, leased to Kinder Morgan. This dissolution increases the risk that soda ash exporters will look for new export facilities outside of the Columbia River.



Photo Source: Port of Portland

⊖ **Port Competition.** Canpotex can shift shipments from the Portland to its export facility in British Columbia in response to higher port costs. Some soda ash shippers can also use US Gulf terminals to handle exports from Wyoming.

⊖ **Global Competition.** Production of soda ash from Turkey, which came online in 2017, presents a new challenge to Columbia River exports.¹⁹

Soybeans and Corn

Summary. The market position of Columbia River ports is strong due to rail efficiency, lower ocean transportation costs to Asia, and massive investment in terminal capacity. Demand for Columbia River ports in the corn/soybean cargo market is relatively inelastic, i.e., shipments through the ports are relatively unresponsive to changes in port costs. However, U.S. suppliers and overseas consumers have some degree of port choice, and higher port costs can have a marginal impact on the overall volume of Columbia River exports.

⊕ **Rail & Proximity to Production.** Columbia River ports are the closest West Coast seaports to the corn and soybean production areas in the Upper Midwest (North Dakota, South Dakota, Minnesota, Nebraska). The position of Columbia River ports in corn and soybean exports from

¹⁹ "Soda ash production in Turkey rose in 2018 when a 2.5-million-ton-per-year plant opened all of its production lines after several months of operational delays. Total production capacity in Turkey is estimated to be between 4 million and 5 million tons and soda ash shipments, especially for export, are expected to increase significantly over the next few years." U.S. Geological Survey, *Mineral Commodity Summaries*, February 2019

these production areas improved with the introduction of shuttle train systems in the mid-1990s, allowing for more efficient transport of bulk grain by rail.²⁰

- ⊕ **Capacity and Investment.** Massive investments in Columbia River terminal capacity have strengthened the Columbia River's market position over the past ten years. Other U.S. West Coast ports cannot duplicate the level of investment, assuring a strong market position for the foreseeable future.
- ⊕ **Ocean Transport Costs.** Columbia River ports are well-situated to be a conduit for U.S. grain and soybean exports by vessel to Asia relative to ports in the U.S. Gulf and South America. According to data published by USDA, the grain vessel rate to Japan from the PNW is \$25.5 per metric ton as compared to \$46.8 per metric ton from the U.S. Gulf.²¹
- ⊖ **U.S. Port Competition.** Columbia River export elevators compete with facilities in the Puget Sound and U.S. Gulf. The two export facilities in Puget Sound have the same relative ocean and rail advantages. U.S. Gulf ports enjoy the benefit of low-cost barge transportation that can offset its higher ocean transportation costs to Asia.
- ⊖ **Overseas Competitors.** The U.S. competes in global corn and soybean markets with suppliers in South America, primarily Brazil and Argentina. Brazil has already surpassed the United States as the world's biggest soybean exporter.

Wheat

Summary. Wheat is the bedrock cargo for Columbia River ports. Shipments of wheat will be relatively unresponsive to changes in port costs.

- ⊕ **Location.** Columbia River ports provide a natural export gateway for wheat produced in the PNW and Upper Midwest, including Montana, Wyoming, North Dakota, and South Dakota.
- ⊕ **Rail.** Rail access to inland wheat elevators along the water grade Columbia River corridor is excellent. Increasing volumes of wheat have shifted to shuttle train delivery, improving rail efficiency.
- ⊕ **Barge.** Columbia River export elevators enjoy the ability to receive shipments by barge, which is especially efficient for wheat grown near the Snake River.

²⁰ Shuttle systems are 110 railcar unit trains that travel as a single block of railcars from origin to destination, with no need for processing (disassembling inbound trains and reassembling outbound trains) at classification yards.

²¹ Agricultural Marketing Service, USDA, *Grain Transportation Report*, page 20, January 23, 2020. Data from O'Neil Commodity Consulting.

COLUMBIA RIVER PILOTAGE STUDY



- ⊕ **Specialized Infrastructure.** Columbia River export elevators are designed and equipped to handle wheat, whereas the two Puget Sound export elevators are not.
- ⊕ **Market Demand.** Wheat exported from the Columbia River, such as soft white wheat and hard red spring wheat, have strong demand in Asian markets. PNW wheat has a quality advantage in certain markets.
- ⊖ **Global Competition.** Both Canada and Australia can produce wheat that is of comparable quality to U.S. PNW wheat. Other wheat producers, such as Russia, have been improving their wheat quality.

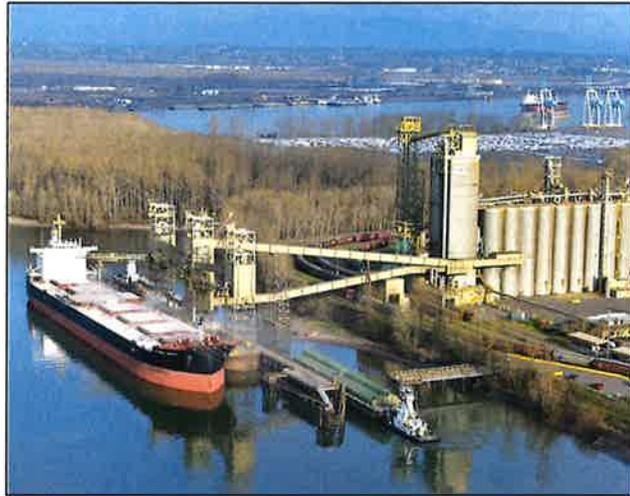


Photo Source: Port of Portland

Bentonite Clay and Copper Concentrate

Summary. Bentonite clay and copper concentrate are dry bulk cargos that are exported in relatively small volumes and are sometimes co-loaded on the same vessel. Both cargos benefit from efficient rail access to Columbia River ports.

- ⊕ **Location and Rail.** Columbia River ports are the closest seaports to the origins of both bentonite clay (Wyoming) and copper concentrate (Montana). Rail access to these origins along the water-grade Columbia River corridor is excellent.
- ⊕ **Terminal Infrastructure.** Columbia River ports have the existing dry bulk handling facilities suitable for handling these cargos, whereas other potential seaport gateways do not.
- ⊖ **High-Value Cargo.** Copper concentrate has a high value per weight for a bulk cargo – \$1,834 per metric ton – which makes transport to a port outside of the Columbia River potentially more feasible.
- ⊖ **Investment.** Copper concentrate and bentonite have not invested in Columbia River terminals, making it easier for them to transfer shipments to another port area.

Import Dry Bulks: Cement, Fertilizers, and Gypsum

Summary. Fertilizers, cement, and gypsum are direct inputs to local construction, agricultural production, and manufacturing. These cargos are relatively unresponsive to changes in port costs.

- ⊕ **Fertilizers.** Columbia River ports are the closest seaports to the Columbia River Basin and Willamette Valley agricultural regions and are thus the most efficient gateways for fertilizer imports to those areas.

- ⊕ **Cement.** Throughout the country, cement import facilities are located in or near major cities where demand is greatest. Because of the higher cost of rail and truck transport, importers strive to substitute lower-cost water transportation where possible.
- ⊕ **Gypsum.** Columbia River gypsum imports are offloaded directly to a wallboard manufacturing plant in Rainier, Oregon.

Logs

Summary. Log exports tend to ebb and flow with the strength of domestic demand and global competition. After peaking at 3.9 million tons in 2013, Columbia River log exports declined to 2.2 million tons in 2018 due in part to the strength of the U.S. housing markets.

- ⊕ **Location.** Longview and Astoria are located within cost-effective trucking distance – generally 50 miles or less – from log production areas.
- ⊕ **Rail.** Logs from the Willamette Valley can be efficiently transported by rail to Rainier, OR, and then trucked across the river to a log export terminal in Longview.

Breakbulk / General Cargo

- ⊕ **Steel Slab.** A steel mill in North Portland remanufactures the steel slab imported through Vancouver. The slabs weigh 20 to 30 tons each, making long-distance inland transport costly. This cargo is relatively insensitive to changes in Columbia River pilotage costs.
- ⊕ **Steel (Kalama).** More than 200,000 tons of steel coil is imported annually to a remanufacturing plant in Kalama. This Kalama cargo is likely to be unresponsive to short-term changes in pilotage costs.

- ⊕ **Wind Energy.** Columbia River ports handle high, wide, and heavy shipments associated with wind energy development in the PNW region. Columbia River ports have a superior truck, rail, and barge transport system to this wind energy development region.



Photo Source: Port of Portland

- **Steel (Vancouver).** Breakbulk steel, including pipe, is also imported to Vancouver for distribution to the PNW region by truck and rail. Given this wider distribution to multiple consumers throughout the region, this cargo is likely more sensitive to changes in port costs than the steel imported to Kalama.
- ⊖ **Wood Pulp.** Wood pulp is the largest volume export cargo shipped in breakbulk from the Columbia River. This cargo is subject to containerization and shipment through Puget Sound ports.

Liquid Bulks

- ⊕ Each year, more than 150 tankers, tugs with oil barges in tow, and articulated tug barges deliver approximately 2 million tons of refined petroleum products for consumption in the Portland-Vancouver area and transshipment to river barge for delivery to the eastern Oregon and Washington. Refined petroleum products are also delivered to the area by pipeline, and the total amount delivered by water will vary by demand and pipeline capacity. Demand for waterborne shipments of petroleum products is likely to be unresponsive to changes in port costs.

- ⊕ Other tanker activity includes imports of sodium hydroxide, toluene, and ammonia. These cargos are primarily consumed as inputs to the local industry and are likely to be unresponsive to changes in port costs.

APPENDIX A: RATEMAKING PROCESS

REGULATORY BACKGROUND

Oregon maritime pilot groups are private contractors that collect fees directly from vessels that use their services. The Board sets the rates the pilots may charge via a public tariff.

Oregon law ([ORS 776.115](#)) directs the Board to "Fix, at reasonable and just rates, pilotage fees..." and that "the board shall give due regard to the following factors:

- The length and net tonnage of the vessels to be piloted.
- The difficulty and inconvenience of the particular service and the skill required to render it.
- The supply of and demand for pilotage services.
- The public interest in maintaining efficient, economical and reliable pilotage service.
- Other factors relevant to the determination of reasonable and just rates."

Oregon Administrative Rule (OAR) [856-030-0000](#) addresses the substantive elements of ratemaking in more detail (**Attachment 1**).

Four key existing Board orders direct the current process to make the tariff:

- Final Order 10-01, "In the Matter of the Petition of the Columbia River Pilots for a Change in Pilotage Rates," issued May 19, 2010 ("**Order 10-01**").
- Final Order 10-02, "In the Matter of the Petition of the Columbia River Bar Pilots for a Change in Pilotage Rates," issued May 19, 2010 ("**Order 10-02**").
- Final Order 14-01, "In the Matter of the Petition of the Columbia River Bar Pilots for a Change in Pilotage Rates," effective April 15, 2014 ("**Order 14-02**").
- Final Order 18-01, "In the Matter of Automatic Cost of Living Adjustments...", effective November 30, 2018 ("**Order 18-01**").

REVENUE TARGET

The first step of the ratemaking process is to determine a just total revenue level. The Board sets the total revenue amount by determining these components:

- Target Net Income
- Target Gross Income
- Number of Pilots
- Expenses Required to Provide Service

Target Net and Gross Income

The Board determines per-pilot Target Net Income ("TNI") in consideration of the factors listed in OAR [856-030-0000 \(1\)](#). In May 2019, the Board reported that the TNI for both pilotage groups was to \$276,258.²²

As reported to the Board by the pilotage groups, for the year ended December 31, 2018, the "Net (Cash) Available Distribution Per Pilot" was \$340,260 for CRBP and \$384,940 for COLRIP.²³

TNI is grossed up to Target Gross Income ("TGI") by the addition of per pilot benefit expenses, including pension, medical, and equipment allowance.

Expenses

Operating Expenses

The tariff revenue requirement includes the operating expenses of the pilotage groups.

Transportation Expenses – Bar

The tariff funds Bar transportation costs related to the operation of the helicopter service, pilot boats, and associated services. These transportation system costs are adjusted quarterly to reflect actual costs and forecasted vessel transits.

The tariff also funds actual Bar pilot boat mortgage costs through a pilot boat surcharge that is adjusted quarterly to the number of vessel transits.

The tariff also pays actual fuel costs for the helicopter and boats. These fuel costs are allocated quarterly to the number of vessel transits in a "pass-through" charge.

Other Expenses – River

In addition to TGI and operating expenses, the 2010 rate order for the River also included payments to retirees and expense reimbursements as revenue requirements to be funded by the tariff, subject to inflation indexing.

Number of Pilots

Bar

In 2010, the Board found "15 FTE pilots as the necessary to perform prompt and efficient pilotage on the Columbia Bar Pilotage Ground and approve the Settlement Agreement formula for calculating the number of fulltime equivalent pilots."²⁴ (**Order 10-02**, p.8.)

²² Beginning in 2019, the Board began conducting a biennial review of the tariff process ([OAR 856-025-0055](#)). As part of this tariff review process, the Board is directed to provide the "current target net pilot income, as adjusted pursuant to any automatic adjustments ordered, in a cover letter." On May 31, 2019, the Board reported that TNI was \$276,258 for both pilot groups. This TNI was presumably effective on December 1, 2018 – the date of the CPI adjustment prior to the Board's TNI report.

²³ Columbia River Bar Pilots LLC, Astoria, Oregon, [Financial Statements for the Year Ended December 31, 2018](#), and, Columbia River Pilots, [Special Purpose Financial Statement Year Ended December 31, 2018, with Independent Accountant's Review Report](#).

²⁴ "FTE" = Full-Time Equivalent. The Board adopted a Settlement Agreement between the CBRP, the Ports of Longview, Vancouver, Kalama, and Portland, and the Columbia River Steamship Owners Association (CRSOA) in Order 10-02.

COLUMBIA RIVER PILOTAGE STUDY



The Settlement Agreement approved by the Board provides a quarterly adjustment to the number of tariff-funded Bar pilots based on a work-load factor of 233.33 vessel transits per pilot per year. (**Order 10-02**, Appendix A, Exhibit A, p. 9.) The number of pilots is calculated by dividing the number annual vessel transit projection by the work-load factor (233.33), adding one (1) to include the pilot administrator, and then adding 10 percent to the total. The 10 percent factor is capped at 1.5. For example:

- (a) 2,886 projected vessel transits = 12.37 pilots (2,886 divided by 233.33) plus 1 (administrator) = 13.37 pilots
- (b) 10% factor: 13.37 times 10% = 1.34
- (c) Total Funded Pilots: 13.37 plus 1.34 = 14.71

In 2014, the Board amended the FTE adjustment mechanism for the Bar to set a floor or minimum of 17.07 pilots. (**Order 14-01**) If the FTE adjustment results in FTE less 17.07, the FTE funded by the tariff is set to 17.07.

CRBP reported 16.93 actual FTEs in 2018.²⁵

River

In 2010, the Board set the number of River pilots to be funded by the tariff at 43 FTE. (**Order 10-01**, p 13.) This 2010 order assumed the following:

- (a) Annual projection of 1,443 one-way transits (2,886 total transits),
- (b) 2.8 pilot assignments per one-way transit
- (c) Annual projection of 4,040 pilot assignments (1,443 one-way transits x 2.8)
- (d) Work-load factor: 106 assignments per pilot per year
- (e) Two (2) administrator pilots

The Board also established the following mechanism to adjust the number of River pilot FTEs if needed:

The current quarterly estimated number of assignments is 1,010. If the actual number of assignments exceeds 1,037 per quarter for two consecutive quarters, the tariff will be revised to reflect an additional FTE and increased vessel traffic. For each additional 27 assignments per quarter for two additional consecutive quarters, the tariff will be revised to provide funding for an additional FTE and increased vessel traffic. (**Order 10-01**, p 7.)

Since 2010, the FTEs funded by the tariff has been increased twice by the Board per this adjustment mechanism. In January 2011, the funded FTEs funded was increased by 5.16 percent from 43 to 45.22. In April 2014, following a spike in the two-quarter average of assignments, the number of

²⁵ CRBP Financial Statements (2018)

funded FTEs was increased another 13.12 percent, bringing the total number of tariff-funded River pilots to 51.15 FTEs.²⁶

The Board has interpreted the 2010 rate order to only allow for upward adjustments to the number of River pilot FTEs funded by the tariff. The Board has not adjusted the number of funded FTEs since 2014.

COLRIP reported 45.69 pilot FTEs in 2018.²⁷

AUTOMATIC TARIFF ADJUSTMENTS

The Oregon Pilotage Tariff identifies five automatic rate adjustments mechanisms: number of pilots and TGI, inflation, fare-box benefit expenses (pension), fuel pass-through cost, and traffic-related increases. The Bar tariff incorporates adjustments for vessel size (draft feet and GRT) and the number of pilot assignments in each quarterly adjustment.

Number of Pilots

The FTE adjustment mechanisms for the Bar and River pilots are described above.

Inflation (Cost of Living)

An annual rate adjustment, effective September 1 of each year, is made to the pilotage rates to reflect changes in the Consumer Price Index ("CPI").²⁸ The amount of the adjustment is the percent change of the CPI for the preceding 12 months ending June 30 of each subject year.²⁹ All River pilotage rates are uniformly adjusted to the change in the CPI. In the Bar pilotage tariff, the CPI adjustment is made to the Target Gross Income and non-transportation expenses.

Pension (Fare-Box Benefit) – River

Per page 2 of the Oregon Pilotage Tariff

Board Order 10-01 continues an annual automatic rate adjustment applicable to the Columbia-Willamette River pilotage ground, to reflect changes in fare-box benefit expenses from deaths or retirements. The adjustment is made pursuant to the formulae prescribed by the order. Each adjustment occurs immediately after the corresponding CPI adjustment. This adjustment does not apply to the surcharges and pension assessments listed in items 1, 9, 10, 11, 14, 15, and 16 of Section 3 or the surcharges in Section 2. The pension assessments are subject to the automatic CPI adjustment.

²⁶ The Board has increased the tariff rates by a fixed 1.790 percent per additional FTE. This study has been unable to ascertain why this particular percentage factor is used rather than the percentage FTE increase over the prior base, e.g., an increase of one FTE from a base of 43 FTE equals 2.325 percent (1 divided by 43) rather than 1.79 percent.

²⁷ COLRIP Financial Statements (2018)

²⁸ Effective September 1, 2018, the Western Region all urban consumers CPI became the index on which the annual automatic cost of living adjustment to the pilotage rates is based, replacing the Portland-Salem all urban consumers CPI, which was discontinued in January 2018. Board Order 18-01

²⁹ OBMP "Summary of Annual Tariff Adjustments."

Traffic-Related Increases – Bar

The 2010 rate order for the Bar includes a quarterly adjustment that provided additional revenue to the Bar pilots in the form of a vessel transit surcharge when vessel transit projection exceeded certain thresholds:

- \$75 when the projection equals or exceeds 3,250
- \$175 when the projection equals or exceeds 3,500
- \$300 when the projection equals or exceeds 3,750

In 2014, the Board stopped making this quarterly adjustment and permanently instituted a Traffic Adjustment charge at the 3,750 projection (\$300). The Board also started applying CPI to the charge, which it had not done before 2014. The "Traffic Adjustment" was set to \$359.38 in the January 15, 2020 tariff.

Vessel Size

OAR [856-030-0000](#) (1), subparagraph (a) directs the Board to consider "...The amount of activity, including number of vessels, number of pilot assignments, size of vessels by gross registered tonnage (GRT), length, and draft..." when determining the number of pilots and pilot compensation.

Bar

The tariff structure for the Bar includes adjustments for tonnage, draft, and pilot assignments for the TGI and non-transportation cost components. Generally, as tonnage, draft, and assignments increase, the rates on tonnage and draft will decrease – and vice versa – all other inputs remaining the same.

River

The tariff structure for the River provides no adjustments based on vessel size or pilot assignments (other than for the calculation of FTEs). Instead, all rates, including those based on GRT, length, and draft, are adjusted only to CPI, the pension calculation, and the number of funded FTEs.

LENGTH CHARGE

For each River transit, there is a "Length Charge," which is assessed as follows: "\$ 348.37 each 50 feet, or fraction thereof, more than 599' LOA, inbound or outbound."³⁰

³⁰ Oregon Pilotage Tariff No. A-10, Section 3, Item 1a

APPENDIX B: VESSEL TRENDS

COLUMBIA RIVER VESSEL TRANSITS AND VESSEL SIZE

This section of the appendix examines the number of Columbia River vessel transits and the average size of Columbia River vessels. The number of transits and vessel size are the primary determinants of pilotage revenue.³¹

Dry bulk vessels account for nearly two-thirds of vessel transits on the Columbia River. In 2018, there were 1,971 dry bulk carrier transits, which was 64 percent of the total 3,060 transits (Table 7).³²

Table 7: Columbia River Vessel Activity – 2018

Ship Type	Transits		Gross Registered Tons (GRT)		
	Transits	Percent of Total	Total GRT	Percent of Total	Average GRT
Dry Bulk Carrier	1,971	64.4%	63,450,887	64.3%	32,192
Vehicle Carrier	360	11.8%	20,995,634	21.3%	58,321
General Cargo	237	7.7%	6,301,025	6.4%	26,587
Liquid Bulk Carrier	147	4.8%	3,384,461	3.4%	23,024
Tug/Supply Offshore Support	130	4.2%	56,582	0.1%	435
Cruise	50	1.6%	3,602,218	3.7%	72,044
Tank Barge	4	0.1%	45,127	0.0%	11,282
Container	2	0.1%	50,966	0.1%	25,483
Other	159	5.2%	786,810	0.8%	4,948
Grand Total	3,060	100.0%	98,673,710	100.0%	32,246

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data

Dry bulk carriers also accounted for 64 percent of the total GRT in 2018. Vehicle carriers accounted for 360 transits (12 percent) and 21 million GRT (21 percent).

Since 2010, following the 2009 recession, when vessel transits dropped precipitously, the number of transits has hovered around 3,000 annually, with the notable exception of 2015 when transits dropped to 2,720 following the loss of Portland container services (Figure 7).

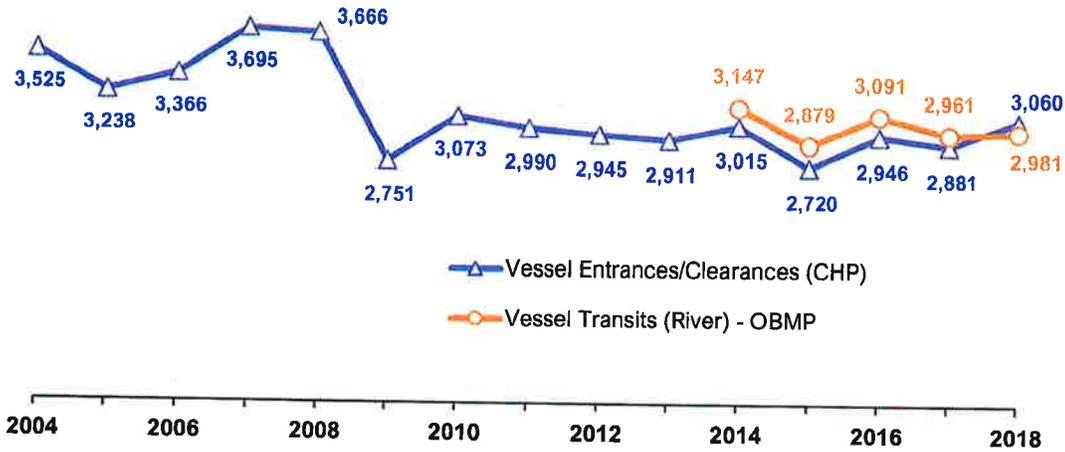
³¹ Vessel transit and GRT data described here is from an analysis of vessel clearances and entrances data compiled by the Customs and Border Patrol ("CHP"). This data includes only foreign-flagged vessels or vessels carrying foreign cargo or passengers. It does not include U.S.-flag vessels in domestic coastwise trade. While CHP data differs from the actual record of pilotages, it nonetheless provides a good approximation of pilotage activity on the Columbia River.

³² There are typically two transits for each vessel calling the Columbia River, one inbound and one outbound.

COLUMBIA RIVER PILOTAGE STUDY



Figure 7: Columbia River Vessel Transits and Pilotages

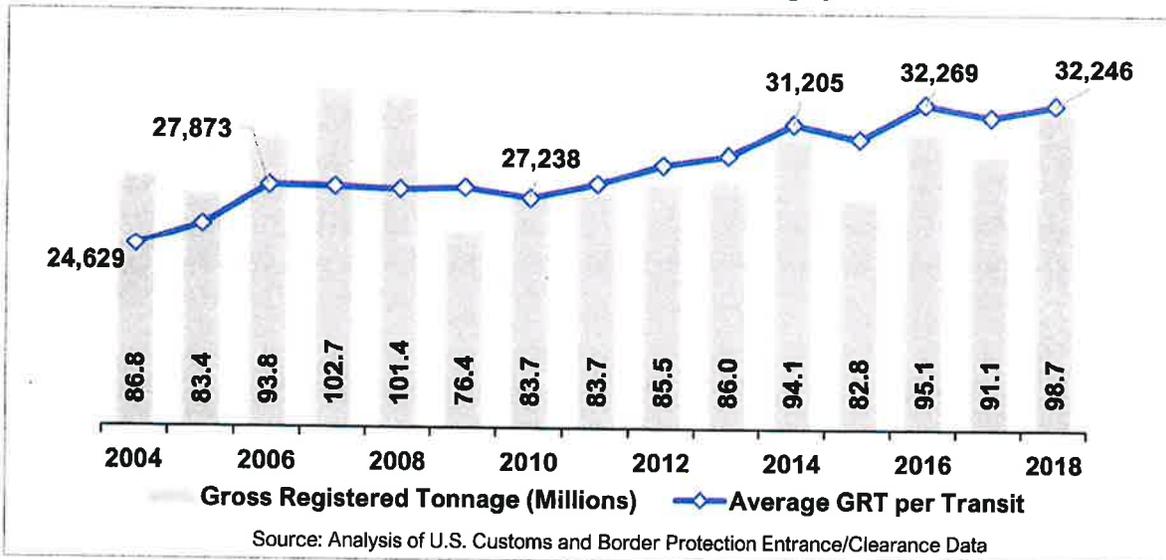


Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data; OBMP Annual Report - 2018.

Dry bulk vessels have sustained the number of Columbia River transits over the past ten years, growing from 1,716 transits in 2008 to 1,971 transits in 2018. The other major vessel categories – vehicle, general cargo, and container – all declined over that period.

Despite the flat trend in vessel transits, the total GRT of vessels increased from 76.4 million in 2009 to 98.7 million in 2018, an increase of 29 percent.

Figure 8: Columbia River Gross Registered Tons, Total and Average per Transit



Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data

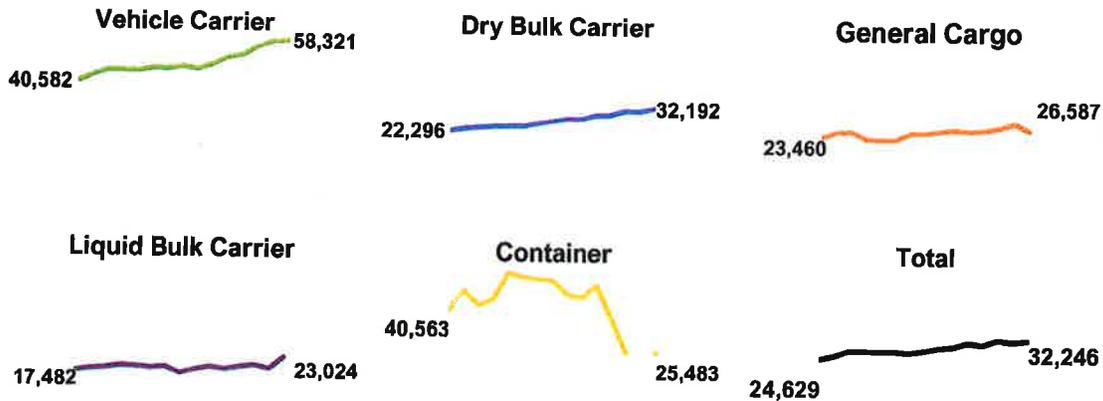
The increasing upward trend in GRT is attributable to the increasing average size of vessels calling the Columbia River. The average vessel GRT increase from 27,238 in 2010 to 32,246 in 2018, an increase of 18 percent.

COLUMBIA RIVER PILOTAGE STUDY



Increasing vessel size is most pronounced in the dry bulk and vehicle carrier ship types (Figure 9). The deepening of the Columbia River in 2010 has encouraged the increased use of Panamax bulk vessels over the smaller Handy and Handymax varieties. Large 6,000-unit pure car carriers ("PCCs") have come to dominate the automobile trades, replacing smaller car carriers and allowing carriers to reduce port calls while maintaining or increasing overall cargo volume.

Figure 9: Columbia River Average GRT per Transit by Ship Type, 2004 - 2018



Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data

Columbia River Vessel Length

The average length of Columbia River vessels has increased from an estimated 592 feet in 2010 to 617 feet in 2018.³³ The estimated percentage of vessels exceeding 600 feet in length increased from 49 percent in 2010 to 63 percent in 2018 (Figure 11). Due to the increased use of Panamax dry bulk ships to transport grain, the percentage of vessels exceeding 700 feet in length increased from 12 percent to 25 percent.

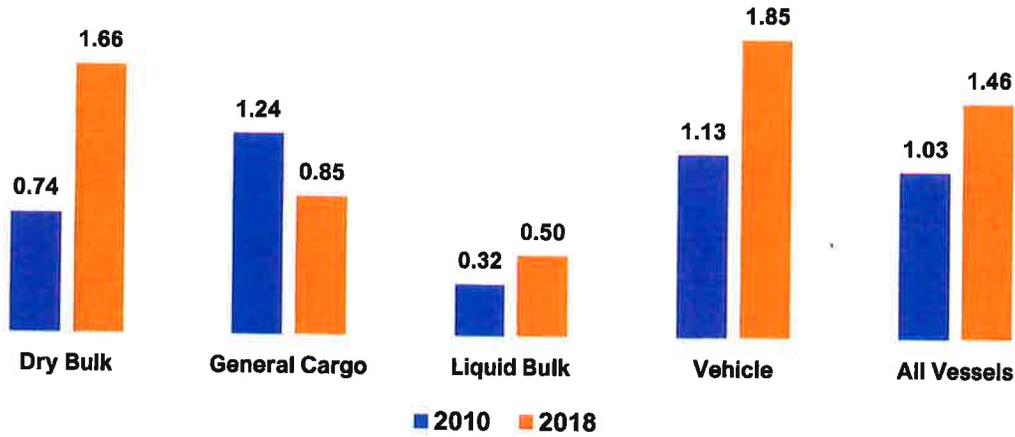
As vessel sizes have increased, so have the number of Length Charges per transit. For example, a typical Handy Dry Bulk vessel with a length of 590 feet would have zero (0) Length Charges, while a typical Panamax Dry Bulk vessel with a length of 738 feet would have three (3) Length Charges. In 2010, there were an estimated 1.03 Length Charges per transit. In 2018, there were an estimated 1.46 Length Charges per transit (Figure 10).

³³ Vessel length has been estimated Hub Consulting by applying conversion factors based on GRT values from the CBP vessel database.

COLUMBIA RIVER PILOTAGE STUDY

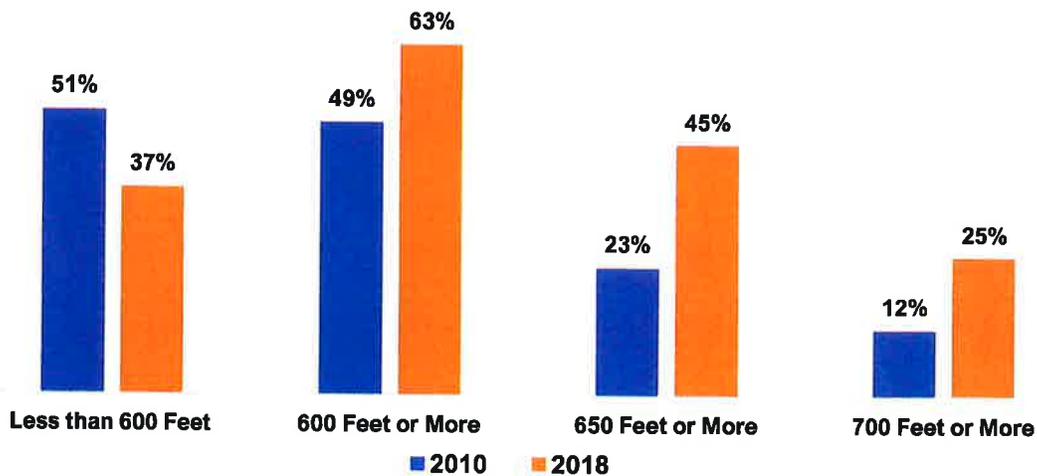


Figure 10: Length Charges per Transit per Vessel Type (Estimated), 2010 and 2018



Source: Hub Consulting estimate based on CBP data

Figure 11: Percentage of Vessel Calls by Vessel Length (Estimated), 2010 and 2018

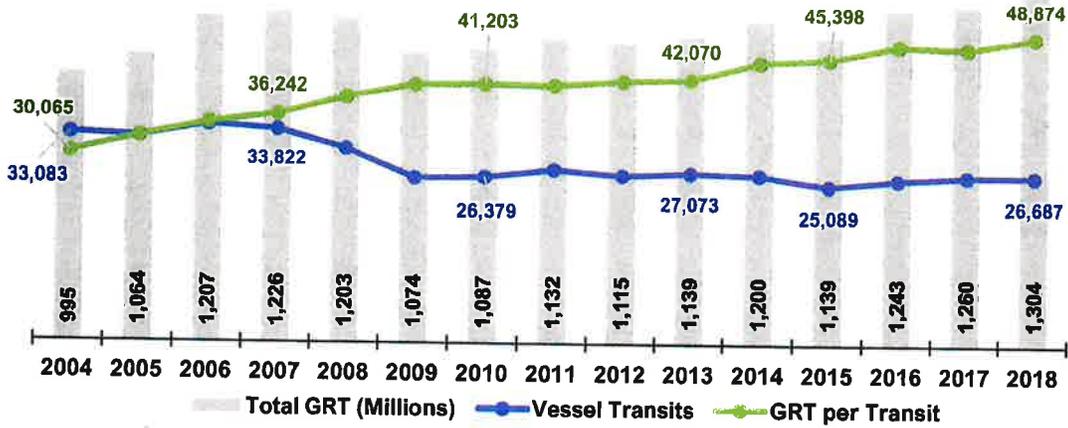


Source: Hub Consulting estimate based on CBP data

Columbia River Vessel Draft

In addition to GRT and length, the average draft of Columbia River vessels has also been increasing. This draft increase is mostly attributable to the deepening of the Columbia River navigation channel from 40 feet to 43 feet in 2010.

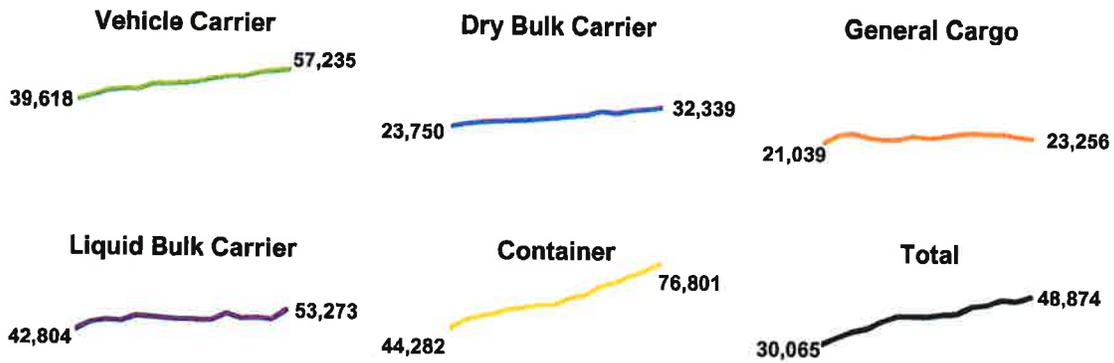
Figure 13: U.S. West Coast Vessel Transits, GRT per Transit, and Total GRT



Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data

As shown in Figure 14, all the major vessel types have experienced size growth since 2004.

Figure 14: U.S. West Coast Average GRT per Transit by Ship Type, 2004 - 2018

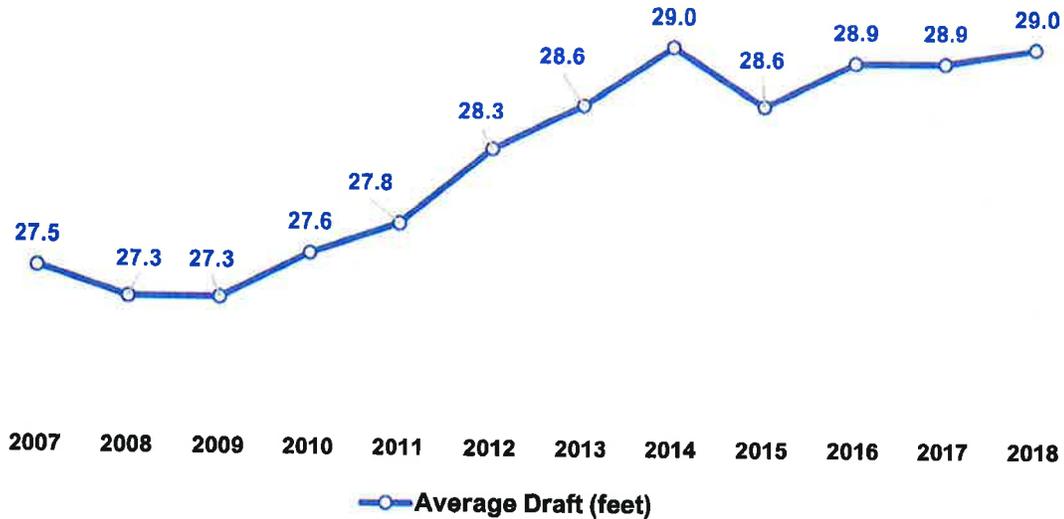


Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data

COLUMBIA RIVER PILOTAGE STUDY



Figure 12: Columbia River Vessels, Average Draft, 2007 - 2018



Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data

U.S. WEST COAST VESSEL TRANSITS AND VESSEL SIZE

The vessel trends for the U.S. West Coast in total are like those for the Columbia River: vessels are getting larger, and the number of transits is flat or declining.

- The average GRT per transit has increased by 19 percent from 41,024 in 2010 to 48,874 in 2018 (Figure 13).
- Over the same period, the number of transits remained almost unchanged (1 percent increase).

Due to increasing GRT per transit, and despite transit numbers remaining flat, the overall total GRT at West Coast ports increased 20 percent from 2010 to 2018.

ATTACHMENTS

Attachment 1: Oregon Administrative Rule (OAR) 856-030-0000

Rate-making — Substantive Elements

The Board shall for each pilotage ground, establish a rate structure that provides for efficient, economical, and competent pilotage services and fair compensation for pilotage services and expenses:

(1) In determining the number of pilot positions needed and fair compensation for services and expenses, the Board shall consider:

(a) The amount of activity, including number of vessels, number of pilot assignments, size of vessels by gross registered tonnage (GRT), length, and draft;

(b) Any change in the amount of activity since the last rate order;

(c) The public interest in prompt and efficient service;

(d) The professional skills and experience required of a pilot and the difficulty and inconvenience of providing the service, including time necessary to perform the service;

(e) Evidence of compensation for comparable maritime professions, including other state regulated pilotage associations;

(f) Evidence of the economic and market conditions existing both locally and within the region of any pilotage association used for the purpose of comparison;

(g) Total gross and net income for the pilots group since the last rate order, or as directed by the Board, including sources of income by tariff category; and

(h) Individual amounts paid to pilots since the last rate order, or as directed by the Board, which may be shown as both gross and adjusted gross income, as reported for tax purposes.

(2) For the purposes of subsection (1)(e) above, the Board shall at a minimum consider evidence of the compensation and benefits provided to pilots in pilotage associations serving Puget Sound and San Francisco.

(3) In determining compensation for expenses the Board shall consider evidence of appropriate expenses related to the provision of pilotage services as shown by records of the pilots group, and verified by an independent audit.

(4) In receiving evidence on any financial or economic issue, the Board or its hearings officer may require parties to submit independently audited or other financial records in order to hold all parties to a comparable standard of proof.

<https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3993>

COLUMBIA RIVER PILOTAGE STUDY



Attachment 2: Pilotage Cost Per Transit, Port Comparison (in US \$)

	Panamax Dry Bulk	Handymax Dry Bulk	Handy Dry Bulk	Handymax - General Cargo	Liquid Bulk Carrier	Pure Car Carrier	Small Container	Medium Container
Columbia River - Bar	\$7,408	\$6,313	\$5,806	\$7,008	\$5,956	\$8,918	\$7,535	\$9,690
Columbia River - River	\$11,258	\$7,855	\$6,266	\$9,919	\$6,970	\$14,655	\$12,610	\$18,273
Columbia River - Bar + River	\$18,666	\$14,168	\$12,073	\$16,927	\$12,926	\$23,573	\$20,145	\$27,963
Fraser Surrey - Ocean	\$4,351	\$3,957	\$3,326	\$4,092	\$3,637	\$3,774	\$4,972	\$6,635
Fraser Surrey - River	\$2,960	\$2,496	\$1,897	\$2,690	\$2,176	\$2,632	\$3,545	\$5,208
Fraser Surrey - Ocean + River	\$7,311	\$6,452	\$5,223	\$6,782	\$5,814	\$6,406	\$8,517	\$11,843
Vancouver BC	\$4,528	\$4,134	\$3,503	\$4,269	\$3,814	\$3,951	\$5,149	\$6,812
Seattle	\$3,455	\$2,247	\$1,791	\$2,953	\$1,864	\$5,093	\$3,631	\$6,096
Oakland	\$5,365	\$3,692	\$2,982	\$4,749	\$3,142	\$7,728	\$5,520	\$8,750
Stockton - Ocean + River	\$9,064	\$7,296	\$6,143	\$8,388	\$6,745	\$11,368	\$9,336	\$12,620
Port Hueneme	\$1,799	\$1,363	\$1,201	\$1,574	\$1,264	\$1,674	\$1,972	\$2,077
Los Angeles	\$2,826	\$2,741	\$2,707	\$2,795	\$2,713	\$2,948	\$2,832	\$2,994

Attachment 3: Pilotage Cost Calculation Examples

Columbia River

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Feet)	853
Breadth (Feet)	106
Draft - Roundtrip Avg (Feet)	35.4

	Quantity	Unit Price	Amount
Bar Pilot Costs			
Per Draft Foot	35.4	\$15,830.80	\$561
Per Gross Registered Ton	41,000	\$0.08200	\$3,362
Transportation Surcharge	1	\$2,803.82	\$2,804
Professional Development	1	\$65.41	\$65
Pilot Boat Surcharge	1	\$304.00	\$304
Fuel Surcharge	1	\$185.89	\$186
Traffic Adjustment	1	\$359.38	\$359
Board Operations Fee	1	\$50.00	\$50
Subtotal Bar Pilot Costs			\$7,691
River Pilot Costs			
Per Draft Foot	35.4	\$35,822.50	\$1,269
Per Gross Registered Ton	41,000	\$0.20050	\$8,221
Transit Fee	1	\$636.53	\$637
Professional Development	1	\$71.21	\$71
Pension Assessment	1	\$321.96	\$322
Each 50' Foot of Length > 599'	6	\$348.37	\$2,090
Board Operations Fee	1	\$0.00	\$0
Subtotal River Pilot Costs			\$12,610
Total Pilotage Costs			\$20,301

*Board Operations Fee: \$50 on inbound Bar; \$50 on outbound River.
Oregon Pilotage Tariff No. A-10 Effective January 15, 2020*

Puget Sound

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Feet)	853
Breadth (Feet)	106
Draft - Roundtrip Avg (Feet)	35.4

	Quantity	Unit Price	Amount
Boarding Fee	1.0	\$348.00	\$348
Tonnage Charge			
0 - 20,000 GRT	20,000	\$0.00840	\$168
20,000 - 50,000 GRT	21,000	\$0.08140	\$1,709
50,000 or more GRT	-	\$0.09740	\$0
Total Tonnage Charge			\$1,877
Transportation Charge			
Seattle	1	\$18.75	\$19
Tacoma	1	\$87.50	\$88
LOA Charge			
Seattle (Zone IV)	1	\$1,387.00	\$1,387
Tacoma (Zone V)	1	\$1,958.00	\$1,958
Total Cost Per Transit			
Seattle			\$3,631
Tacoma			\$4,271

Pilotage rates for the Puget Sound pilotage district. WAC 363-116-300

Effective January 1, 2019, through 2400 hours December 31, 2019

Port Hueneme, CA

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Meters)	260.0
Breadth (Meters)	32.3
Draft - Roundtrip Avg (Meters)	10.8

	Quantity	Unit Price	Amount
LOA Charge	1.0	\$1,804.00	\$1,804
GRT Charge	41,000	\$0.00410	\$168
Subtotal			\$1,972
Total Cost Per Transit			\$1,972

Port of Hueneme Tariff, effective January 1, 2020

Los Angeles, CA

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Meters)	260.0
Breadth (Meters)	32.3
Draft - Roundtrip Avg (Meters)	10.8

	Quantity	Unit Price	Amount
LOA Charge	1.0	\$2,574.00	\$2,574
GRT Charge	41,000	\$0.00630	\$258
Subtotal			\$2,832
Total Cost Per Transit			\$2,832

Port of Los Angeles Tariff, rates as of January 15, 2020

Oakland, CA

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Feet)	853
Breadth (Feet)	106
Draft - Roundtrip Avg (Feet)	35.4

	Quantity	Unit Price	Amount
LDA Charge (per foot)	35.4	\$10.26	\$364
GRT Charge	41,000	\$0.09243	\$3,790
Pension Surcharge (per GRT)	41,000	\$0.02814	\$1,154
Continuing Education	1	\$25.00	\$25
Navigation Technology Surcharge	1	\$40.00	\$40
Subtotal			\$5,372
Board Operations Surcharge		2.75%	\$148
Subtotal			\$5,520
Total			\$5,520
Total Cost Per Transit			\$5,520

*Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun
Rates for SF Bar Pilots in effect January 15, 2020*

COLUMBIA RIVER PILOTAGE STUDY



Stockton, CA

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Feet)	853
Breadth (Feet)	106
Draft - Roundtrip Avg (Feet)	35.4

	Quantity	Unit Price	Amount
LOA Charge (per foot)	35.4	\$10.26	\$364
GRT Charge	41,000	\$0.09243	\$3,790
Pension Surcharge (per GRT)	41,000	\$0.02814	\$1,154
Continuing Education	1	\$25.00	\$25
Navigation Technology Surcharge	1	\$40.00	\$40
Subtotal			\$5,372
Board Operations Surcharge		2.75%	\$148
Subtotal			\$5,520

Total			\$5,520
River Transit			\$3,161
Vessel Length Surcharge			\$655
Total Cost Per Transit			\$9,336

*Board of Pilot Commissioners for the Bays of San Francisco, San Pablo, and Suisun
Rates for SF Bar Pilots in effect January 15, 2020*

Fraser Surrey, BC

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Meters)	260.0
Breadth (Meters)	32.3
Draft - Roundtrip Avg (Meters)	10.8
Pilotage Units	905.9

	Quantity	Unit Price	Amount
Brotchie (Sea) to Sand Heads			
Pilotage Unit Charge	905.9	\$3.9924	\$3,617
GRT Charge	41,000	\$0.01166	\$478
Hours	5	\$229.65	\$1,148
Southern Expense	1	\$552.28	\$552
Brotchie Launch	1	\$445.01	\$445
Pilot Boat Replacement Charge	1	\$60.00	\$60
Launch Fuel Charge - Brotchie	1	\$107.00	\$107
Technology Charge	1	\$50.00	\$50
Subtotal			\$6,457
Sand Heads to Fraser Surrey			
Pilotage Unit Charge	905.9	\$3.9924	\$3,617
GRT Charge	41,000	\$0.01166	\$478
Hours	2	\$229.65	\$459
Technology Charge	1	\$50.00	\$50
Subtotal			\$4,604
Total Cost in Canadian \$			\$11,061
US \$ per Canadian \$			\$0.77
Total Cost Per Transit in US \$			\$8,517

Pacific Pilotage Tariff in effect January 15, 2020

"Pilotage unit" means the result obtained by multiplying the overall length of the ship, by the breadth and the draught of the ship at the time of the assignment and by dividing the product by 100.

COLUMBIA RIVER PILOTAGE STUDY



Vancouver, BC

Vessel Type	Small Container
Gross Registered Tons (GRT)	41,000
Overall Length (Meters)	260.0
Breadth (Meters)	32.3
Draft - Roundtrip Avg (Meters)	10.8
Pilotage Units	905.9

	Quantity	Unit Price	Amount
Brotchie (Sea) to Sand Heads			
Pilotage Unit Charge	905.9	\$3.9924	\$3,617
GRT Charge	41,000	\$0.01166	\$478
Hours	6	\$229.65	\$1,378
Southern Expense	1	\$552.28	\$552
Brotchie Launch	1	\$445.01	\$445
Pilot Boat Replacement Charge	1	\$60.00	\$60
Launch Fuel Charge - Brotchie	1	\$107.00	\$107
Technology Charge	1	\$50.00	\$50
Subtotal			\$6,687
Total Cost in Canadian \$			\$6,687
US \$ per Canadian \$			\$0.77
Total Cost Per Transit in US \$			\$5,149

Pacific Pilotage Tariff in effect January 15, 2020

"Pilotage unit" means the result obtained by multiplying the overall length of the ship, by the breadth and the draught of the ship at the time of the assignment and by dividing the product by 100.

COLUMBIA RIVER PILOTAGE STUDY



Attachment 4: Top 10 Columbia River Exports and Imports (Thousands of Metric Tons)

Export Commodity	CY 2018	YTD 2019 thru Oct.
Corn	13,709	4,709
Wheat	12,730	11,115
Soybeans	5,336	6,013
Soda Ash	4,203	3,687
Potash	3,643	2,587
Logs	2,200	1,246
Petroleum Coke	873	542
Ferrous Scrap Metal	793	581
Copper Concentrates	307	174
Sorghum	265	91
Total – All Export Commodities	45,051	31,393

Import Commodity	CY 2018	YTD 2019 thru Oct.
Cement	677	524
Semi-finished Steel (Slab)	632	379
Motor Cars & Vehicles	585	490
Pebbles, Gravel, Etc.	430	342
Fertilizers (Nitrogenous)	412	372
Gypsum	389	260
Flat-rolled non-alloy steel	314	231
Petroleum Prods (not crude)	228	320
Sodium Hydroxide	201	186
Salt	130	91
Total – All Import Commodities	4,724	3,870

Source: U.S. Census Bureau Trade Data

Attachment 5: Columbia River Domestic Coastwise Shipments – 2018 (Metric Tons)

Commodity	Downbound	Upbound	Total
Gasoline	0	828,636	828,636
Distillate Fuel Oil	0	721,382	721,382
Kerosene	0	472,852	472,852
Lumber	197,566	0	197,566
Wood Chips	0	142,012	142,012
Manufac. Prod. NEC	118,867	8,359	127,226
Lube Oil & Greases	4,024	74,352	78,376
Crude Petroleum	32,399	0	32,399
Sodium Hydroxide	0	8,346	8,346
Residual Fuel Oil	0	1,285	1,285
Grand Total	352,856	2,257,223	2,610,079

Source: U.S. Army Corps of Engineers, Waterborne Commerce of the United States

Attachment 6: Cargo Value per Metric Ton, 2018

Cargo	Cargo Value per Metric Ton - 2018
Automobiles, Import & Export	\$14,279
Container, Import & Export	\$3,033
Copper Concentrate, Export	\$1,863
Breakbulk Steel, Import	\$767
Steel Slab, Import	\$552
Soybeans, Export	\$369
Scrap Metal, Export	\$358
Petroleum Coke, Export	\$343
Fertilizers, Import	\$264
Bentonite Clay, Export	\$258
Potash, Export	\$254
Wheat, Export	\$247
Logs, Export	\$217
Soda Ash, Export	\$202
Corn, Export	\$188
Cement, Import	\$45
Gypsum, Import	\$12

Source: U.S. Census Bureau, Port Trade Data³⁴

³⁴ Based on Columbia River trade in 2018 except for Container, which is based on Seattle and Tacoma container trade in 2018.

COLUMBIA RIVER PILOTAGE STUDY



Attachment 7: Length Charge Analysis, 2018 versus 2010

Length Charge = each 50 feet, or fraction thereof, more than 599' LOA

Year	Vessel Type	Transits	Estimated # of Length Charges	Length Charges per Transit
2010	CONTAINER	161	855	5.31
	CRUISE	18	90	5.00
	DRY BULK CARRIER	1,769	1,312	0.74
	GENERAL CARGO	369	456	1.24
	LIQUID BULK CARRIER	151	48	0.32
	OTHER	124	0	0.00
	TANK BARGE	15	0	0.00
	TUG/SUPPLY OFFSHORE SUPPORT	121	0	0.00
	VEHICLE CARRIER	345	389	1.13
2010 Total		3,073	3,150	1.03

Year	Vessel Type	Transits	Estimated # of Length Charges	Length Charges per Transit
2018	CONTAINER	2	4	2.00
	CRUISE	50	266	5.32
	DRY BULK CARRIER	1,971	3,268	1.66
	GENERAL CARGO	237	202	0.85
	LIQUID BULK CARRIER	147	73	0.50
	OTHER	159		
	TANK BARGE	4		
	TUG/SUPPLY OFFSHORE SUPPORT	130		
	VEHICLE CARRIER	360	665	1.85
2018 Total		3,060	4,478	1.46

Length Charge: \$348.37 each 50 feet, or fraction thereof, more than 599' LOA.
 Per Length Charge (Section 3, Item 1a, Oregon Pilotage Tariff A-10).

NOTE: The length of each vessel is estimated based on vessel type and GRT. Data source: CHP Vessel Entrances and Clearances.

Attachment 8: Tariff Page, Automatic Adjustments

OREGON PILOTAGE TARIFF NO. A-10

Table of Contents

Section 1. GENERAL INFORMATION 3
 Section 2. COLUMBIA RIVER BAR PILOTAGE GROUND..... 6
 Section 3. COLUMBIA AND WILLAMETTE RIVER PILOTAGE GROUND 8
 Section 4. COOS BAY BAR PILOTAGE GROUND.....11
 Section 5. YAQUINA BAY BAR PILOTAGE GROUND13

NOTES:

1. This tariff supersedes the last published rates for Oregon Pilotage Tariff No. A-9. Changes from the last issued rates are noted in bold type. Revisions will be made by printing the revised pages, or reprinting of the entire tariff, subject to the number of revisions.
2. Board Orders 09-02 (Amends Order 08-01), 10-01 & 10-02 continue, for each pilotage ground, to fund Continuing Professional Development (CPD). Each pilotage group is required to report annually to the Board any excess or deficit in fees collected, and all expenditures in connection with CPD. This charge may be adjusted annually to reflect any excess or deficit amounts. Board Order BP 19-01 Changes the formula for adjusting CPD for the Columbia River Bar pilotage ground.
3. Board Order 09-02 for the Coos/Yaquina Bay pilotage grounds initiated a 25% increase in most tariff items effective May 1, 2009, to address a severe decline in shipping.
4. *Helicopter/Pilot Boat Transportation System.* Board Order 10-02 (Columbia River Bar pilotage ground) funds all aspects of the helicopter / pilot boat transportation system with two surcharges in tariff item 1 of Section 2. The surcharge funds the annual cost of the mortgage payments on the pilot boats *Astoria* and *Columbia*. This is a quarterly adjustment based on an annualized vessel transit formula.
5. *Board Operations Fee.* A Board operations fee was approved by the 2013 Legislature to fund expenditures related to regulatory oversight of pilotage in the State of Oregon.

AUTOMATIC ADJUSTMENTS. There are five automatic rate adjustment mechanisms:

- *Inflation:* Board Orders 09-02, 10-01 and 10-02 continue an annual automatic rate adjustment that started September 1993, to reflect changes in the Consumer Price Index (CPI). This adjustment will continue to apply to most tariff items each September as long as this tariff remains in effect. The annual adjustment for 2018 was changed to reflect the deletion of the Portland-Salem area index. The Western Region index will be used instead (Board Order 18-01).
- *Fare-box Benefit Expenses:* Board Order 10-01 continues an annual automatic rate adjustment applicable to the Columbia-Willamette River pilotage ground, to reflect changes in fare-box benefit expenses from deaths or retirements. The adjustment is made pursuant to the formulae prescribed by the order. Each adjustment occurs immediately after the corresponding CPI adjustment. This adjustment **does not** apply to the surcharges and pension assessments listed in items 1, 9, 10, 11, 14, 15, and 16 of Section 3, or the surcharges in Section 2. The pension assessments are subject to the automatic CPI adjustment.
- *Fuel Pass-Through Cost:* Board Order 10-02 continues adjustment mechanism applicable to aviation fuel for the helicopter and diesel fuel for the pilot boats. The adjustments will be made on a quarterly basis on actual fuel expenses during the prior quarter.
- *Number of Pilots/TGI:* Board Order 14-01 continues a quarterly adjustment mechanism for the Columbia River Bar pilotage ground, whereby the number of pilots funded by the tariff and the target gross income will be adjusted quarterly (but not lower than 17.07 FTE) based on changes in vessel transits, billable vessels, average vessel draft and average vessel gross registered tons.
- *Traffic-Related Increases:* Board Orders 10-01 and 10-02 implement a sliding scale for adjusting tariff rates when vessel transit projections exceed certain levels.

Attachment 9: Cargo Information Table

Cargo	Vessel Type	2018 Metric Tons	2018 Cargo Value	Cargo Value / Metric Ton	Vessel Shipment Size (M. Tons)	Shipment Cargo Value	Pilotage Cost	Pilotage Cost / Shipment Cargo Volume
Automobiles, Import & Export	Pure Car Carrier	692,900	\$9,894,000,000	\$14,279	5,600	\$82,071,467	\$47,146	0.06%
Container - Medium, Import & Export	Medium Container			\$3,033	21,600	\$65,512,154	\$55,926	0.09%
Bentonite Clay / Copper Concentrate, Export	Handy Dry Bulk	433,554	\$604,000,000	\$1,393	24,000	\$33,435,308	\$24,145	0.07%
Soybeans, Export	Panamax Dry Bulk	5,334,783	\$1,968,594,938	\$369	65,999	\$24,354,373	\$37,333	0.15%
Steel Slab, Import	Handymax - General Cargo	632,000	\$349,000,000	\$552	35,000	\$19,320,000	\$33,854	0.18%
Container - Small, Import & Export	Small Container			\$3,033	7,200	\$21,837,385	\$40,290	0.18%
Scrap Metal, Export	Handy Dry Bulk	787,418	\$281,913,158	\$358	32,000	\$11,456,707	\$24,145	0.21%
Wheat, Export	Handymax Dry Bulk	12,383,460	\$3,054,913,535	\$247	45,000	\$11,101,187	\$28,336	0.26%
Fertilizers, Import	Handymax Dry Bulk	412,000	\$108,900,000	\$264	40,000	\$10,572,816	\$28,336	0.27%
Corn, Export	Panamax Dry Bulk	13,701,574	\$2,573,696,922	\$188	65,000	\$12,209,568	\$37,333	0.31%
Potash, Export	Handy Dry Bulk	3,642,552	\$925,750,775	\$254	30,000	\$7,624,468	\$24,145	0.32%
Petroleum Coke, Export	Handymax Dry Bulk	873,138	\$299,156,671	\$343	22,500	\$7,709,008	\$28,336	0.37%
Soda Ash, Export	Handy Dry Bulk	4,197,947	\$847,130,014	\$202	30,500	\$6,154,787	\$24,145	0.39%
General Breakbulk, Import	Handymax - General Cargo	520,000	\$398,700,000	\$767	10,000	\$7,667,308	\$33,854	0.44%
Logs, Export	Handymax - General Cargo	1,960,319	\$424,750,571	\$217	35,000	\$7,583,598	\$33,854	0.45%
Cement, Import	Handy Dry Bulk	677,500	\$30,660,000	\$45	31,000	\$1,402,893	\$24,145	1.72%

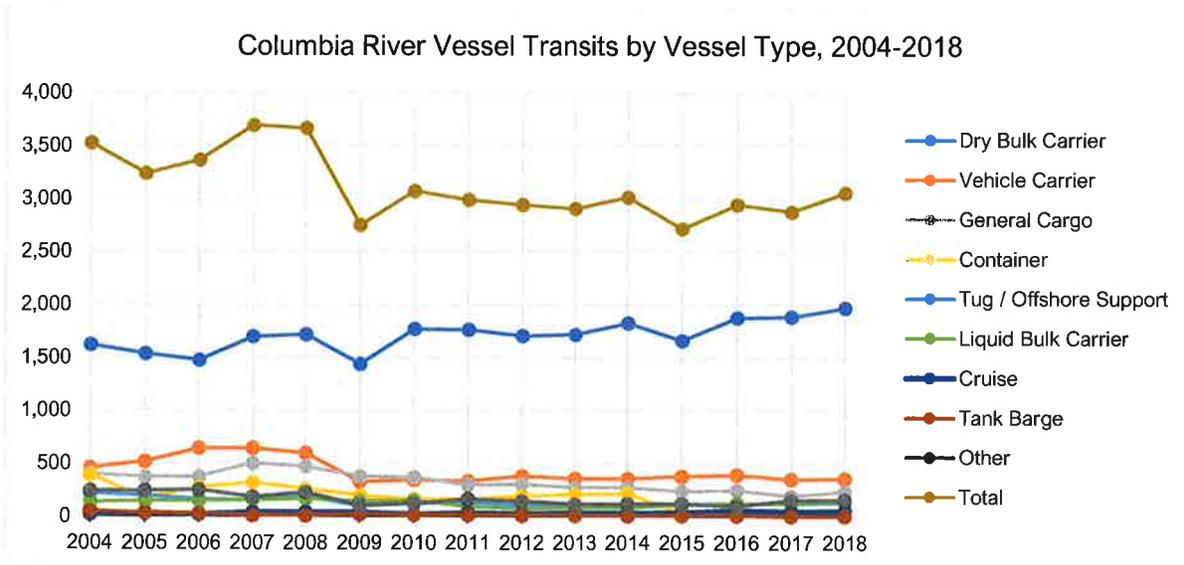
Attachment 10: Cargo Information Table - Additional Calculations

Cargo	Import-Export / Vessel Type	2018 Metric Tons	2018 Cargo Value	Cargo Value / Metric Ton	Vessel Shipment Size (M. Tons)	Shipment Cargo Value	Pilotage Cost
Container - Small	Export	11,320,338	\$13,153,315,596	\$1,162	4,400	\$5,112,443	
			# of Export Ctnrs	200			
			M. Tons / Ctnr	22.0			
	Import	9,530,924	\$56,930,048,915	\$5,973	2,800	\$16,724,941	
			# of Import Ctnrs	200			
			M. Tons / Ctnr	14.0			
	Small Container	20,851,262	\$70,083,364,511	\$3,033	7,200	\$21,837,385	\$40,290
Container - Medium							
	Export	11,320,338	\$13,153,315,596	\$1,162	13,200	\$15,337,330	
			# of Export Ctnrs	600			
			M. Tons / Ctnr	22.0			
	Import	9,530,924	\$56,930,048,915	\$5,973	8,400	\$50,174,824	
			# of Import Ctnrs	600			
			M. Tons / Ctnr	14.0			
	Medium Container	20,851,262	\$70,083,364,511	\$3,033	21,600	\$65,512,154	\$55,926
Bentonite Clay							
		127,000	\$33,000,000	\$260	13,000	\$3,377,953	
Copper Concentrate							
		306,554	\$571,000,000	\$1,863	11,000	\$20,489,072	
	Handy Dry Bulk	433,554	\$604,000,000	\$1,393	Total	\$23,867,025	\$24,145
Automobiles							
	Export	108,100	\$1,655,000,000	\$15,310	2,600	\$39,805,735	
	Import	584,800	\$8,239,000,000	\$14,089	3,000	\$42,265,732	
	Pure Car Carrier	692,900	\$9,894,000,000	\$14,279	5,600	\$82,071,467	\$47,146

Attachment 11: Columbia River Vessel Transits by Vessel Type, 2004-2018

Year	Dry Bulk Carrier	Vehicle Carrier	General Cargo	Container	Tug / Offshore Support	Liquid Bulk Carrier	Cruise	Tank Barge	Other	Total
2004	1,619	456	402	391	216	130	20	51	240	3,525
2005	1,535	516	373	171	194	142	29	34	244	3,238
2006	1,474	642	376	271	160	145	18	27	253	3,366
2007	1,695	643	503	318	155	155	36	8	182	3,695
2008	1,716	596	471	258	185	164	38	9	229	3,666
2009	1,438	329	379	198	101	143	36	19	108	2,751
2010	1,769	345	369	161	121	151	18	15	124	3,073
2011	1,763	332	299	165	130	92	30	14	165	2,990
2012	1,706	382	305	192	108	73	22	10	147	2,945
2013	1,719	358	272	208	115	79	32	10	118	2,911
2014	1,825	359	273	218	100	80	30	9	121	3,015
2015	1,661	381	241	37	119	113	36	11	121	2,720
2016	1,877	396	246	19	122	121	56	11	98	2,946
2017	1,886	353	194		121	123	46	1	157	2,881
2018	1,971	360	237	2	130	147	50	4	159	3,060

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



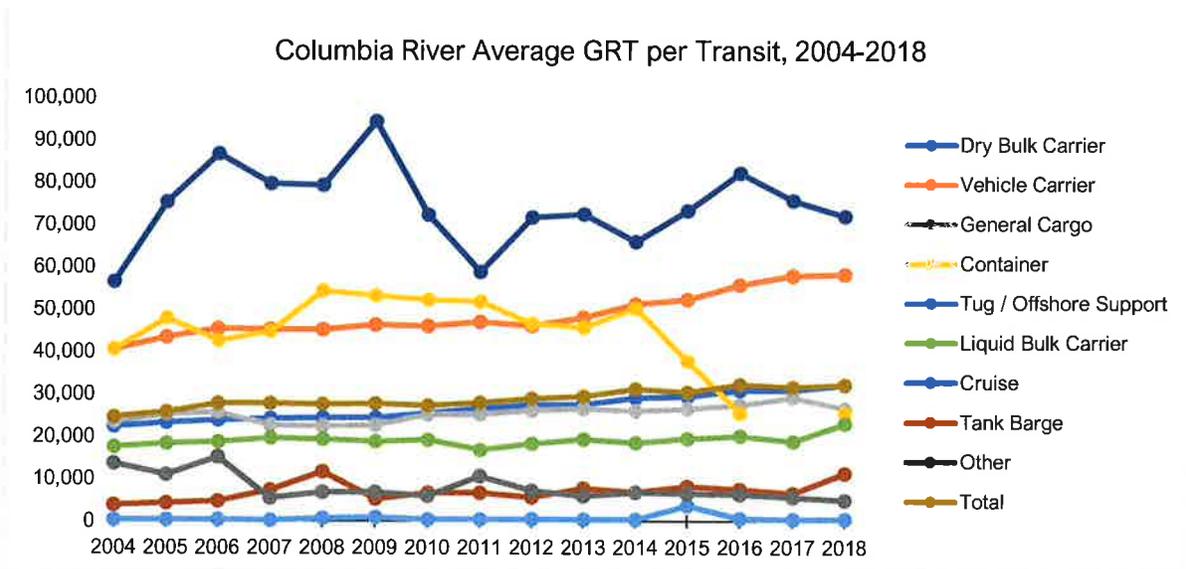
COLUMBIA RIVER PILOTAGE STUDY



Attachment 12: Columbia River GRT per Transit by Vessel Type, 2004-2018

Year	Dry Bulk Carrier	Vehicle Carrier	General Cargo	Container	Tug / Offshore Support	Liquid Bulk Carrier	Cruise	Tank Barge	Other	Total
2004	22,296	40,582	23,460	40,563	270	17,482	56,561	3,851	13,604	24,629
2005	23,270	43,430	25,241	47,937	327	18,337	75,354	4,257	11,047	25,767
2006	23,843	45,451	25,688	42,572	341	18,721	86,710	4,763	15,184	27,873
2007	24,179	45,324	22,595	44,844	230	19,554	79,787	7,335	5,473	27,807
2008	24,375	45,256	22,484	54,403	641	19,290	79,370	11,699	6,877	27,661
2009	24,379	46,397	22,592	53,194	847	18,787	94,435	5,246	6,851	27,782
2010	25,464	46,084	25,119	52,267	377	19,139	72,336	6,678	5,931	27,238
2011	26,551	47,014	25,200	51,893	350	16,778	58,812	6,730	10,635	27,999
2012	27,447	46,168	26,128	46,643	440	18,236	71,810	5,657	7,202	29,018
2013	27,534	48,100	26,548	45,733	402	19,303	72,462	7,752	5,932	29,527
2014	29,172	51,255	26,063	50,214	386	18,484	66,034	6,850	6,800	31,205
2015	29,442	52,377	26,580	37,730	3,623	19,427	73,355	8,238	6,571	30,446
2016	30,859	55,782	27,472	25,483	610	20,096	82,187	7,458	6,323	32,269
2017	30,891	57,972	29,213		378	18,773	75,749	6,576	5,645	31,629
2018	32,192	58,321	26,587	25,483	435	23,024	72,044	11,282	4,948	32,246

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



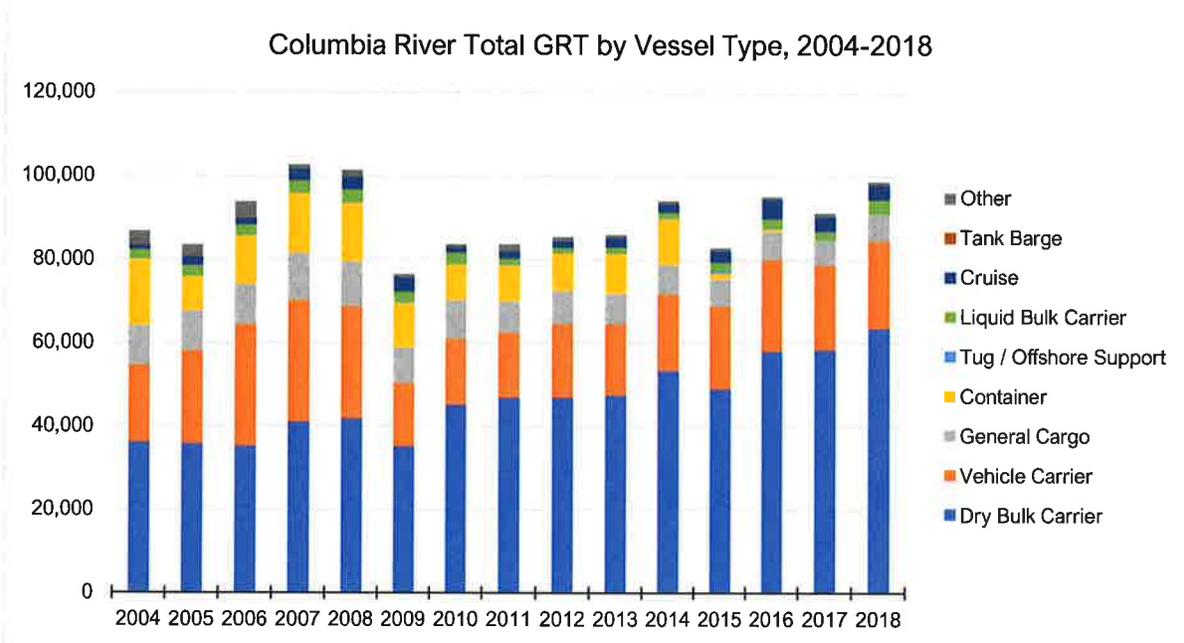
COLUMBIA RIVER PILOTAGE STUDY



Attachment 13: Columbia River Total GRT by Vessel Type, 2004-2018

Year	Dry Bulk Carrier	Vehicle Carrier	General Cargo	Container	Tug / Offshore Support	Liquid Bulk Carrier	Cruise	Tank Barge	Other	Total
2004	36,096	18,505	9,431	15,860	58	2,273	1,131	196	3,265	86,816
2005	35,720	22,410	9,415	8,197	63	2,604	2,185	145	2,695	83,435
2006	35,145	29,180	9,659	11,537	55	2,715	1,561	129	3,842	93,820
2007	40,983	29,143	11,365	14,260	36	3,031	2,872	59	996	102,745
2008	41,827	26,973	10,590	14,036	119	3,164	3,016	105	1,575	101,404
2009	35,057	15,264	8,562	10,532	86	2,687	3,400	100	740	76,428
2010	45,046	15,899	9,269	8,415	46	2,890	1,302	100	735	83,702
2011	46,810	15,609	7,535	8,562	46	1,544	1,764	94	1,755	83,718
2012	46,824	17,636	7,969	8,955	48	1,331	1,580	57	1,059	85,459
2013	47,331	17,220	7,221	9,513	46	1,525	2,319	78	700	85,952
2014	53,238	18,401	7,115	10,947	39	1,479	1,981	62	823	94,083
2015	48,904	19,956	6,406	1,396	431	2,195	2,641	91	795	82,814
2016	57,922	22,090	6,758	484	74	2,432	4,602	82	620	95,064
2017	58,260	20,464	5,667	0	46	2,309	3,484	7	886	91,123
2018	63,451	20,996	6,301	51	57	3,384	3,602	45	787	98,674

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



Attachment 14: Port Areas, Major Ports Included

Columbia / Willamette River	Puget Sound	Long Beach and Los Angeles	San Francisco Bay / San Joaquin R.
Astoria Kalama Longview Portland Vancouver	Anacortes Bellingham Everett Olympia Port Angeles Seattle Tacoma	Long Beach Los Angeles	Stockton San Francisco Sacramento Richmond Redwood City Oakland Carquinez Strait

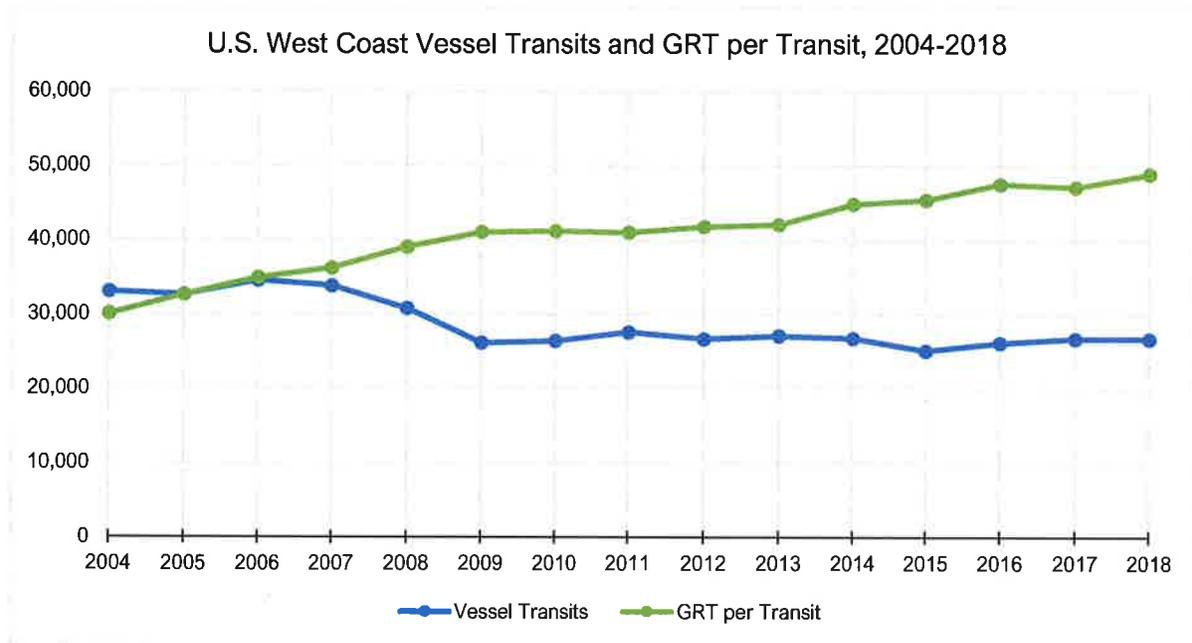
COLUMBIA RIVER PILOTAGE STUDY



Attachment 15: Vessel Transits, GRT, and GRT per Transit, U.S. West Coast Ports, 2004-18

Year	Vessel Transits	Total GRT	GRT per Transit
2004	33,083	994,653,275	30,065
2005	32,623	1,063,770,145	32,608
2006	34,541	1,206,504,871	34,930
2007	33,822	1,225,770,047	36,242
2008	30,788	1,202,790,790	39,067
2009	26,164	1,074,150,852	41,055
2010	26,379	1,086,905,253	41,203
2011	27,591	1,131,884,613	41,024
2012	26,671	1,114,646,402	41,792
2013	27,073	1,138,969,224	42,070
2014	26,764	1,200,156,320	44,842
2015	25,089	1,138,981,824	45,398
2016	26,149	1,243,358,717	47,549
2017	26,726	1,259,655,137	47,132
2018	26,687	1,304,297,950	48,874

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



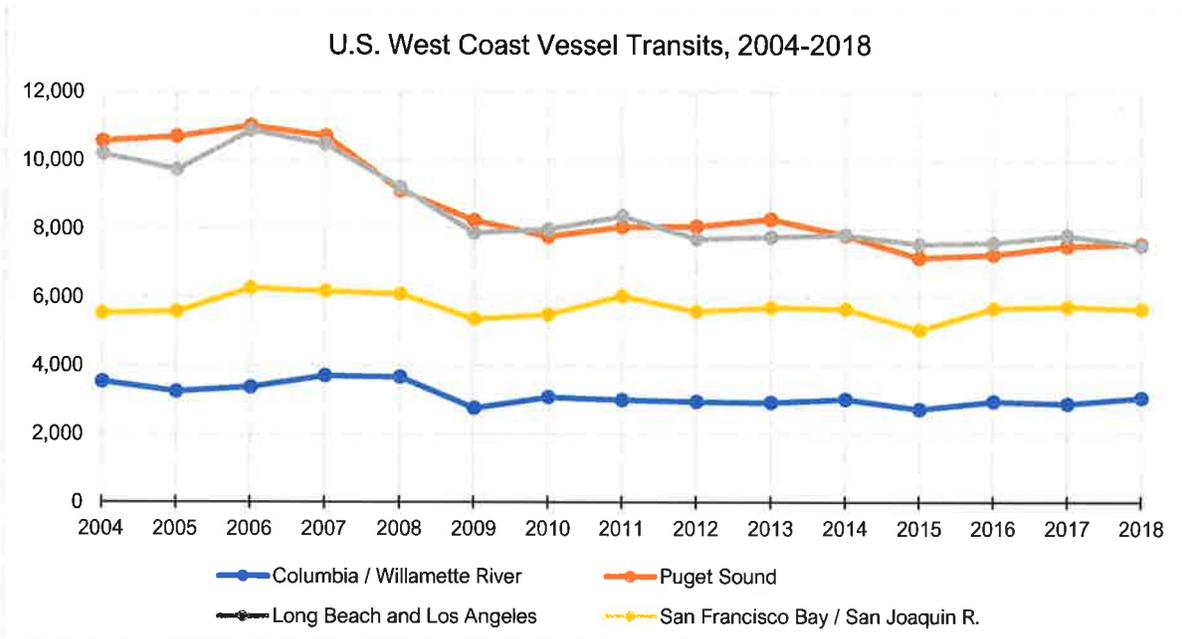
COLUMBIA RIVER PILOTAGE STUDY



Attachment 16: Vessel Transits, Major U.S. West Port Areas, 2004 -18

Year	Columbia / Willamette River	Puget Sound	Long Beach and Los Angeles	San Francisco Bay / San Joaquin R.	Total
2004	3,525	10,573	10,201	5,529	29,828
2005	3,238	10,701	9,741	5,580	29,260
2006	3,366	11,017	10,877	6,264	31,524
2007	3,695	10,725	10,477	6,175	31,072
2008	3,666	9,123	9,222	6,094	28,105
2009	2,751	8,249	7,885	5,361	24,246
2010	3,073	7,776	7,992	5,487	24,328
2011	2,990	8,062	8,384	6,036	25,472
2012	2,945	8,080	7,711	5,589	24,325
2013	2,911	8,283	7,761	5,697	24,652
2014	3,015	7,804	7,835	5,659	24,313
2015	2,720	7,156	7,555	5,041	22,472
2016	2,946	7,257	7,588	5,672	23,463
2017	2,881	7,503	7,806	5,723	23,913
2018	3,060	7,553	7,508	5,650	23,771

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



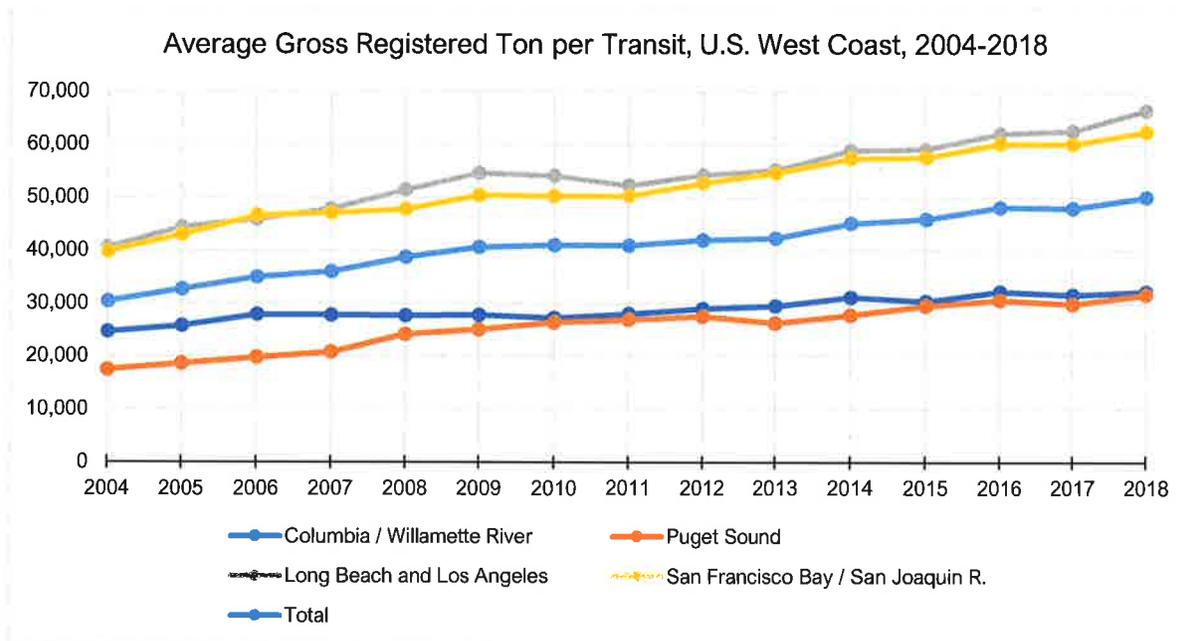
COLUMBIA RIVER PILOTAGE STUDY



Attachment 17: Average Gross Registered Ton per Transit, USWC Port Areas, 2004 -18

Year	Columbia / Willamette River	Puget Sound	Long Beach and Los Angeles	San Francisco Bay / San Joaquin R.	Total
2004	24,629	17,508	40,608	39,773	30,377
2005	25,767	18,617	44,473	43,038	32,673
2006	27,873	19,789	45,894	46,628	34,992
2007	27,807	20,819	47,929	47,128	36,020
2008	27,661	24,167	51,492	47,797	38,712
2009	27,782	25,089	54,635	50,475	40,616
2010	27,238	26,383	54,126	50,279	40,994
2011	27,999	26,913	52,319	50,351	40,957
2012	29,018	27,577	54,325	52,745	42,013
2013	29,527	26,277	55,202	54,621	42,317
2014	31,205	27,762	58,936	57,393	45,132
2015	30,446	29,587	59,197	57,617	45,934
2016	32,269	30,680	62,164	60,228	48,204
2017	31,629	29,895	62,630	60,187	48,040
2018	32,246	31,691	66,558	62,492	50,096

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



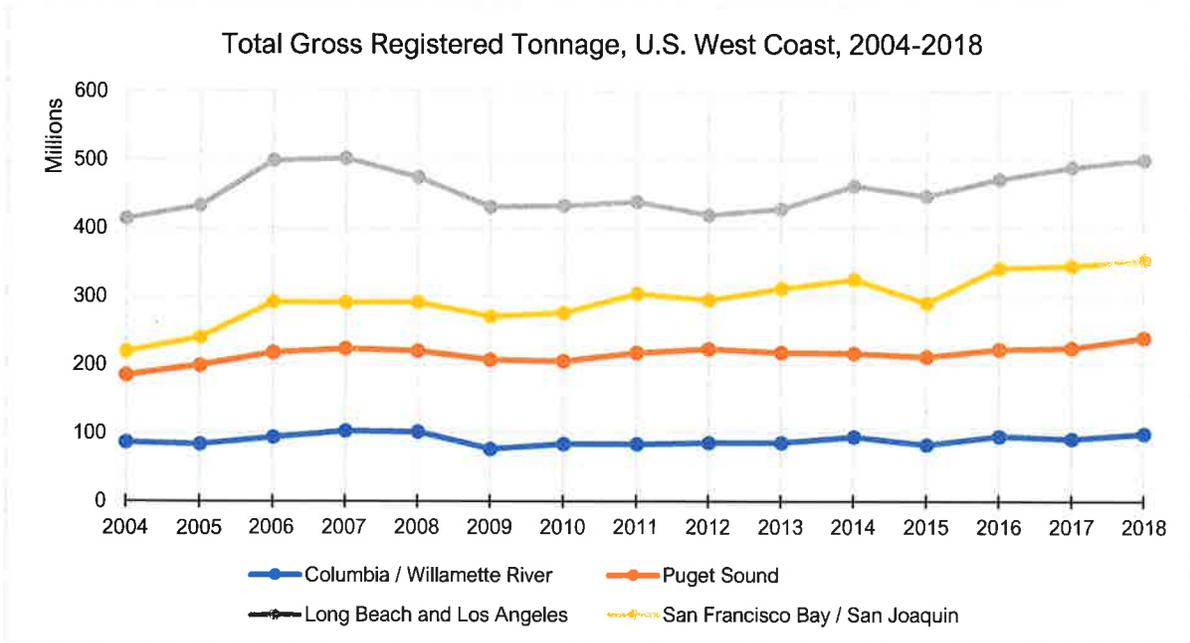
COLUMBIA RIVER PILOTAGE STUDY



Attachment 18: Total Gross Registered Tonnage, Major U.S. West Port Areas, 2004 -18

Year	Columbia / Willamette River	Puget Sound	Long Beach and Los Angeles	San Francisco Bay / San Joaquin	Total
2004	86,816,328	185,115,655	414,243,262	219,905,697	906,080,942
2005	83,434,616	199,217,630	433,216,037	240,150,416	956,018,699
2006	93,820,308	218,012,096	499,190,640	292,075,449	1,103,098,493
2007	102,745,140	223,285,997	502,151,829	291,015,137	1,119,198,103
2008	101,403,930	220,471,787	474,856,257	291,275,055	1,088,007,029
2009	76,427,992	206,961,574	430,798,585	270,594,526	984,782,677
2010	83,702,252	205,153,583	432,577,677	275,880,601	997,314,113
2011	83,718,416	216,976,176	438,646,333	303,915,966	1,043,256,891
2012	85,458,890	222,822,386	418,903,322	294,793,469	1,021,978,067
2013	85,952,357	217,652,430	428,422,693	311,176,462	1,043,203,942
2014	94,083,248	216,653,145	461,759,968	324,789,490	1,097,285,851
2015	82,813,912	211,721,250	447,233,986	290,449,763	1,032,218,911
2016	95,064,304	222,641,235	471,696,843	341,613,897	1,131,016,279
2017	91,123,338	224,302,642	488,891,264	344,451,984	1,148,769,228
2018	98,673,710	239,359,135	499,721,158	353,081,920	1,190,835,923

Source: Analysis of U.S. Customs and Border Protection Entrance/Clearance Data



Attachment 19: U.S. West Coast Total GRT by Vessel Type, 2004 -2018

Year	Dry Bulk Carrier	Vehicle Carrier	General Cargo	Container	Tug / Offshore Support	Liquid Bulk Carrier	Cruise	Tank Barge	Other	Total
2004	23,750	39,618	21,039	44,282	184	42,804	70,596	7,975	7,650	30,065
2005	25,071	41,922	24,311	48,497	270	46,637	77,093	5,947	6,127	32,608
2006	25,708	44,328	24,987	50,670	212	47,823	77,041	8,980	8,616	34,930
2007	26,067	45,314	23,396	51,841	226	47,344	77,733	3,106	4,130	36,242
2008	26,342	45,349	22,543	53,995	276	49,922	78,456	4,154	4,974	39,067
2009	26,773	48,203	22,710	55,095	209	49,584	83,753	3,493	4,615	41,055
2010	27,241	48,394	23,974	56,028	188	48,790	84,041	3,409	4,682	41,203
2011	27,776	48,893	23,245	56,431	195	48,340	81,846	4,986	5,706	41,024
2012	28,418	49,984	24,178	59,828	196	48,311	86,011	3,762	4,556	41,792
2013	28,847	51,673	24,977	61,155	190	48,207	87,709	3,426	4,569	42,070
2014	30,538	53,158	25,326	65,575	168	51,344	84,544	4,088	5,030	44,842
2015	29,758	53,300	24,987	67,663	607	49,024	84,620	4,396	5,466	45,398
2016	30,962	55,559	25,137	70,431	276	49,608	86,258	3,069	4,214	47,549
2017	31,431	56,431	24,073	73,179	271	48,791	83,135	3,267	4,218	47,132
2018	32,339	57,235	23,256	76,801	299	53,273	85,219	3,261	4,298	48,874

