# Appendix A
## Economic Shifts in the Portland Harbor: An Evaluation of Employment, Wages, and Investment

May 31, 2021

Prepared for: City of Portland Bureau of Planning and Sustainability

Final Report

ECONorthwest
ECONOMICS · FINANCE · PLANNING

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# 1. Introduction and Purpose

The City of Portland is currently in the process of updating its Economic Opportunities Analysis (EOA), which will determine how the City plans to accommodate economic growth over the next 20 years. Recognizing the importance of the Portland Harbor to economic growth, and its unique characteristics, the City is conducting a separate study of Marine-Dependent Industrial Land in the Harbor.

As a component of the Portland Marine Industrial Land Analysis (MILA), this section will address three research topics:

1. Identification of sectors of the Harbor economy that are dependent on proximity to marine/rail functions of the Harbor.
2. Evaluate recent investment trends in the Harbor. Identify geographic areas that are increasing or decreasing in investment activity and competitiveness.
3. Assess industry-specific employment and wage trends. Assess which industries and/or geographic areas in the Harbor that are growing and becoming more competitive.

This Economic Shifts Report will be used to inform the MILA's assessment of the land supply and demand balance for marine terminal, production, and service uses in the harbor over the next 20-years.

## Data Sources Used

To conduct this analysis, we used the following data sources:

- **Quarterly Census of Employment and Wages (QCEW) (2003-2018).** Geocoded, firm-level employment data includes average employment, wages, and NAICS[1] industry codes.
- **GIS Data from RLIS and the City of Portland.** In addition to layers available from Metro's RLIS database, we utilized data from the City of Portland and other sources, including:
  - Railroad base layer
  - Intermodal terminals
  - River dependent parcels
  - Location and characteristics of docks over water

[1] North American Industry Classification System

- **Interviews.** Information on Investments industry trends were derived from interviews with public and private sector stakeholders.
- **Secondary Sources.** This analysis is built on secondary sources and existing studies leverage past research efforts. Sources included:
  - Port of Portland's 2020 Marine Cargo Forecast
  - News reports on investment and firm specific employment changes
  - Industry trend/research reports and papers

## Methods and Limitations

QCEW data is a useful analytical resource. The disaggregated nature of the data is powerful in understanding the nuances of local geographies and specific industries. However, QCEW data has several limiting characteristics:

- **Confidentiality.** Care must be taken to preserve the confidentiality of individual firms. At small geographies or detailed industry levels, this can limit data reporting.
- **Covered Employment.** The data is limited to employees covered under unemployment insurance. Sectors that have a high utilization of commissioned workers or gig/contract workers are not accurately represented.
- **Timeliness.** The most recent year available is 2018.
- **Misclassifications.** The data is derived from the self-reporting of individual firms. Firms that classify in NAICS categories that are not related to their core business function or have multiple vertical functions may provide misleading results. This condition is common.

# 2. Study Area Defined

This analysis began by delineating a study area representing where marine and rail dependent firms are located in the Portland Harbor. This delineation started with land having a Harbor Access Land or Harbor and Airport District designation. Harbor and Airport District land located east of I-5 was excluded because there is limited marine-dependent activity in this area. This geography includes:

- Swan Island Industrial Area
- The Willamette Rivergate District Industrial Area (including Terminals 4 and 5)
- The Columbia Rivergate District Industrial Area (Including Terminal 6 and the Marine Drive Corridor)
- The US-30 Corridor from the Northwest Industrial District north to Multnomah Channel
- Close-in industrial properties along the Willamette River from Terminal 2 (west bank) and Ash Grove Cement (east bank) south to the former Louis Dreyfus terminal

## Base Data Set

In 2018, there were 1,239 firms[2] located in the study area geography. These include a broad range of businesses directly and tangentially dependent on marine/rail access, in addition to other firms that are not necessarily dependent on the harbor. Using geocoded QCEW data, we selected a baseline dataset that includes firms that are dependent on the Harbor's transportation infrastructure. Firms were selected using the following criteria:

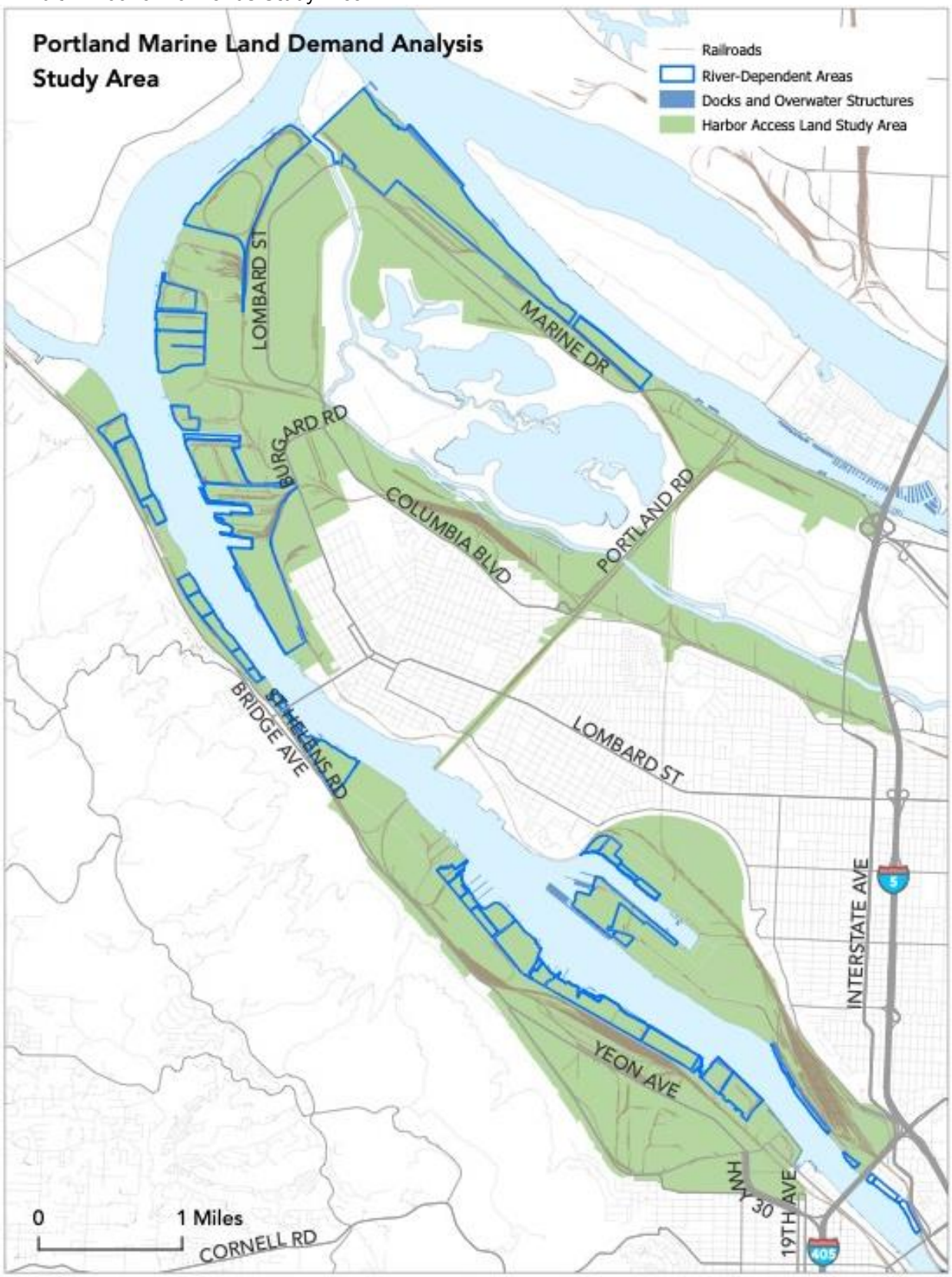
- Firms that were located within 500 feet of a rail line
- Firms located on River Dependent Parcels as defined by the City of Portland
- Firms located within 500 feet of an intermodal terminal
- Firms located within 500 feet of a dock over water

Not all firms in this data set are going to be strictly marine/rail dependent. Nor is the data likely to fully encapsulate firms reliant on the Harbor. However, we would characterize firms in this dataset as a reasonably representative cross-section of the marine harbor economy.

A map demonstrating the study area and these characteristics is included in Exhibit 1. Throughout this report, the term "Portland Harbor" references this base dataset.

[2] Defined as unique geography data points. For example, a business may have business units in multiple locations. In this instance, each location is counted as a unique value.

Exhibit 1. Economic Trends Study Area



# 3. Findings

## Investment

Investment is a reasonable indicator of economic activity and growth. Firms willing to invest in new facilities and equipment have presumably conducted practical due diligence and determined that investments will drive or preserve economic activity. Investment is a proxy for economic activity, intensification, and land utilization. Investments in marine terminals are likely to result in increased throughput capacity. Non-terminal investments are indicative of economic growth and in some cases land consumption in the Harbor.

### Known Investments/Disinvestments

This is an inventory of investments that we have identified through the interview process, industry research, a review of permit and assessor data, or literature review. We expect this section to be updated periodically as the project progresses and more information becomes available. Major investments include:

#### Terminal Investments

- Capacity increases at the Columbia Grain facility at Terminal 5 (2015)
- New ship loading facilities at Kinder Morgan Bulk Terminal (2013)
- Rail and storage tank improvements at International Raw Materials (2014)
- Capacity increases at Louis Dreyfus Commodities grain terminal (2014). This terminal has subsequently ceased operation.
- Road and rail improvements at Rivergate Boulevard (Rivergate Boulevard Overcrossing Project). (2018-ongoing)
- A doubling of capacity at Portland Bulk Terminals (2017)
- Zenith Energy rail capacity increase (2017)
- Initial investments to demolish grain terminal and reposition property at Terminal 4 (ongoing)

#### Non-Terminal Investments

**New Construction/Redevelopment**

- **Amazon Distribution Center in Rivergate (2018).** Roughly 900,000 square foot ground up distribution center.
- **Vigor Vigorous Drydock (2014).** Roughly $50 million investment in the largest drydock in the United States.

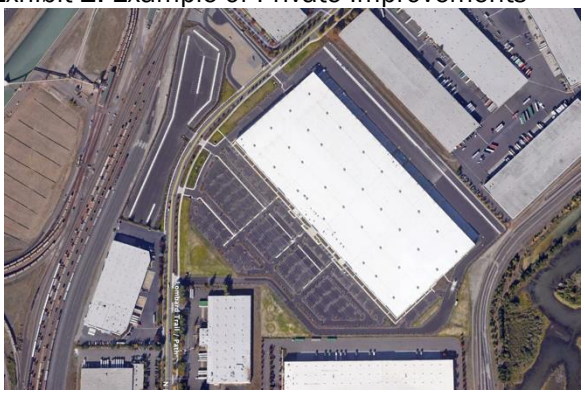
- **Daimler Truck North American Headquarters Campus (2016).** Roughly $150 million investment to complete a 268,000 square foot corporate headquarters building. As a part of the commitment to Portland, Daimler also purchased and leased several buildings on Swan Island to expand its R&D focus on electric and autonomous heavy trucks.
- **FedEx Hub on Swan Island (2015).** Roughly 450,000 square foot ground up destruction center.
- **Portland Community College Swan Island Trades Center (2014).** Redevelopment of 20,000 square foot space. Cost roughly $8.3 million.
- **Parking Improvements on Lots in Rivergate District.**
  - **Parcel: 2N1W26A01200 and 2N1W23D00801**. Parcels were developed for parking along with the Rivergate Amazon Distribution Center in 2018. Total parking development was roughly 7.5 acres.
  - **Parcel: 2N1E3001400.** Roughly 9 acres of this site owned by BNSF expanded parking capacity in 2014.
- **AMD Sweeteners Terminal (2012-2013).** Tear down redevelopment that included a new 32,000 square foot facility, liquid and dry bulk storage, and five-track ladder terminal capable of handling up to 60 rail cars.

**Expansion/Intensification**

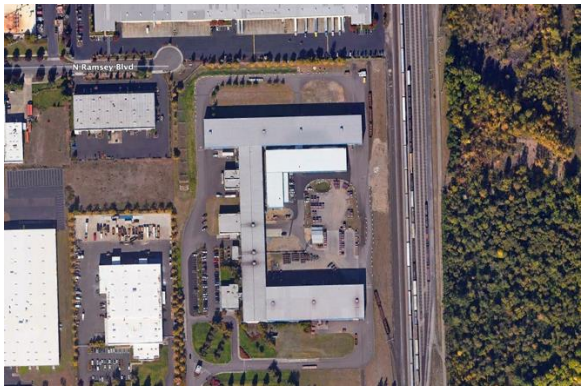
- **Auto Warehousing Company Expansion (2017).** Roughly 18.5-acre parking expansion by Auto Warehousing Company to expand auto cargo capacity.
- **Maruchi Steel (2018) building expansion.** Maruchi Steel, formally Columbia Structural Steel, intensified its existing site with a new 45,000 square foot pre-engineered steel building.
- **Maletis Beverage renovation and expansion (2017).** Maletis completed a year-long renovation of its office building and storage facility on Swan Island. The project included a nearly 20,000 square foot storage expansion and a solar array capable of powering 15 percent of refrigerated storage.

Taken together, these projects resulted in the new development of over 1.6 million square feet of new space (mostly distribution) and the redevelopment/expansions totaling 97,000 square feet. We also note that new space development and parking improvements occurred on several of the few remaining vacant sites available in the harbor.

Exhibit 2: Example of Private Improvements

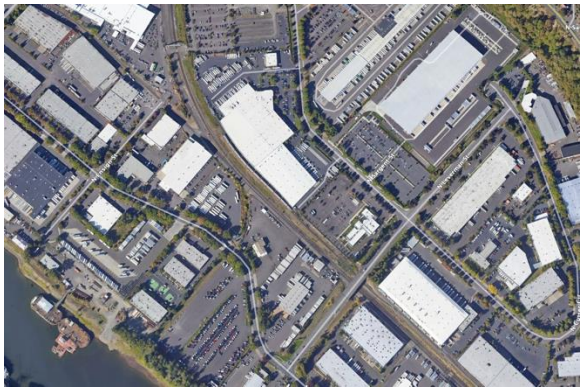


New Amazon Distribution Center (2018)



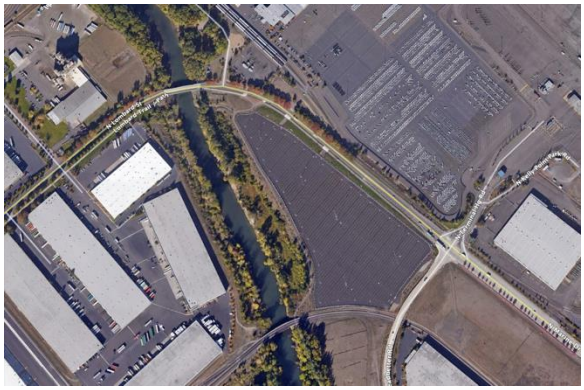

Expansion at Maruchi Steel (2018)

New FedEx Hub (2015)



New PCC Swan Island Trades Center (2014)

AMD Bulk Terminal (2012-13)



Auto Warehousing Company Expansion (2017)

## Planned Investments/Disinvestments

Looking forward, we have identified planned or proposed investments in the Portland Harbor that may experience economic growth and throughput capacity in the foreseeable future. We expect this section to also be updated periodically as the project progresses and more information becomes available through the interview process.

- Implementation of the Rail Master Plan
- Willamette River channel maintenance and expansion
- Infrastructure investments and crane rehabilitation at Terminal 6

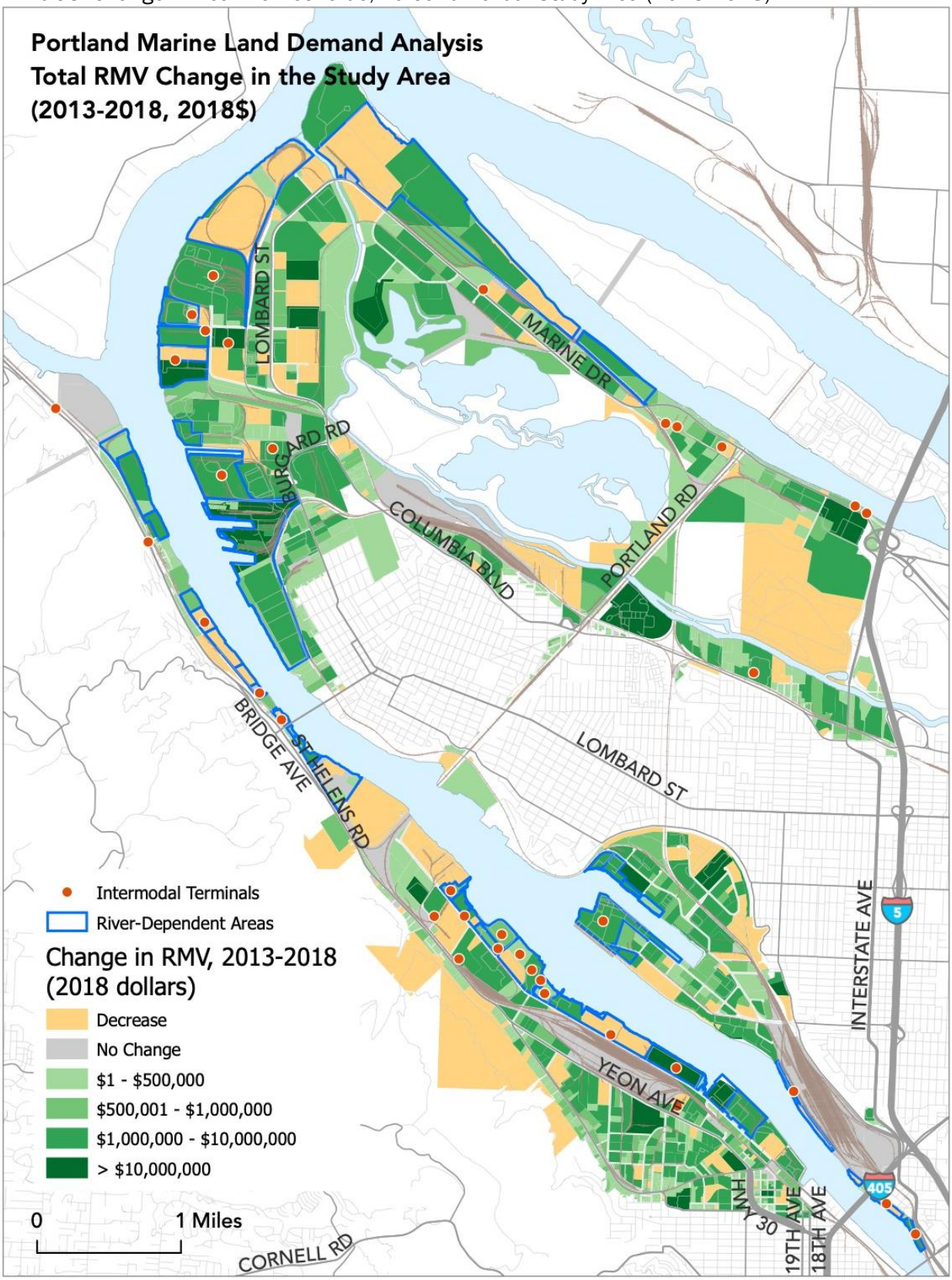
- Continued demolition of grain elevator at Terminal 4 and site/dock investments
- Louis Dreyfus grain terminal ceasing operation (future use is uncertain)
- Long-term prospects of Temco grain terminal ceasing operation

### Shifts in District Valuation

Major capital investments are likely to be associated with an increase in property valuation above and beyond trended market growth. In the map in Exhibit 3, we present the change in real market value at the parcel level in the Harbor between 2013 and 2018. Used as a proxy for identifying investment concentrations, we can draw the following conclusions:

- The data confirms anecdotal identification of recent investments through interviews and secondary sources referenced above.
- Values have increased measurably in the Rivergate District, specifically around Terminal 4 and Terminal 5.
- Close-in waterfront properties have seen some of the largest value gains, including Terminal 2.
- On average, land with liquid bulk facilities along the Highway 30 corridor have seen the lowest value increases.
- Loss in RMV at Terminal 5's Columbia Grain and Portland Bulk Terminal facilities, and at Terminal 6 are data anomalies.

Exhibit 3: Change in Real Market Value, Portland Harbor Study Area (2013-2018)



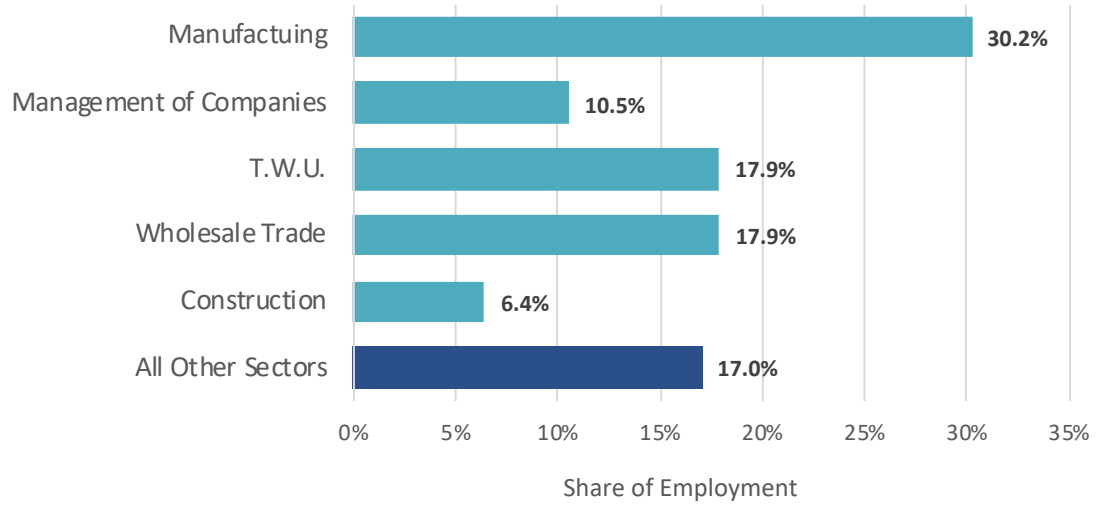
# Employment and Wages

In this section, we evaluate employment and wage trends in the Portland Harbor over the last 15 years. This section will evaluate shifts in economic activity observed in the Harbor with respect to geographic location in the Harbor and sector specific trends.

## Economic Composition of the Portland Harbor

The Portland Harbor maintains its function as a marine-dependent industrial district. In 2018, 72 percent of the economy, as measured by employment, is concentrated in traditionally industrial sectors (construction, manufacturing, transportation and warehousing, and wholesaling). Professional and business services is the largest non-industrial sector. However, in the Portland Harbor this is misleading. A measurable share of professional and business employment is accounted for by corporate functions of manufacturers of industrial goods (i.e. Daimler). This segment accounts for 10.5 percent of employment.

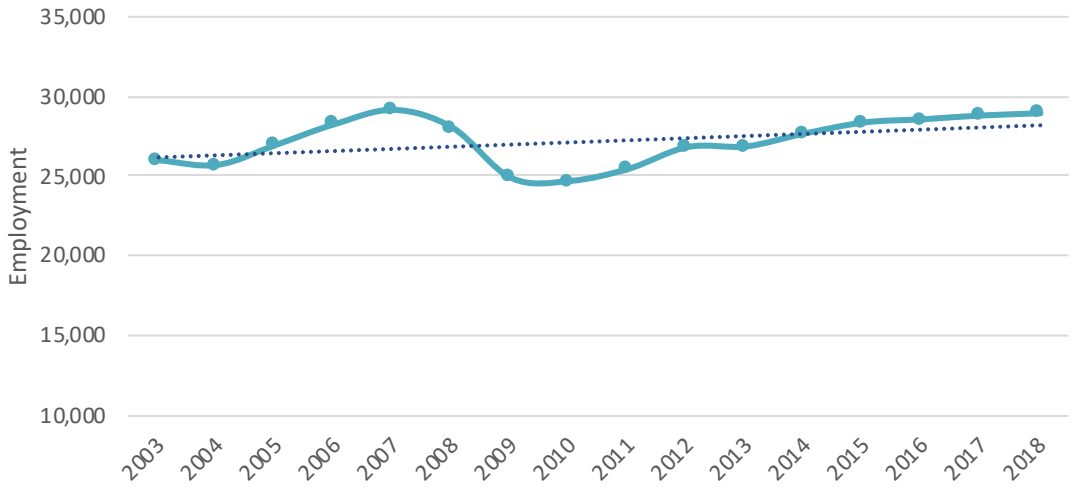
Exhibit 4. Industry Composition of the Portland Harbor, 2018
Source: Quarterly Census of Employment and Wages (QCEW)




## Employment Growth in the Harbor

The Portland Harbor currently employs over 28,700 workers. Over the last 15 years, employment growth has been moderate alongside business cycle volatility. Between the 2007 peak and 2010 trough the Harbor shed over 4,400 jobs. In the recovery since, employment growth has averaged 2 percent annual growth compared to 2.6 percent regionally. Slower than average growth would be expected given the built-out nature of the Harbor.

Exhibit 5. Total Employment Growth in the Portland Harbor, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW)



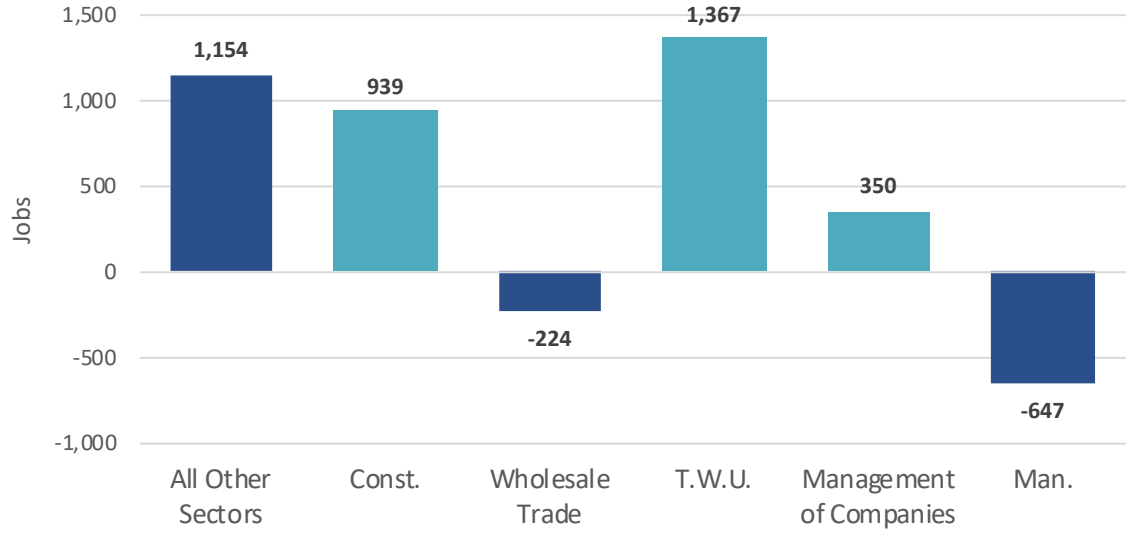

Within industry sectors, the manufacturing sector has been dragged down by contraction in the primary metals, transportation equipment, chemicals, and machinery segments. It is possible that this shift is not as large as data indicates, with growth in "other sectors" professional likely capturing a shift in contract labor utilization. The emergence of the e-commerce sector has driven large increases in the transportation and warehousing sector. These gains have offset declines in marine-cargo handling and other transportation support activities.

## Employment Change by Firm Size

Aside from variance in growth by industry sector, we also observe variance in growth by firm size. Specifically, a large share of employment loses in the harbor have been concentrated in a small number of larger firms. Adjusting for firm size, the bulk of the establishments are exhibiting growth above the total average. A 2019 analysis by the Portland Bureau of Planning and Sustainability found that between 2008 and 2017, industrial employment expanded at a moderate pace when removing several large employers[3]. This is important to consider because large employers do not typically adjust their land utilization quickly in response to cyclical change in labor utilization.

[3] City of Portland, Bureau of Planning and Sustainability. Memo on Northwest Industrial Business Association Job and Wage Trends. May 2019.

Exhibit 6. Employment Growth by Industry Segment, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW)




## Employment Growth by Subarea

The map in Exhibit 7 is a geographical representation of employment growth and contraction in the Portland Harbor over the last five years[4], and area specific observations below characterize broader trends over the last 15 years. Growth has been the strongest on Swan Island, where a concentration of large firms and new firms have led expansion. Other Harbor sub areas have had flat growth overall in the context of a shifting industrial mix led by growth in construction, transportation, distribution, and services offset by contraction in the wholesaling and manufacturing sector.

**Close-In/Highway 30 Corridor.** Stable employment growth and economic recovery from the Great Recession. Shifting industrial mix derived from an evolving Northwest Industrial District.

- Employment has grown at an average annual rate of 1.2 percent over the last five years, but it is currently equal to its 2008 peak of roughly 13,200 employees.
- The manufacturing sector has added 400 jobs over the last five years but remains 12 percent below the 2008 peak. Heavy marine-dependent sectors (metals, machinery, transportation equipment, petroleum and coal products) have grown or remained stable. Declines have been concentrated in printing, food, and to a lesser extend chemicals.
- Strong growth in professional services resulting from the shifting employment mix in the Northwest Industrial District.
- The construction sector has nearly doubled over the last ten years.

[4] Due to confidentiality of QCEW data reporting, the magnitude of reported growth and contraction is intentionally without scale.

**Swan Island Industrial Area.** The least diverse sub area in the Harbor. The sub area's anchor firms have adjusted well in economic cycles, leading to long-term employment growth with cyclical variation.

- Nearly 70 percent of all jobs are located in only 15 firms that employ 100 or more employees.
- Employment has grown at an average annual rate of 2.5 percent over the last five years. Swan Island has seen an increase of over 2,000 jobs over the last 15 years.
- The manufacturing sector shed 1,000 jobs from 2005 to 2010. Employment has rebounded some but remains 14 percent below that 2005 peak. Transportation equipment manufacturing dominates the sector.

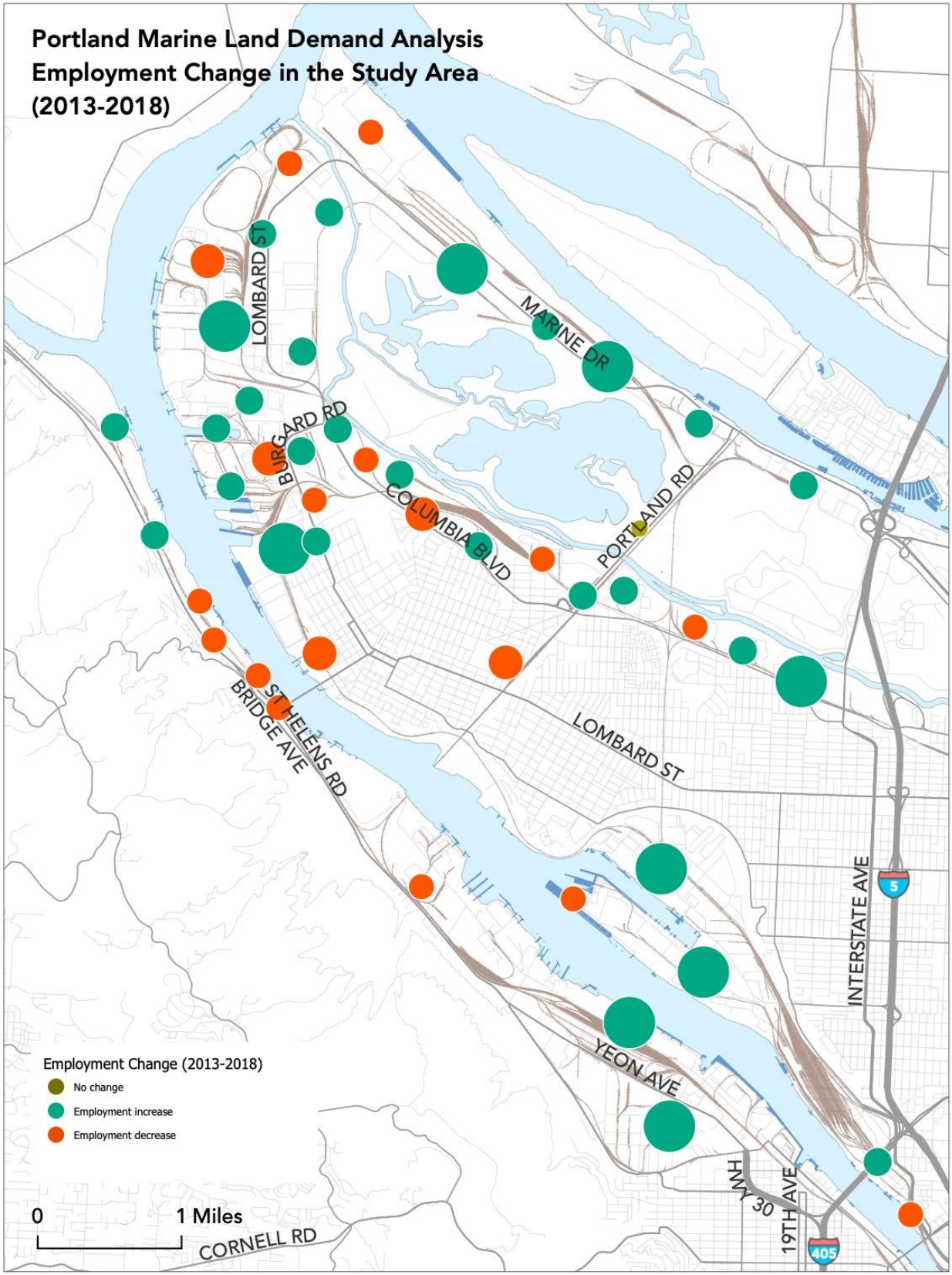
**(Willamette) Rivergate District Industrial Area.** Deceivingly stable total employment includes large shifts across sectors and flat growth. Strengthening competitiveness in the wholesaling and transportation sectors has been offset by a large decline in manufacturing.

- Employment in this section of the Rivergate District has had minimal job fluctuation over the last 10 years. Growth has averaged less than 0.4 percent annually over the last 15 years and is unchanged over the last five years.
- Manufacturing employment has been halved over the last 10 years, shedding nearly 1,000 jobs. Losses have been concentrated in metals, transportation equipment, paper, and food products.
- The wholesaling sector includes Rivergate's metals recycling sector, and the transportation sector includes liquid and dry bulk terminal activity. Several firm reclassifications skew sector specific data within this subset. However, taken together, both sectors have grown by 45 percent over the last 10 years.

**(Columbia) Rivergate District Industrial Area.** Terminal-oriented district with high dependency on marine cargo activity.

- Almost 84 percent of employment is concentrated in the manufacturing and transportation and warehousing sector (which includes terminal operations and marine cargo handling).
- Total employment growth has been flat over the last five years but remains 13 percent below the 2008 peak.
- Manufacturing employment has increased by 2.3 percent annually over the last five years.
- Marine cargo handling employment has contracted measurably, but other transportation support activities have remained stable.

Exhibit 7: Employment Growth and Contraction, Portland Harbor Study Area (2013-2018)



## Marine and Rail Dependent Sector Shifts

In this section, we take a more granular look at the marine/rail dependent production and service sectors of the Harbor economy. Building off the previously established QCEW dataset, we developed six production and service industry profiles. Firms were organized into these groupings in part to meet confidentiality reporting. This process of classification involved:

- Including sectors at the three- and five-digit NAICS level known to be concentrated in marine activities (i.e. marine cargo handling, petroleum bulk stations and terminals, other support activities for water transportation, ship and boat building).
- Including sectors that have companies known to be marine or rail dependent in the harbor.
- Manually adding other companies or sectors based on observations using aerial photography.

Exhibit 8. Major Marine or Rail Dependent Companies in the Portland Harbor, 2018
Source: ECONorthwest

- Owens Corning
- Chevron
- Glacier Northwest
- Ash Grove Cement
- Evraz Steel
- NW Pipe
- Columbia Steel
- Vigor Industrial
- Sulzer Pumps
- Greenbriar Gunderson
- Westrock
- Knife River
- Cascade General
- Lakeside Industries
- NexGen
- Schnitzer Steel
- Calbag Metals
- McCall Oil
- Simplot
- Georgia Pacific
- Columbia Grain
- Kinder Morgan
- International Raw Materials
- NuStar Energy
- Portland Container Repair
- Foss Maritime
- Harley Marine
- BP
- Zenith Energy
- Recology
- CalPortland
- Pacific Rail
- Jones Stevedoring
- Pacific Maritime
- Shaver Transportation
- Toyota Logistics
- Advanced American Construction
- Diversified Marine
- Auto Warehousing Company
- Evans Metal Fabricators
- Phillips

The profiles in the pages below detail the products or service functions of each profile, recent trends or investments impacting the sector's outlook, major firms within each sector, and observed employment and wage trends over the last 15 years.

# Production of Paper Products

The Portland Harbor has several manufacturers of various paper products. Products include packaging, paperboard, cardboard, and printed treated paper products. Local volatility in the data can be in part attributed to the small number of medium-size firms making up the category.

## Major Investments or Industry Changes

- Strong demand growth for packaging is offsetting declining markets for graphic paper. Portland's Harbor's concentration in packaging products may provide stability or growth opportunities as the industry continues to transition.

## Companies in Sector

- Graphic Packaging
- NW Paper Box
- Westrock

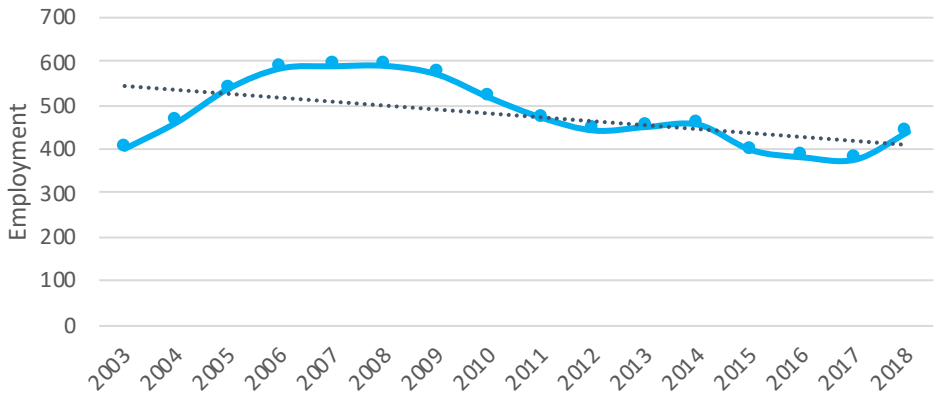
## EMPLOYMENT TRENDS · · · Structural decline in local employment within the sector is consistent with industry trends.

**Current employment is well below the 2007 peak but has turned positive in the last year.**

The Paper Manufacturing sector employed 457 workers in the Portland Harbor in 2018. The 3-year rolling average was up 16 percent over the previous year.

Three-year Rolling Average Employment Level, Portland Marine Dependent Study Area, 2003-2018

Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



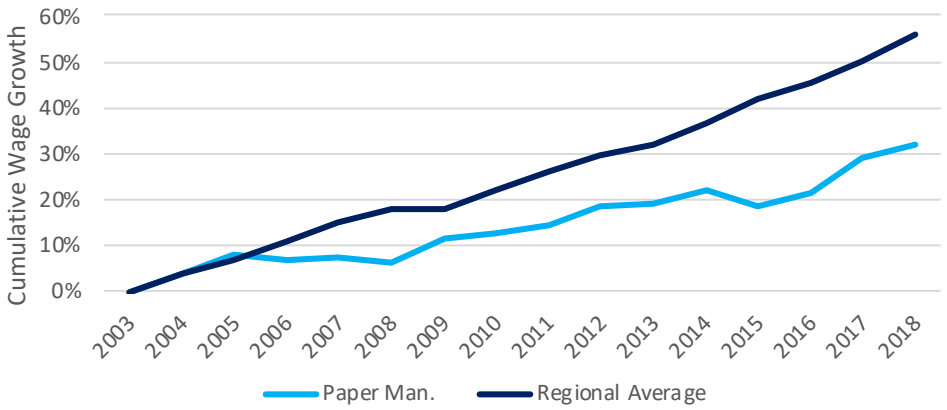

## WAGE TRENDS · · · The Paper Production sector pays slightly above average wages, but wages are growing at a slower pace.

**Wages have increased by 32 percent over the last 15 years compared to a 55 percent gain across all industries in the Portland Metropolitan Area.**

The average wage in the sector was $63,155 in 2018, roughly 3.5 percent higher than the regional average wage.

Cumulative Wage Growth, Portland Marine Dependent Study Area, 2003-2018

Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



# Production of Petroleum, Chemicals, and Minerals Products

The Portland Harbor has a strong concentration of manufactures producing products derived from petroleum, chemical products, and nonmetallic minerals. These products generally serve the construction sector, and include roofing materials, paints, and concrete products.

## Major Investments or Industry Changes

- Graymont investment in capacity improvements at its Rivergate lime production facility.
- The global market for asphalt shingles is expected to expand at a 5.8 percent CAGR over the next five years.

## Companies in Sector

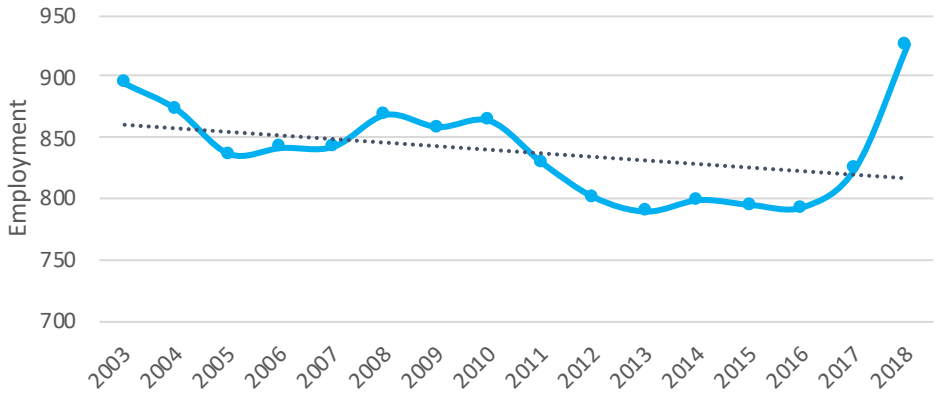
- Owens Corning
- Malarkey Roofing
- Chevron
- Glacier Northwest
- Ash Grove Cement
- Knife River

## EMPLOYMENT TRENDS · · · National construction boom from 2016 pulled the local sector out of a slight downward trend.

**Prior to 2015 the sector was on a downward trend that saw employment down 23 percent from 2003.**

Companies in the sector employed 1,056 workers in the Portland Harbor in 2018. The sector added over 300 new workers from 2015.

Three-year Rolling Average Employment Level, Portland Marine Dependent Study Area, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest

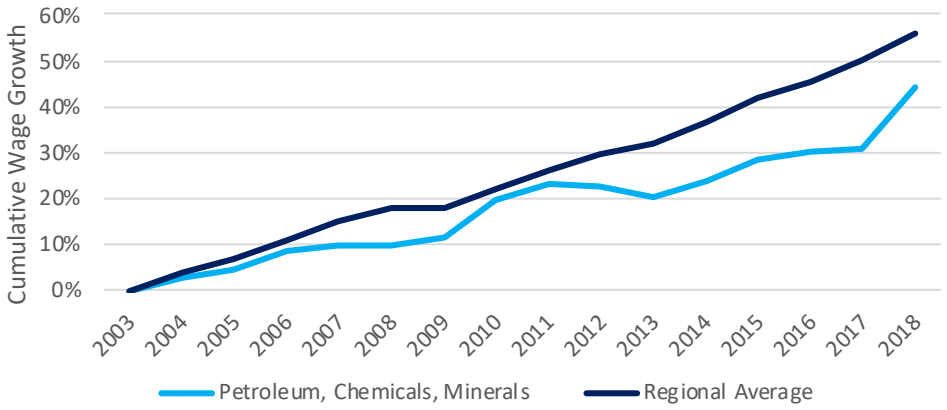



## WAGE TRENDS · · · Sharp wage growth from 2017 in the context of accelerated hiring may be indicative of a labor crunch.

**Wage growth has slightly lagged the overall economy. Wages have increased by 44 percent over the last 15 years.**

The average wage in the sector was $73,092 in 2018, roughly 20 percent higher than the regional average wage. Wages increased by 10 percent between 2017 and 2018.

Cumulative Wage Growth, Portland Marine Dependent Study Area, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



# Production of Metals and Machinery

The Metals and Machinery manufacturing industry is among the most important sectors to the Portland Harbor. Firms in the sector produce components and materials that support downstream sectors including ship and barge building, rail and railcars, storage capacity, water infrastructure, and industrial machinery.

## Major Investments or Industry Changes

- Portland's producers linked to national and global crude oil and equipment markets. Falling demand and stalled construction projects are negatively impacting the sector.
- Evraz has cut nearly 300 jobs in 2020, shutting down its spiral mill.
- ESCO closed its Portland foundry, cutting 176 jobs.

## Companies in Sector

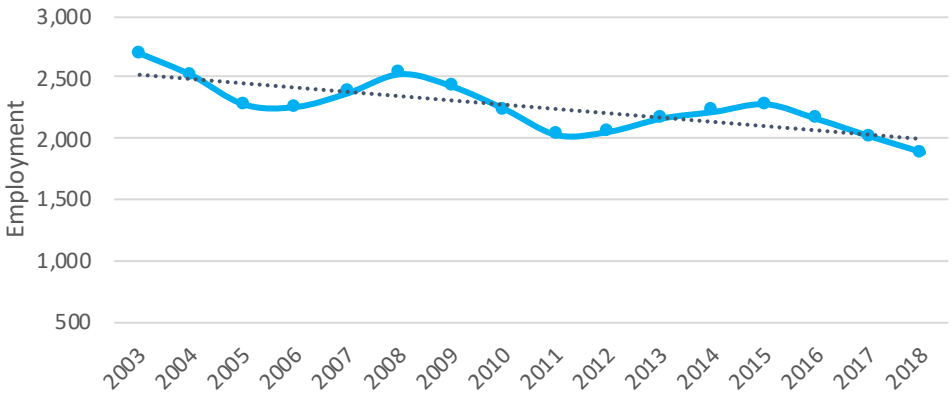
- Evraz Steel
- Northwest Pipe
- Columbia Steel
- Evans Metal Fabricators
- Sulzer Pumps

## EMPLOYMENT TRENDS · · · Continual decline in employment is consistent with structural industry trends. The loss of mid- to large-size local producers have accelerated declines.

**Metals and Machinery production remains one of the largest sectors of the Portland Harbor economy, but the industry has contracted by 35 percent over the last 15 years.**

Companies in the sector employed 1,929 workers in the Portland Harbor in 2018. However, the sector has shed nearly 400 jobs from 2015.

Three-year Rolling Average Employment Level, Portland Marine Dependent Study Area, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest

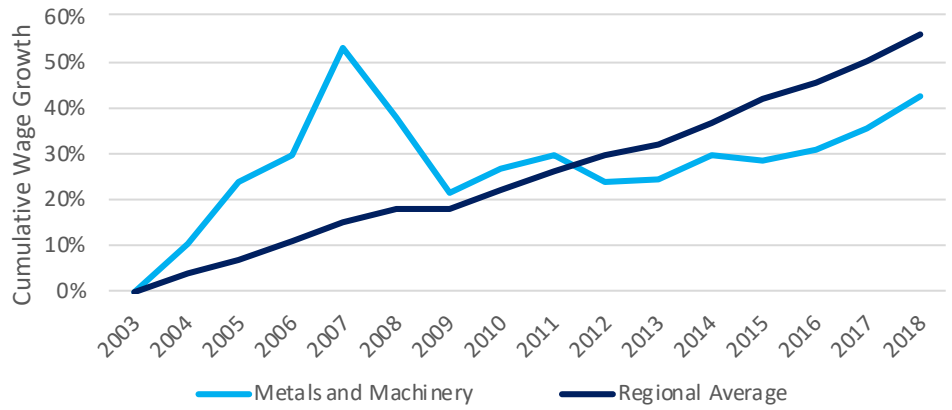



## WAGE TRENDS · · · Wages accelerating since 2015 in the context of decelerating growth. Is the sector competing with other industries for labor?

**Wage anomaly in mid-2000s a likely impact of company mergers and acquisitions.**

The average wage in the sector was $69,497 in 2018, roughly 14 percent higher than the regional average wage. Wage growth has accelerated to 7.3 percent AAGR from 2015.

Cumulative Wage Growth, Portland Marine Dependent Study Area, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



# Production of Transportation Equipment (Excluding Trucks)

The Transportation Equipment sector is arguably the anchor of Portland Harbor's manufacturing cluster. Aside from Daimler's headquarters Western Star manufacturing plant (neither is included in the data below), firms in this sector primarily produce and service boats, ships, and railroad rolling stock.

## Major Investments or Industry Changes

- Vigor's $50 million dry dock investment in 2014 remains one of the largest in North America.
- Vigor purchased former Christensen Yachts site in Vancouver to service new $1 billion Army contract.
- Gunderson recently laid off 200 employees in Portland, citing a surplus of intermodal units and COVID-19 uncertainty.

## Companies in Sector

- Cascade General
- Vigor
- Gunderson
- Diversified Marine

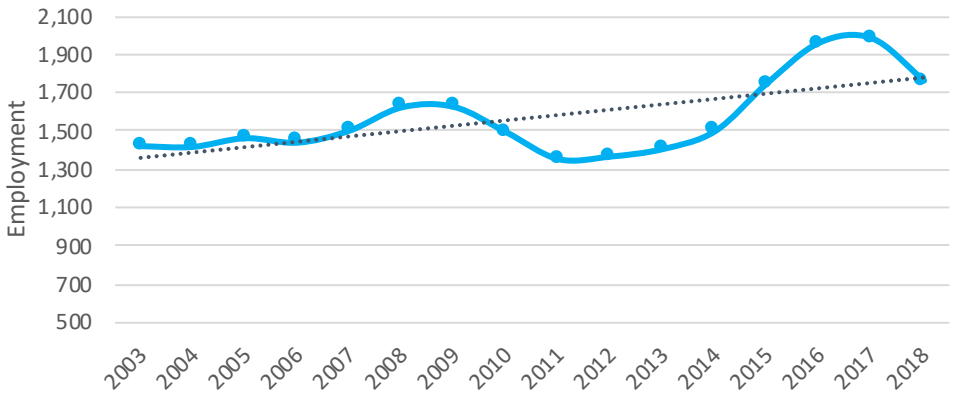
## EMPLOYMENT TRENDS · · · Sustained growth with fluctuations trailing the business cycle. Recent turn in the data likely a function of firm specific fundamentals.

**The Transportation Equipment production sector is one of the only manufacturing sectors in the Harbor with long-term sustained growth.**

Companies in the sector employed 1,609 workers in the Portland Harbor in 2018. The sector has expanded 23 percent since 2003.

Three-year Rolling Average Employment Level, Portland Marine Dependent Study Area, 2003-2018

Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



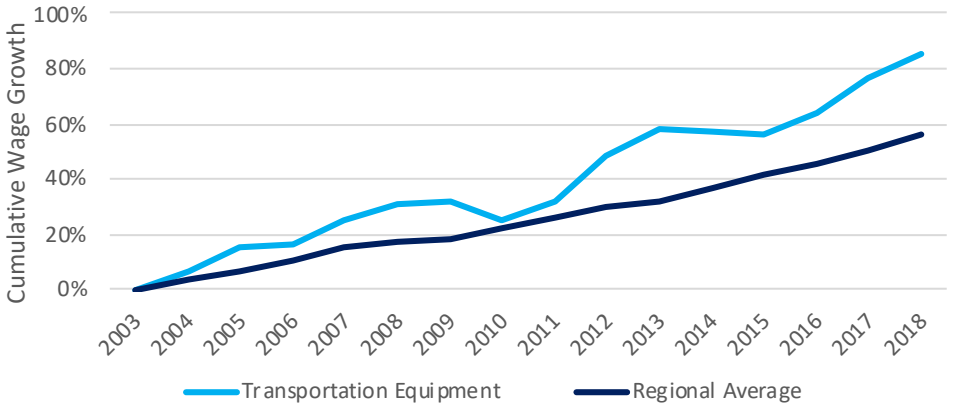

## WAGE TRENDS · · · Wage growth has maintained a correlation to employment levels. Acceleration from 2015 alongside employment growth indicates a potential labor crunch.

**The sector has seen some of the strongest wage growth in the region.**

The average wage in the sector was $78,133 in 2018, roughly 28 percent higher than the regional average wage. Wage growth has averaged 5 percent AAGR since 2010.

Cumulative Wage Growth, Portland Marine Dependent Study Area, 2003-2018

Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



# Wholesaling and Storage

This broad sector includes firms involved in the processing, storage, and distribution of commodities. It includes much of the Harbor's liquid bulk and grain terminal activity. It also includes the Harbor's concentration of Recyclable Metals firms, who self-classify as wholesalers.

## Major Investments or Industry Changes

- Portland Bulk Terminal potash expansion in 2018.
- Zenith Energy acquired a site in 2017 and expanded its rail capacity from 12 to 44 cars. A pipeline expansion is pending.
- A strong global outlook for the metal recycling industry that is expected to grow at 7.8 percent annually through 2025.

## Companies in Sector

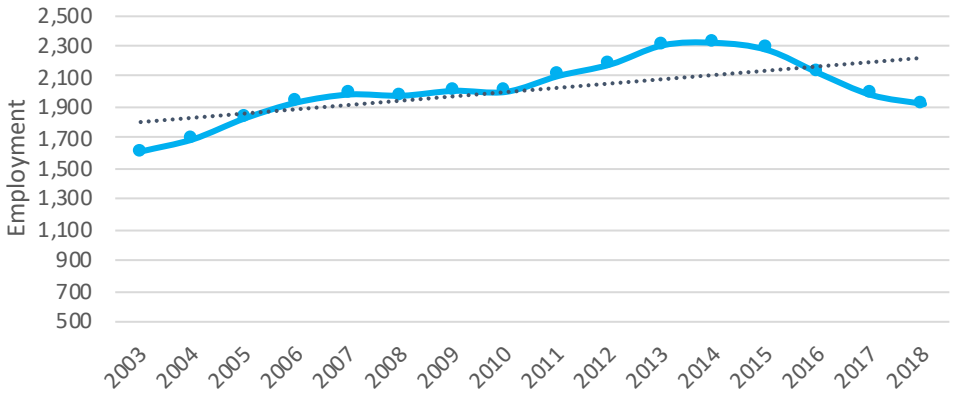
- Schnitzer Steel
- McCall Oil
- Zenith Energy
- Georgia Pacific
- Kinder Morgan
- Calbag

## EMPLOYMENT TRENDS · · · Downturn from 2014 is driven by deterioration in the Recyclable Materials sector and the loss of grain export activity.

**Liquid bulks, including petroleum products and chemicals have expanded by 14 percent over the last 10 years.**

Companies in the sector employed 1,946 workers in the Portland Harbor in 2018. However, employment in the sector has declined by 18 percent from 2018.

Three-year Rolling Average Employment Level, Portland Marine Dependent Study Area, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest

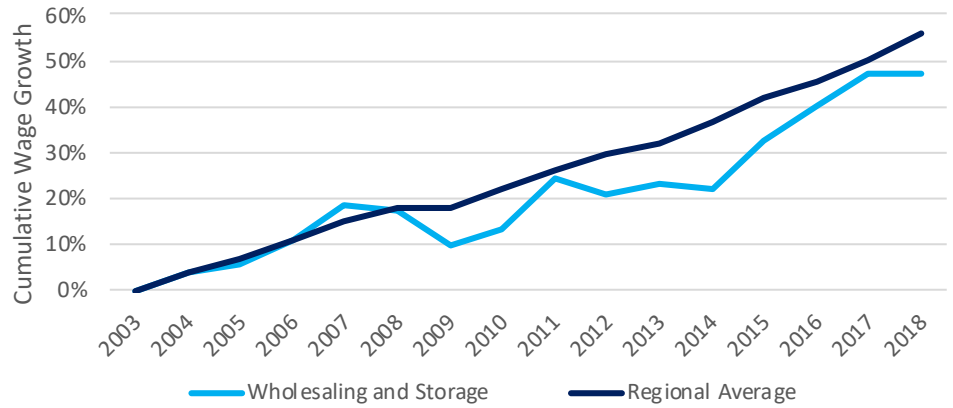



## WAGE TRENDS · · · Long-run wage growth is consistent with regional trend but is highly volatile year-to-year.

**Volatility in the data may be the result of a concentration of firms engaged in commodities with equally volatile pricing markets.**

The average wage in the sector was $69,495 in 2018, roughly 14 percent higher than the regional average wage.

Cumulative Wage Growth, Portland Marine Dependent Study Area, 2003-2018
Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



# Transportation Support Services

This sector includes firms engaged in the support of the rail and water transportation industries. It includes marine cargo handling, navigational services, intermodal yard operations, and other miscellaneous services.

## Major Investments or Industry Changes

- Pending litigation impacting the long-term solvency on the ILWU.
- Long-term prospects of container service at Terminal 6.
- Structural cargo trend and outlook is positive. Impact on the Harbor will be a function of market share.

## Companies in Sector

- Pacific Maritime
- Harley Marine
- Jones Stevedoring
- Shaver
- Pacific Rail Services

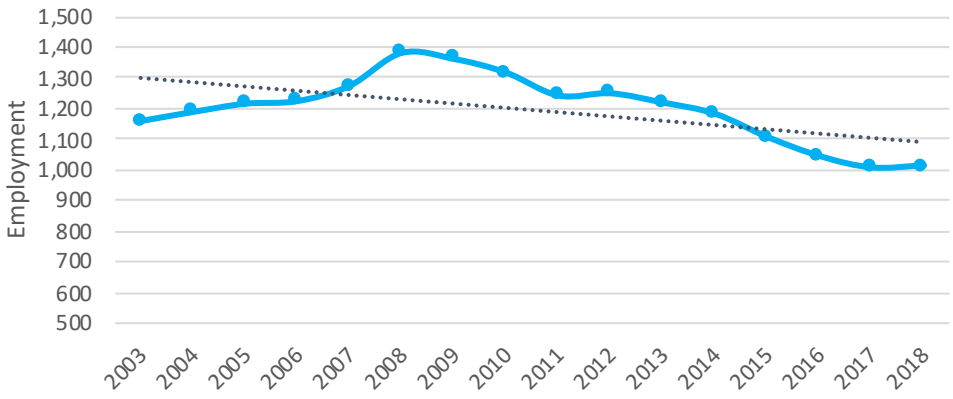
## EMPLOYMENT TRENDS · · · Systematic decline in employment driven by decline in marine cargo handling. Declining trend preceded disruption in container service.

**Non-marine cargo services in the sector have exhibited sustained growth over the last 15 years.**

Companies in the sector employed 1,017 workers in the Portland Harbor in 2018. However, employment in the sector contracted 20 percent over the last 10 years.

Three-year Rolling Average Employment Level, Portland Marine Dependent Study Area, 2003-2018

Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



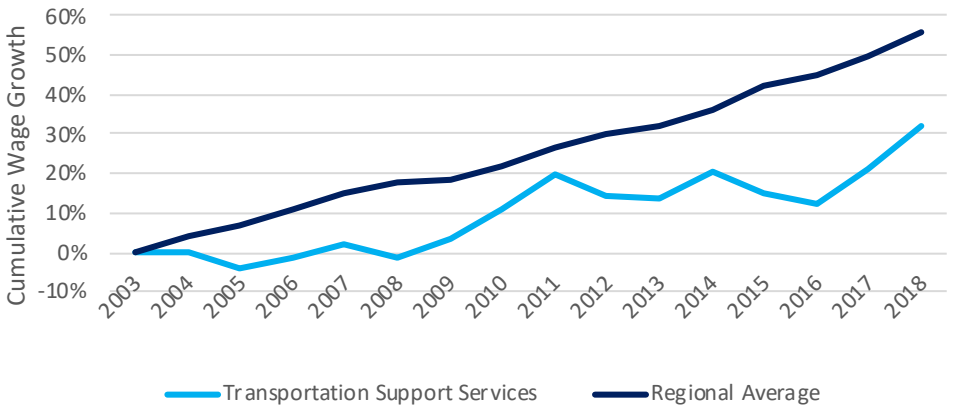

## WAGE TRENDS · · · Below-average wage growth in the context of declining employment is indicative of an oversupply of labor in the market.

**Upturn in wages from 2016 may be the result of the return of container service and/or new labor contracts.**

The average wage in the sector was $73,677 in 2018, roughly 21 percent higher than the regional average wage.

Cumulative Wage Growth, Portland Marine Dependent Study Area, 2003-2018

Source: Quarterly Census of Employment and Wages (QCEW) and ECONorthwest



# Appendix B

# The Impacts Changes in Marine Terminal Design and Land Needs on Portland Harbor Competitiveness

May 31, 2021

Prepared for: City of Portland Bureau of Planning and Sustainability

Final Report

ECONorthwest
ECONOMICS · FINANCE · PLANNING

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# Table of Contents

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# 4. Introduction

Key drivers of recent shifts in marine terminal design include the size and shape of vessels coming through a port; trends in unit train lengths and pricing; requirements for storage and capacity of commodities; and methods to move commodities through terminals efficiently. The efficiency and speed at which to handle each of these components are factors in a port or terminal's competitiveness and overall efficiency. Ports can increase the efficiency of the use of space for some commodity types, while other commodity types require upgrades to infrastructure (e.g., rail access) or equipment to meet current trends and demands. Where space or land is constrained, the efficient movement or storage of commodities is critical.

This report summarizes the key components of the layout of marine terminal facilities and describes factors and trends that have led to change in the design of these facilities. Organized by four considerations for marine terminal facility design—land, infrastructure, automation, and sustainability—this report compares the implications for different types of commodities. Finally, we conclude with a brief evaluation of the trends mostly likely to affect the terminal facilities in the Portland Harbor.

# 5. Marine Terminal Design Trends

Overall, the design and layout of marine terminal facilities has remained relatively consistent. Recent trends in terminal facility design are related to changes and innovations in technology integration and the optimization of existing space and operations. As ports attempt to keep up with demand, and considering the costs to update infrastructure, updates are more frequently completed incrementally without completely redesigning a facility. Moreover, many ports are land constrained, leading to optimization of existing space and increased efficiency in operation.[5]

Considerations for terminal design and layout vary for different commodity (or cargo) types, though many marine terminal facilities are set up to accommodate more than one type of cargo. Capacity and infrastructure for storage of a commodity, or the mechanism for moving it on and off the terminal site result in different methods for operation.[6] Other factors, such as dwell time are important to consider for all commodities to ensure efficiency and maximize competitiveness.

## Infrastructure

According to the 2017 Marine Cargo Forecast, needed infrastructure improvements for Pacific Northwest ports include the need to "handle heavier loads, upgrade on-dock rail systems, deepened berths."[7] In addition, access to the terminal from road and rail systems present challenges with congestion in urban areas and coordination with various transport modes. A study for the National City Marine Terminal in San Diego, CA suggested optimization of the location of on-dock rail systems as a method to improve efficiency.[8]

In a concept and business case analysis of the Port of Portland in 2016, The Tioga Group reported stakeholder input on the Port's rail infrastructure. Stakeholders raised potential issues of rail capacity, though a shortage had not yet impacted other factors of the supply chain.[9] The report suggested two potential solutions for increasing rail capacity through service connections with the Seattle area or other intermodal terminals.

[5] Amir Gharehgozli, Rene de Koster, and Nima Zaerpour. "Container Terminal Layout Design: Transition and Future." Maritime Economics & Logistics, October 15, 2019.

[6] U.S. Department of Transportation Bureau of Transportation Statistics. "Port Performance Freight Statistics Annual Report to Congress 2018." 2018.

[7] BST Associates. "Washington Marine Cargo Forecasts 2017." August 13, 2017. pg. 119.

[8] Vickerman & Associates, LLC. "National City Marine Terminal Optimization Study." Unified Port of San Diego. January 21, 2015.

[9] The Tioga Group. "Trade and Logistics Report: Concepts and Business Case Analysis." February 2016.

## Containers

Infrastructure and equipment upgrades to accommodate container cargo include accommodation of larger vessels, wider berths, deeper channels, and increased crane height with upgraded "ship to shore" reach, and stacking mechanisms.[10] Ports typically accommodate these upgrades through incremental updates to the existing terminal facilities or building new facilities. As of 2018, container ports throughout the U.S. had active or near-term projects planned to accommodate new physical equipment and design demands for container vessels and cargo capacity.[11]

As of 2017, the average size of container vessels calling at Pacific ports in the U.S. was about 7,000 TEU, which increased from about 6,000 TEUs. This is compared to the average vessel size at all U.S. ports between 4,000-6,000 TEUs. Container vessel size will continue to increase, requiring ports to continue to update infrastructure to accommodate them. Maintaining channel and berth depths and lengthening berths will be required to accommodate larger vessels. The increases in size also requires increased storage capacity and more efficient operations landside to avoid long dwell times. Ports that are unable to accommodate increased vessel size will likely still see smaller container vessels calling.

**Highlight: Port of Grays Harbor**

The Port of Grays Harbor is working with BHP to bring a potash export facility to Terminal 3. If implemented, the expansion would bring updates to the facility's rail infrastructure and accommodation for vessel berths. According to the project description on BHP's website, these specific improvements include a looped rail system with capacity for an 8,500 foot train and additional tracks and dredging for the berth requirements.[12]

The Port also received a grant in 2020 for planning of the expansion of the Terminal 4 Cargo Yard.[13]

## Dry Bulk

Factors in the size and layout of dry bulk terminal facilities include the cargo volume and number of different types of commodities, which require separate storage facilities. Transportation for dry bulk to and from the terminal include trucks, rail, and barge, with rail as the primary vehicle for dry bulk exports.[14]

Increasing the efficiency of throughput of dry bulk cargo is best done through the efficient use of space and improving operational tasks. To determine adequate capacity of dry bulk terminals, a 2014 study

[10] Ashebir Jacob, P.E, Moffat & Nichol. "Continuing Evaluation of Marine Terminal Design & Cargo Handling." AAPA Marine Terminal Management Training Program. October 2014.

[11] U.S. Department of Transportation Bureau of Transportation Statistics. "Port Performance Freight Statistics Annual Report to Congress 2018." 2018.

[12] BHP. Potash export facility. https://www.bhp.com/environment/regulatory-information/potash-export-facility-at-grays-harbor/potash-export-facility/

[13] Port of Grays Harbor. "Port of Grays Harbor awarded $50,000 grant for East Terminal 4 Cargo Yard Expansion Plan." July 16, 2020. https://www.portofgraysharbor.com/news/2020/CERBaward.pdf

[14] U.S. Department of Transportation Bureau of Transportation Statistics. "Port Performance Freight Statistics Annual Report to Congress 2018." 2018.

suggests reviewing "the overall logistics process, the equipment handling capacity, and arrival characteristics of transportation modes connecting to the terminal."[15]

Based on conversations with the Port of Portland, the maximum capacity of a dry bulk terminal is an important factor, but simply increasing storage capacity does not address all potential infrastructure issues. Dry bulk facilities are operated by various companies that may not use the entire capacity of the storage facilities at a given time. Improving the efficiency of the movement of cargo to and from the facility, such as rail systems is a critical factor in meeting the demand for dry bulk markets.

Companies operating dry bulk terminals, which include grain mill operations, are increasingly investing in longer term infrastructure improvements that are difficult to move. This can signal a long-term investment in the terminal location. Examples of improvements to grain facilities include addition of storage capacity "to take advantage of bulk purchasing that is increasingly accomplished via rail,"[16] or increasing operations in one location in a region compared to smaller dispersed mills.

Changes in the regulatory environment and trends toward organic or GMO-free grain product have also led to further changes in equipment needed for mills at dry bulk terminals. This includes dedicated facilities for these products to avoid cross-contamination. Additional equipment to accommodate these products include, "selected ingredient bins and scales dedicated for meat and bone byproducts for conventional feeds, adequate ingredient bins to allow for alternate ingredients, dual mixers and downstream conveyance, attention to cleanout and adequate system capacities."[17]

Another consideration for mill operations is structural upgrades, which requires a decision on material type—concrete or steel. Concrete is preferred for decreased contamination risk, while steel is generally cheaper and does not last as long as concrete. Again, while increasing facility size and equipment requires upfront costs, operators are still seeing the demand to make these improvements.[18]

### Automobiles

Increased demands for automobile cargo at U.S. Pacific coast ports present a few considerations for upgraded infrastructure. Infrastructure needed for automobile cargo include an efficient rail system and sufficient storage space.

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[15] Dr Mi-Rong Wu, consultant, TBA. "Dry Bulk Terminal Capacity Planning." Dry Bulk Cargo and Handling. February 2014. pg. 65.

[16]. Kim Berndtson "Design Trends Give Mills a Competitive Advantage." Feed & Grain. February 6, 2017. http://www.feedandgrain.com/magazine/design-trends-give-mills-a-competitive-advantage

[17] Kim Berndtson "Design Trends Give Mills a Competitive Advantage." Feed & Grain. February 6, 2017. http://www.feedandgrain.com/magazine/design-trends-give-mills-a-competitive-advantage

[18] Ibid.

Transport of larger vehicles (e.g., SUVs or trucks) requires bi-level rail cars with higher clearance, compared to tri-level cars used for smaller vehicles. In 2018, Automotive News reported that the demand for larger vehicles by U.S. consumers comes with increased demand for the rail cars to transport the vehicles.[19] In some areas, this has led to a shortage of these cars and an inefficient use of space to store unused tri-level rail cars.

Another consideration for the rail system needed to efficiently transport automobile cargo and the associated supply chain is the turning capabilities available.[20] While the Port of Portland is aware of the increasing demand for more efficient turning operations for rail systems, the Port's existing land constraints prohibit this type of expansion.

## Land Need

Many U.S. ports, especially those in close proximity to urban areas, are land constrained. For some commodity types, infrastructure or equipment upgrades allow for vertical (i.e., stacking) storage increases that do not require additional land. Other commodity types, such as automobiles, cannot integrate the same space-saving options. This requires a more efficient use of space through operational improvements that move cargo on and of the port property more efficiently.

[19] Eric Kulisch. "As automakers move more vehicles via ship, investments pour into North American ports." Automotive News. November 19, 2018. https://www.autonews.com/article/20181119/OEM01/181119823/as-automakers-move-more-vehicles-via-ship-investments-pour-into-north-american-ports

[20] Ibid.

### Containers

Recent deviations from traditional horizontal layout are emerging due to: increase in demand (i.e., container count), land constraints, and advancement of technology for automation.[21] Up to this point, most terminals have accommodated increased demand by optimizing current layout, but as trends continue, they will need to look at redesign or expansions. For ports that are land constrained, additional solutions beyond optimization of equipment and existing infrastructure include "land reclamation or using hinterland 'dry ports'"[22] that may offer solutions for empty container storage.

**Highlight: Ports of Seattle and Tacoma**
In 2019, the Ports of Seattle and Tacoma, in a partnership known as the Northwest Seaport Alliance developed upgrades to Terminal 5 that would allow Seattle to continue to compete with west coast ports and the demands for next-generation port facilities. Upgrades will include accommodation of container vessels up to 18,000 TEU, efforts to reduce emissions and noise, and technology to improve efficiency of operations of the various transportation modes at the terminal.[24]

### Dry Bulk

As noted previously, the capacity of dry bulk storage facilities on a terminal property is one factor in efficient use of space for dry bulk storage, as these facilities are typically operated by private entities and out of the port's control. According to the Bureau of Transportation Statistics' 2018 Report to Congress, "storage [for dry bulk cargo] may not be limited to a port's internal boundaries if outside storage capacity is accessible nearby. Acreage is most relevant for container terminals, which are less variable in their configuration than bulk terminals."[23] This suggests that ports can still compete for dry bulk cargo despite limitations in land capacity.

## Automation

Automation improvements, similar to infrastructure improvements, are completed incrementally. Options for automation at marine terminal facilities include equipment automation, operations, and improved real-time data to affect overall efficiency.[25] Future trends in terminal design are likely beyond most ports' near or mid-term plans. Next-generation ports will first emerge at global port sites and will be fully or partially automated on both seaside and land side operations.

Examples of incremental technological updates at smaller U.S. ports include improved access to data on peak demand for container types to better plan for availability, as well as updates to

[21] Amir Gharehgozli, Rene de Koster, and Nima Zaerpour. "Container Terminal Layout Design: Transition and Future." Maritime Economics & Logistics, October 15, 2019.

[22] Ibid. pg. 2.

[23] U.S. Department of Transportation Bureau of Transportation Statistics. "Port Performance Freight Statistics Annual Report to Congress 2018." 2018. pg. 4-2.

[24] https://www.nwseaportalliance.com/about/strategic-plan/t5

[25] Fox Chu, Sven Gailus, Lisa Liu, and Liumin Ni. "The future of automated ports." McKinsey & Company. November 2018.

equipment to automate stacking through vertical systems and grid systems similar to technology in warehousing.[26] As with any upgrade, ports consider how technological upgrades that automate processes and operations contribute to increased efficiencies. Considerations for cost, environmental sustainability, and social impact are key factors in technological upgrade decisions.[27]

Dry and liquid bulk terminals and facilities are also seeing advances in automation. For dry bulk, automation becomes useful as operators respond to tighter regulations for health and safety with ingredient tracking mechanisms that closely monitor potential contamination.[28] Similar to terminals, bulk terminals are also seeing increases in automated or semi-automated equipment such as "stackers, reclaimers, conveyor belts, car dumpers, wagon loaders and vessel loaders and unloaders."[29]

## Sustainability

Sustainability considerations and infrastructure resiliency are another key component of recent trends in marine terminal facility design. Susceptibility to natural disasters (hurricanes and earthquakes) and climate change generally have led to improvements to port infrastructure and operations. In the Pacific Northwest, the Cascadia earthquake would affect regionwide infrastructure at ports and their transportation networks. Options for natural disaster preparedness at ports includes installing equipment and structures that can withstand these disasters. The Port of Portland has identified the infrastructure that would not withstand the Cascadia earthquake and continues to plan for emergency preparedness and the potential damage and disruption to port activities. According to interviews with industry stakeholders, Cascadia earthquake risk specifically impacts costs of improving, repairing and retrofitting, liquid bulk storage capacity in Portland's Critical Energy Infrastructure Hub (CEI).

[26] The Tioga Group. "Trade and Logistics Report: Concepts and Business Case Analysis." February 2016.

[27] Amir Gharehgozli, Rene de Koster, and Nima Zaerpour. "Container Terminal Layout Design: Transition and Future." Maritime Economics & Logistics, October 15, 2019.

[28] Kim Berndtson "Design Trends Give Mills a Competitive Advantage." Feed & Grain. February 6, 2017. http://www.feedandgrain.com/magazine/design-trends-give-mills-a-competitive-advantage

[29] Hellenic Shipping News Worldwide. "Technology key to competitive dry and liquid bulk operations." TOC Worldwide. September 8, 2017. https://www.hellenicshippingnews.com/technology-key-to-competitive-dry-and-liquid-bulk-operations/

# 6. Summary of Design Characteristics

## Terminal Design Characteristics

In this section we present a summary of typical design characteristics of terminal development suitable for the Lower Columbia and Pacific Northwest. Example commodities reflect a combination of uses present in the Portland Harbor as well as potential future market opportunities on the Lower Columbia[30].

Exhibit 1. Design Characteristics of Selected Commodity Types
Source: ECONorthwest

| Commodity (Example) | Terminal size | Vessel Size<br>Draft Depth<br>Typical Load | Storage Type<br>Load Method<br>Delivery Method |
|---|---|---|---|
| **Dry Bulk**<br>(Potash) | 40 acres<br>80 – 100 with unit train | Panamax<br>39 – 40 ft.<br>50 – 60,000 MT | Covered<br>Conveyor<br>Rail, unit trains |
| **Dry Bulk**<br>(Urea) | 40 acres (terminal only)<br>100 acres (with plant) | Handymax<br>33 – 36 ft.<br>40 – 55,000 MT | Covered<br>Conveyor<br>Rail, unit trains |
| **Other Dry Bulk Import**<br>(Cement, Limestone) | 20 – 30 acres (standard)<br>5 – 15 acres (infill) | Panamax or Barge<br>Depth varies<br>Load varies | Open/other<br>Conveyor<br>Rail and barge |
| **Autos**<br>(RORO) | 100 – 150 acres (large)<br>50 – 80 acres (typical)<br>20 – 30 acres (expansions) | Car Carrier<br>32 ft.<br>6 – 6,500 units | Open<br>RORO<br>Rail and truck |
| **Breakbulk/Neo Bulk**<br>(General) | 20 acres | Handymax<br>33 – 36 ft.<br>40 – 55,000 MT | Open, paved<br>Mobile Harbor Crane<br>Rail and truck |
| **Breakbulk**<br>(Scrap Metal) | 20 – 35 acres | Handymax<br>33 – 36 ft.<br>40 – 55,000 MT | Open<br>Crane<br>Rail or truck |
| **Breakbulk**<br>(Wind/large machinery) | 20 – 40 acres (standard) | Panamax<br>39 – 40 ft.<br>50 – 60,000 MT | Open<br>Mobile Harbor Crane (x2)<br>Rail and truck |
| **Liquid Bulk**<br>(Biodiesel) | 20 or more acres | Panamax<br>39 – 40 ft.<br>50 – 60,000 MT | Storage tanks<br>Pipeline<br>Pipeline and rail |
| **Dry Bulk**<br>(Grain) | 40 – 60 acres | Panamax<br>39 – 40 ft.<br>50 – 60,000 MT | Silo storage<br>Conveyor<br>Rail and barge |

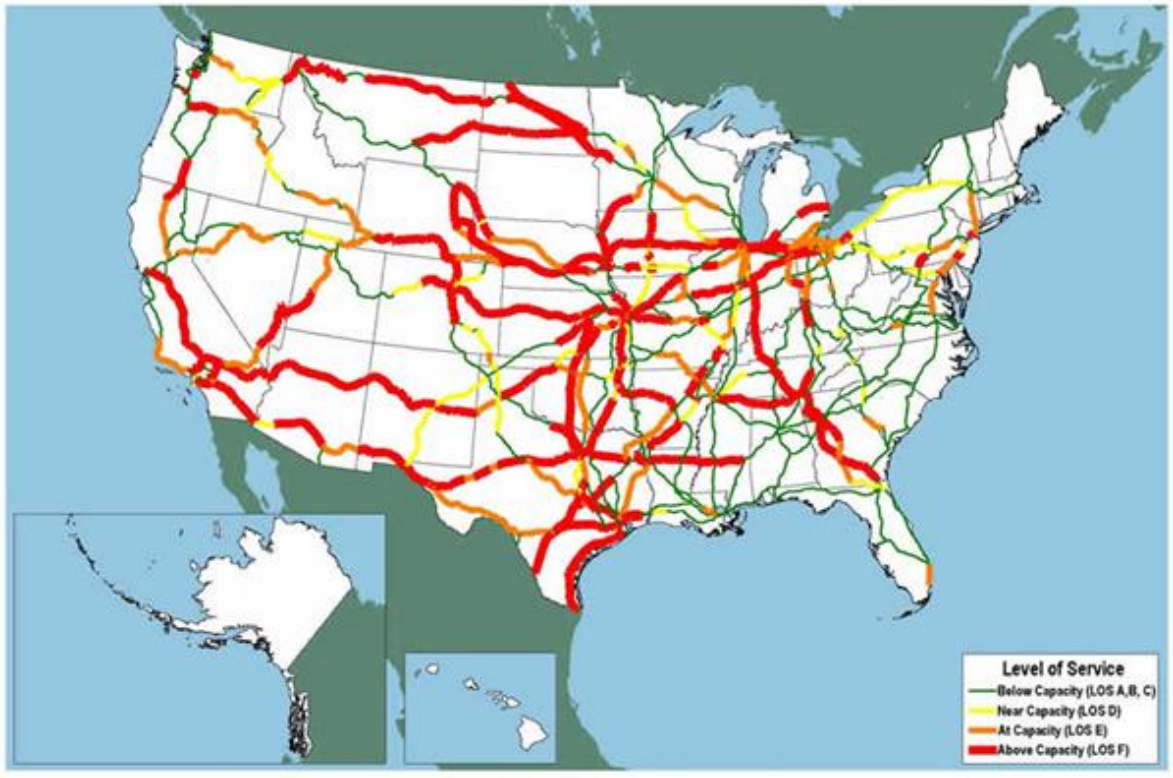
[30] Port of Longview. "Barlow Point Master Plan Feasibility Study." March 2016.

## Rail Design Factors and Characteristics

Changes in unit train length and rail capacity are driving terminal site selection away from population centers and on to larger sites. The following observations reflect the current and near-term rail conditions impacting terminal design[31,32]:

- Unit grain train sizes are expected to remain at approximately 110 cars.
- Heavy dry bulk mineral unit trains are expected to run at 115 to 120 cars.
- Export Potash trains operate with 170 to 180 cars at approximately 8,500 feet.
- Manifest trains will run up to 7,000 feet on average.
- Loop train terminal configurations that can accommodate 8,000 feet or more are most preferred and offer a competitive advantage over alternatives.
- Rail congestion is an ongoing constraint that will continue to drive shifts in the market.
- Railroads are requiring longer sidings to accommodate potential expansions. This generally translates into larger acreage needs for terminals over time.

Exhibit 2. Train Volumes in 2035 Compared to 2007 Levels.
Source: Association of American Railroads, National Rail Infrastructure Capacity and Investment Study (2007)



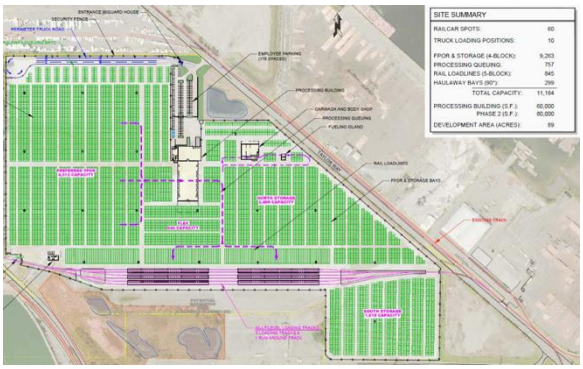

[31] KPFF Consulting Engineers. "Barlow Point Planning—Meeting 2 Presentation Deck". December 5, 2014.

[32] Interviews with the Port of Portland and Rail Operators. July 2020

# Example Planned Terminal Designs

## Parcel 77 Auto Terminal | Tacoma, WA

- Modern auto import facility on 89 developed acres. Total capacity of over 11,100 units.
- Through rail ladder configuration with six railcar ladder spots.
- Includes an initial 60,000 square foot processing building with a second 80,000 square foot phase planned.
- Total estimated cost of over $35 million.

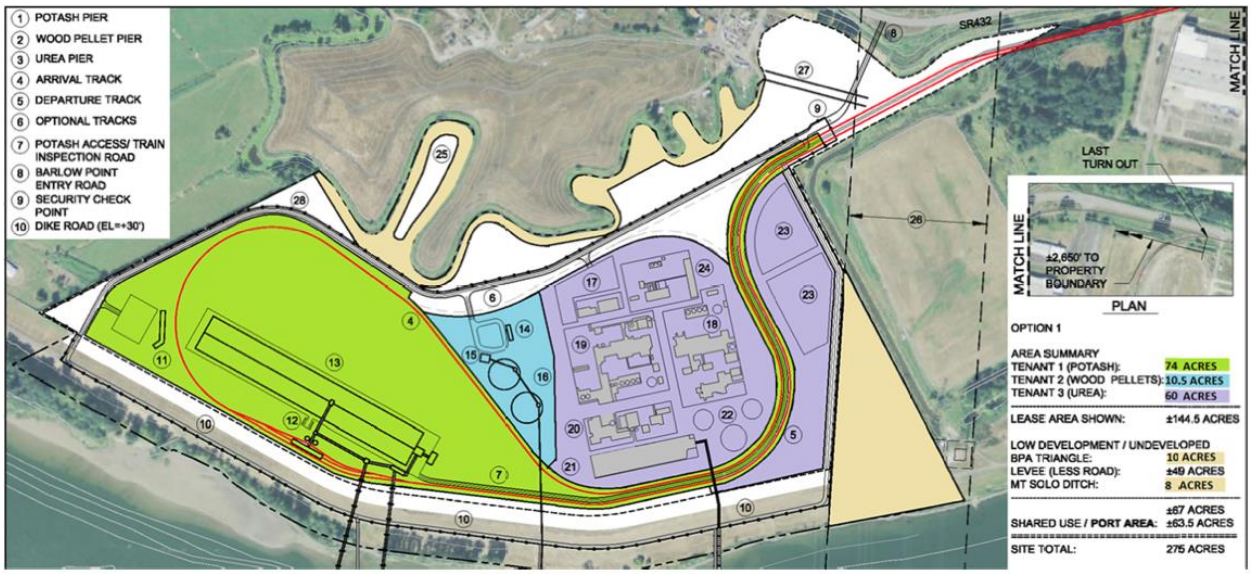



## G3 Grain Terminal | Vancouver, BC

- A $500 million-dollar state-of-the-art grain terminal located on roughly 60 acres. The facility opened in July 2020.
- Infinity loop train rail infrastructure capable of accommodating two trains, each up to 135 cars. Includes 48 concrete storage silos with a storage capacity of 180,000 metric tons. Will include three ship-loading booms and a dock capable of handling post-panamax ships.
- The modern unloading conveyance system allows trains to be unloaded while in motion, increasing throughput velocity.
- Estimated to employ between 50 and 60 permanent jobs on-site.

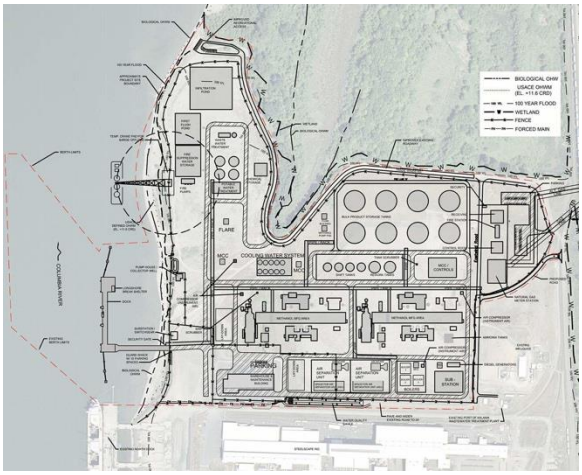
## Barlow Point Multi-use Terminal | Longview, WA

- Project is in Master Planning Phase. Over 275 acres available to accommodate multiple users. Potential target users include potash, urea, wood pellets, liquid bulks, and methanol.
- Plans for multiple loop tracks capable of accommodating 150% of daily train capacity and full unit trains up to 8,500 feet.




## NW Innovation Works Methanol Terminal | Kalama, WA

- Modern methanol production and export facility located on roughly 90 acres. The project would be the largest gas-to-methanol plant in the world.
- Would have the capacity to produce 3.6 million annually and handle between 36 and 72 vessel calls per year.
- Gas would arrive by pipeline through a new 3.1-mile pipeline segment.

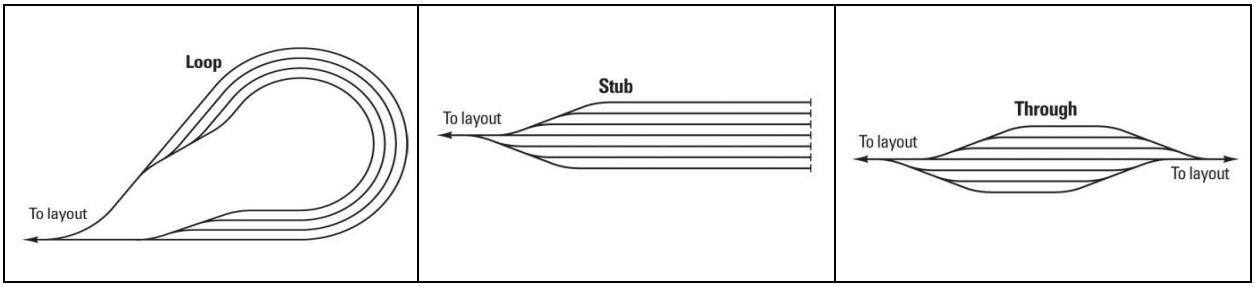


# 7. Conclusion and Local Considerations

Recent trends in marine terminal design indicate near-term opportunities for larger global ports to consider upgrades. Smaller or medium-sized regional ports, including the Port of Portland, are more likely to consider incremental upgrades to infrastructure, equipment, and operations. Further, the Port of Portland is land constrained, similar to other ports in the Pacific Northwest; however, conversations with Port personnel indicates that cargo operators continue to show demand for port activities in Portland. Most notably, the Port of Portland's access to Class 1 rail services continues to be a key reason operators move cargo in Portland. Based on the preceding research and analysis, we find the following factors to be most relevant to the terminal development on the Lower Columbia and more specifically the Portland Harbor.

**Unit train length impacts on terminal design.** Growth in in unit trains will continue to drive terminal sizes higher and place priority on loop train configurations. The Portland Harbor lacks sites of sufficient size to accommodate loop track configurations. Our interviews with Port and Railroad representatives suggest that a terminal with an efficiently designed ladder system would be competitive in lieu of a loop track considering the Harbor's Class I rail advantages.

Exhibit 3. Rail Staging Configurations
Source: Modern Railroader




Another potential solution for is a new innovative solution called an Infinity Loop. Unlike many unit train facilities, the Infinity Loop allows the same staging yard tracks to be used for staging both arriving trains and trains that have already been processed and are soon to depart[33]. The advantage of this configuration is that if can accommodate unit trains on a relatively smaller site. This configuration was used in the G3 Grain terminal in Vancouver, BC.

**Consolidation in grain terminal development.** The trend of consolidation of grain terminal activity away from smaller terminals toward larger terminals with greater efficiency is already impacting the Portland Market. The Louis Dreyfus terminal near the Steel Bridge has already ceased operation. The Port of Portland's 2020 Marine Cargo Forecast also expressed concern about the long-term viability of Portland's Temco terminal: "In addition, the volumes exported

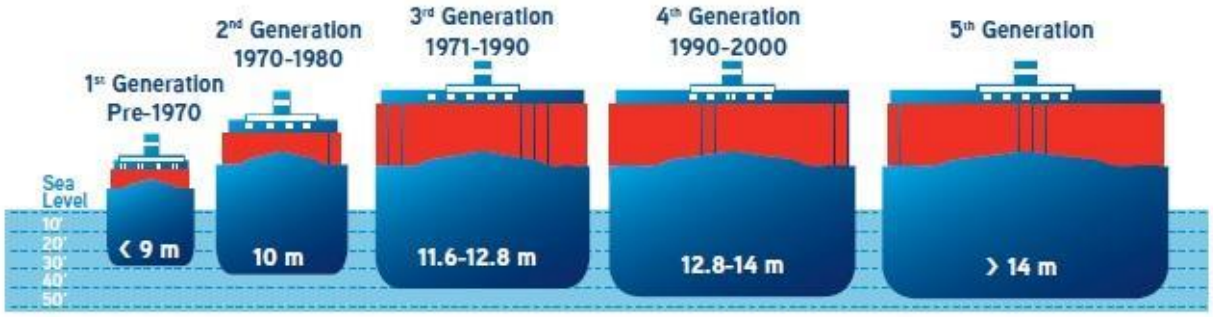
[33] https://www.railwayage.com/freight/class-i/hdrs-infinity-loop-earns-national-award/

through the other small terminal in Portland (TEMCO) has been sharply reduced in recent years, and the long-term future of this terminal is in doubt."[34]

**Policy impacts on liquid bulk terminals.** The City of Portland's Fossil Fuel Terminal Zoning Amendments[35] restrict the development of new and expansion of existing storage tank capacity at bulk fossil fuel terminals. This has already impacted terminal investments in the Harbor, with Zenith Energy expanding its direct rail to ship transfer capacity (which is allowed under the ordinance). They have also proposed a direct pipeline expansion project.

**Increasing vessel size impacts on container market competitiveness.** The continued shift of the container and bulk market toward larger ships will limit the Harbor's competitiveness in the long run. Container ships larger than 7,000 TEU require channel depths that will not be available on the Lower Columbia. This will limit Portland's container market to smaller vessels.

Exhibit 3. Container Ship Evolution
Source: U.S. Environmental Protection Agency




**Opportunities for breakbulk market growth.** Over the planning period, the Port of Portland will be exploring its options to expand its breakbulk portfolio in response to market opportunities. Smaller breakbulk and neo bulk terminals are suitable for smaller infill sites that may be available in the Harbor. Other breakbulk opportunities like heavy machinery and wind energy components would require larger sites and equipment upgrades. Investments in a low dock, heavy dock, and mobile harbor cranes would increase breakbulk competitiveness.

**Portland Shipyard needs.** Stakeholder interviews revealed that congestion at the Portland Shipyard is a growing concern. Stakeholders have begun to explore solutions for in-water staging.

**Storage upgrades to improve resiliency.** Portland's Critical Energy Hub (CEI). The CEI Hub covers a six-mile stretch on the lower Willamette River located between the south tip of Sauvie Island and the Fremont Bridge on US Highway 30. It has storage capacity for up to 360 million

[34] BST Associates. "2020 Portland Harbor Marine Cargo Forecast, Chapter 5, p. 11." May 2020.

[35] https://www.portland.gov/bps/fossil-fuel-zoning/about-fossil-fuel-terminal-project

gallons of fuel/petroleum products. The need to improve seismic stability and resiliency at the CEI Hub will impact investment decisions and costs in the Harbor over the planning period.

# Appendix C

## An Assessment of Marine Industrial Competitiveness on the Lower Columbia River

May 31, 2021

Prepared for: Portland Bureau of Planning and Sustainability

Final Report

ECONorthwest
ECONOMICS · FINANCE · PLANNING

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# Table of Contents

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# 1. Introduction

The Portland Harbor competes on a regional scale with other port districts and industrial areas for both marine terminal business and marine dependent industrial development that include both production and service-oriented users. Firms will weigh the relative value-proposition offered by alternative areas in their site location and expansion decisions. Therefore, current and future demand for industrial land in the Portland Harbor will be, in part, a function of its relative position vis-à-vis the competitive landscape. In this chapter, we investigate some of the factors that collectively influence competitiveness. We will investigate market trends and shifts in marine cargo market share, we document assets like land availability and underutilized river-access sites, and we include a qualitative assessment derived from interviews with leaders at alternative port locations.

## Data Sources Used

The analysis in this report was compiled from the following data sources:

**Primary Data Sources**. Primary data sources in this analysis include databases from public and private sources documenting trade, throughput volume, and waterway commodity flows.

- Army Corps of Engineers Database of Waterway Commerce
- Bureau of Transportation Statistics Port Performance Freight Statistics Program
- WISERtrade Database of International Trade (Portland and Vancouver only)
- Port Reported Tonnage Reports (Vancouver and Longview only)

**Secondary Data Sources**. Existing reports and secondary sources were incorporated into this analysis to leverage existing research and information. These sources included planning documents, market research reports, news articles, budget reports, and industry publications.

**Interviews.** Data an information gathered from primary and secondary sources were supplemented by interviews with port staff at the Port of Portland and other Lower Columbia ports. Additional outreach to private sector firms in the Portland Harbor informed our evaluation of Portland's competitiveness.

# 2. Cargo Volume Trends

In this section of our report, we present marine cargo trends on the Lower Columbia River. This assessment will consider the competitive mix of commodity flows, cargo volumes, and relative market share. This analysis will include the tonnage flowing through Portland, Vancouver, Kalama, and Longview. Port Westward properties were omitted for two reasons. First, Army Corps of Engineers data used in this analysis lumps Port Westward in with other small Columbia River areas below Portland/Vancouver. Second, by comparison, recent cargo volumes at Port Westward are small and limited to recent ethanol export. Port Westward is addressed elsewhere in this report but not in the evaluation of cargo volume trends. In the analysis below, the term "Port" is used loosely to define concentrated areas of waterborne commodity flows. For example, data reported for "Portland" includes commodities that arrive and depart from both Port of Portland operated sites as well as berths at private terminals.

## Export Market Growth

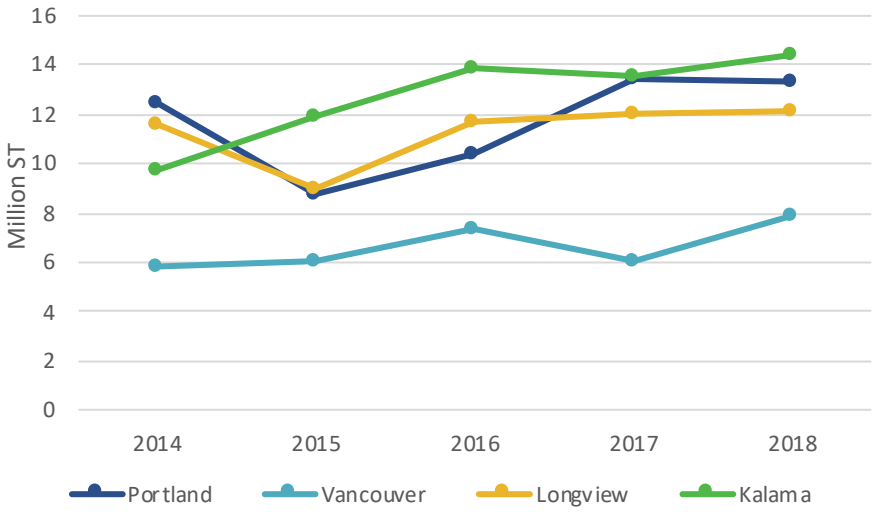
Marine trade on the Lower Columbia continues to be driven largely by exports, which have grown from 81 percent to 85 percent of all foreign trade over the last five years. Portland's trade balance is on par (84 percent exports) with the regional average. While grain had driven much of the region's export growth, Portland's export demand has been driven by potash, fuels and petroleum products, metallic salts (soda ash), and autos.

## EXPORT TRENDS · · · All Lower Columbia port areas have seen export growth over the last five years. Kalama and Vancouver have had the fastest growth. Kalama is now the largest exporter in the market by tonnage.

**48 million tons of cargo was exported by Lower Columbia ports in 2018, a 20 percent increase over five years.**

Export growth on the Lower Columbia has been largely driven by increases in grain exports (+29 percent). Portland saw grain exports increase through 2017 before falling sharply in 2018.

Exhibit 1. Total Export Volume of All Commodities at Lower Columbia Ports, 2014-2018
Source: USACE



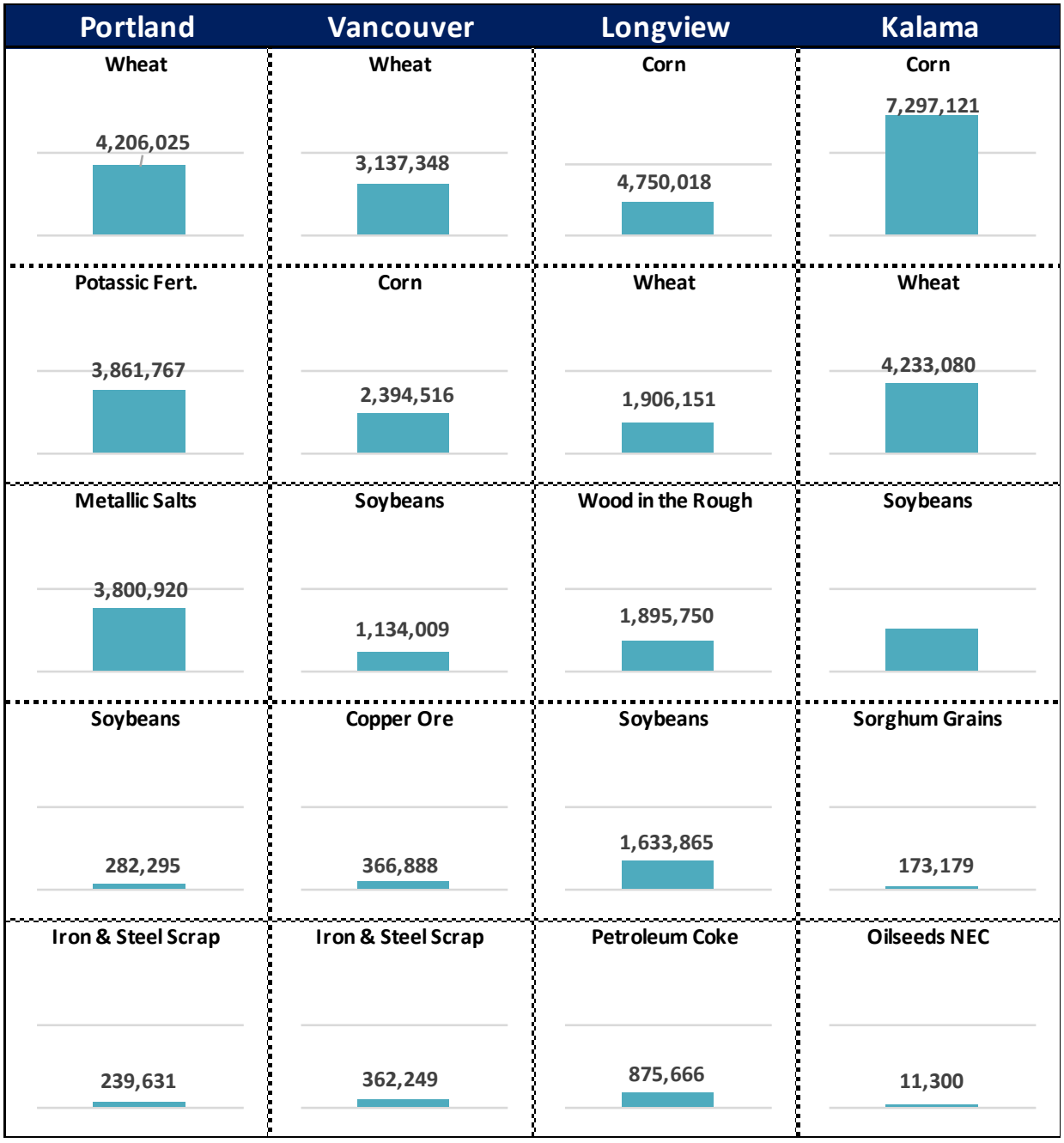

## TOP 5 EXPORTS · · · Grains are the most important export commodity to Lower Columbia Ports. Portland is the only Lower Columbia Port not exporting large volumes of corn.

**Non-grain dry bulks comprise three of Portland's top 5 exports, with Potash, Soda Ash, and Scrap comprising 60 percent of current export volume.**

Wheat, Corn, and Soybeans account for 70 percent of all Lower Columbia Exports.

Exhibit 2. Top 5 Export Commodities at Lower Columbia Ports (in Short Tons) 2018

Source: USACE




## Import Market Growth

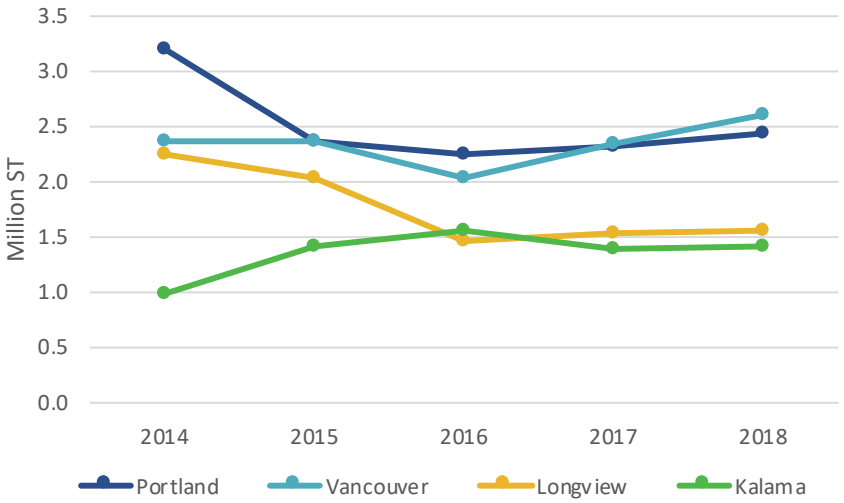
Imports comprise a minority and declining share of marine trade activity on the Lower Columbia. With the exception of automobiles (Portland, Vancouver) and containers (Portland), imports at Lower Columbia ports are largely driven by the production and supply-chain needs of manufactures and the construction sector.

## IMPORT TRENDS · · · Declining import volumes from 2014 to 2016, followed by slight growth through 2018. Portland's sharp decline driven by fall in containerized imports.

**8 million tons of cargo was imported by Lower Columbia ports in 2018, a 9 percent decrease over five years.**

Loss of bulk steel imports and containers at the Port of Portland drove imports down. These losses were partially offset by increases in gasoline, automobiles, cement and concrete, and misc. bulk fertilizers and chemicals.

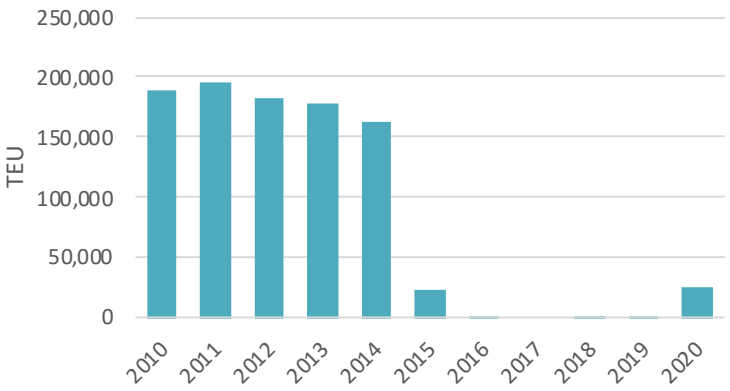
Exhibit 3. Total Import Volume of All Commodities at Lower Columbia Ports, 2014-2018
Source: USACE




## CONTAINERIZED TRADE · · · A return of service unique to the Portland market

**The Port of Portland is the only market on the Lower Columbia that handles containerized trade. Portland lost its container service in 2016, with weekly service resuming by mid-2018. According to representatives at the Pacific Maritime Association, Portland handled roughly, 165,000 TEU in 2014 before service disappeared in 2017.** Weekly calls have returned; through June 2020 the Port of Portland had handled almost 25,000 TEU.

Exhibit 4. Total Containerized Trade in Portland Harbor, 2010-2020
Source: Pacific Maritime Association



TOP 5 IMPORTS · · · Imports in Longview and Kalama are largely driven by specific local producers. Portland and Vancouver imports include automobiles and a strong correlation to the construction sector.

**Portland and Vancouver are the only automobile importers on the Lower Columbia. Vancouver imports for Subaru and Portland imports Hyundai, and Toyota.**

Kalama mainly imports products related to local manufacturers Kalama Emerald Chemical and Steelscape. Vancouver's I&S imports are driven by Evraz Steel.

Exhibit 5. Top 5 Import Commodities at Lower Columbia Ports (in Short Tons) 2018

Source: USACE


## Domestic and Intraport Commodity Flows

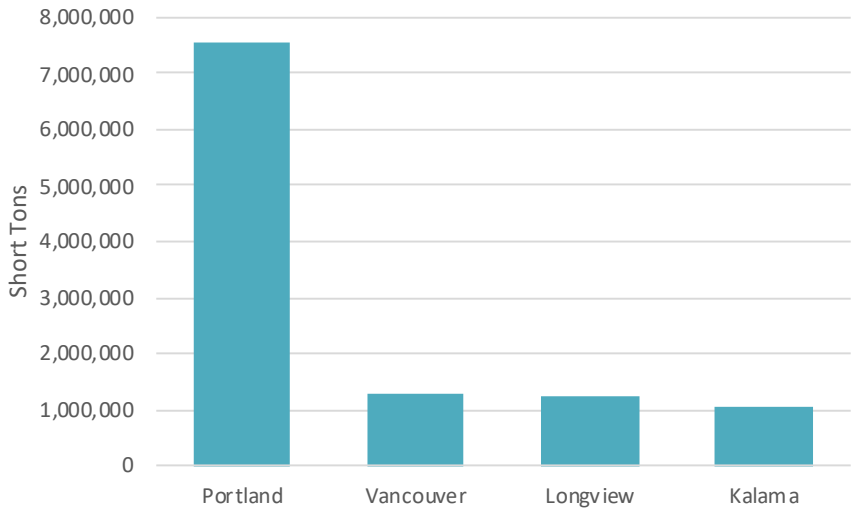
The impact of waterway cargo flows is not exclusive to international trade. The movement of goods within a port area, to or from a coastwise location, or within a navigational system may also impact throughput demand.

## DOMESTIC COMMODITY FLOWS · · · Portland's Harbor is far more connected to the regional economy and regional freight system.

**The Portland Harbor moves over 7.5 million tons of cargo coastwise or within the Columbia River system. This is twice the volume of all other Lower Columbia Ports combined.**

Portland is the only port with measurable intraport waterway cargo flows. Roughly 230,000 tons of sand and gravel were moved within the harbor in 2018.

Exhibit 6. Domestic and Intraport Cargo Volumes at Lower Columbia Ports, 2018
Source: USACE




- Portland has the highest share of waterway commerce moving domestically, accounting for one-third of all waterway cargo volume. The second highest is Vancouver at 12 percent.
- Outbound domestic shipments of fuel products (gasoline, distillate fuel oil, kerosene, and crude oil) topped 1.1 million tons in 2018.
- Over 2.4 million tons of the same fuel products arrived in Portland from domestic sources.
- Georgia Pacific is likely responsible for most of the 433,000 tons of paper products received in the harbor (from domestic sources) in 2018.
- Portland has the largest share of its wheat exports (49 percent) that arrive by waterway commerce.

Taken together, Portland's harbor is far more active and connected to regional freight networks than trade data would reveal. Including domestic and intraport flows, 23.2 million tons of cargo moved through Portland's terminals in 2018, roughly equivalent to total flows in Vancouver and Longview combined.

## Market Share

In this section we evaluate Portland's market share of specific commodity types that make the largest share of waterway cargo volumes in Portland and on the Lower Columbia. Existing market shares are indicative of local competitiveness in a point-in-time, with changes in market share suggesting a shifting competitive landscape.

### GRAINS · · · Capacity expansion and improved competitiveness in Kalama began shifting market share from Portland in 2015. Portland has not captured any market share in a growing corn export market.

**In 2018 corn was the single largest export commodity on the Lower Columbia. Every competitive port on the Lower Columbia handles corn, except Portland. Portland has historically handled low corn volumes.**

Total corn exports grew by 266 percent between 2014 and 2018.

**Portland's total market share in the export of grain commodities is 13 percent.**

In 2018 Portland did not handle any grain commodities other than wheat and soybeans.

Exhibit 7. Lower Columbia Port Market Share for Grain Commodities, 2018
Source: USACE

| | Short Tons | | | | Market Share | | | |
|---|---|---|---|---|---|---|---|---|
| Commodity | PDX | VAN | LONG | KAL | PDX | VAN | LONG | KAL |
| Wheat | 4,206,025 | 3,137,348 | 1,906,151 | 4,233,080 | 31% | 23% | 14% | 31% |
| Corn | 0 | 2,394,516 | 4,750,018 | 7,297,121 | 0% | 17% | 33% | 51% |
| Soybeans | 282,295 | 1,134,009 | 1,633,865 | 2,574,765 | 5% | 20% | 29% | 46% |
| Other | 0 | 29,315 | 182,400 | 184,479 | 0% | 7% | 46% | 47% |
| Total | **4,488,320** | **6,695,188** | **8,472,434** | **14,289,445** | **13%** | **20%** | **25%** | **42%** |

Exhibit 8. Lower Columbia Port Market Share for Wheat Exports, 2014-2018
Source: USACE

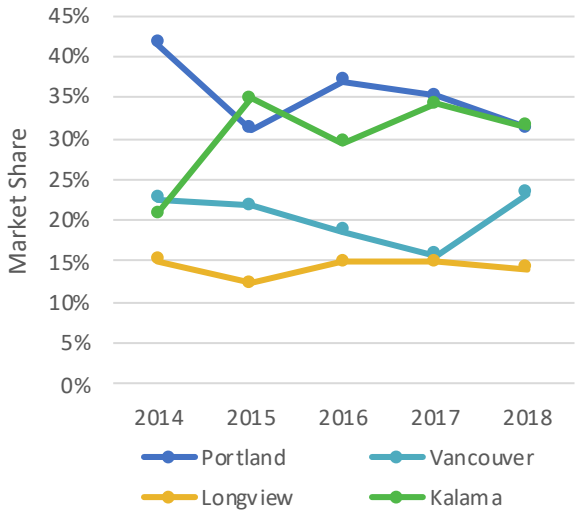
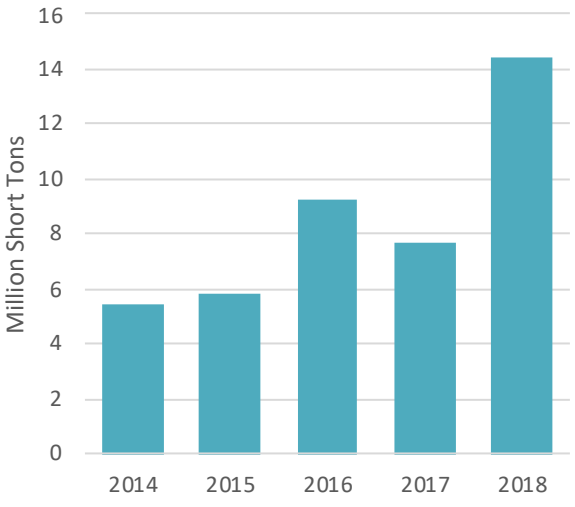



Exhibit 9. Lower Columbia Corn Export Growth, 2014-2018
Source: USACE

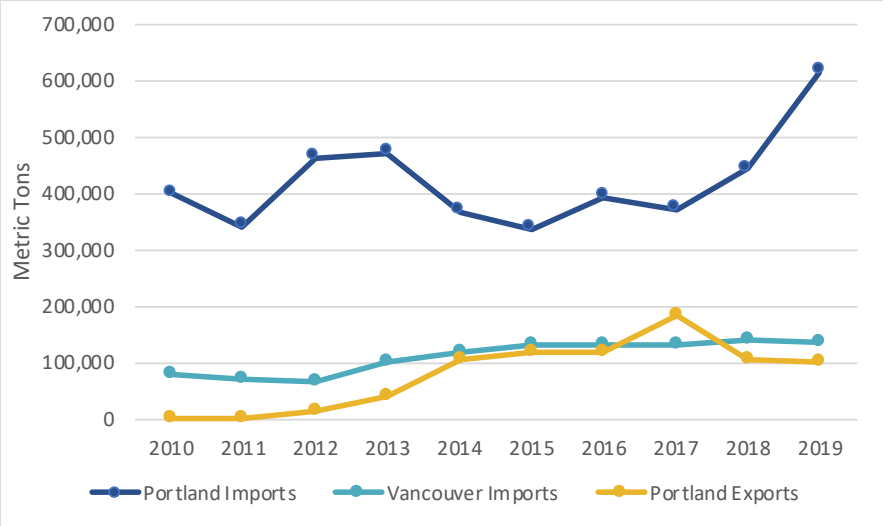


## AUTOS · · · Portland remains the only auto exporter on the Lower Columbia and the top exporter on the West Coast. It remains the dominate importer on the Lower Columbia.

**In 2019 Portland exported roughly 103,000 MT of Fords from Terminal 6. Based on historical unit data, this equates to 50k to 55k units[36].**

Auto imports through Portland have increased by nearly 83 percent since 2015. A surge in volumes from Toyota have driven growth in 2019.

Exhibit 10. Total Import and Export Volume of Autos at the Port of Portland and Port of Vancouver, 2010-2019
Source: USACE

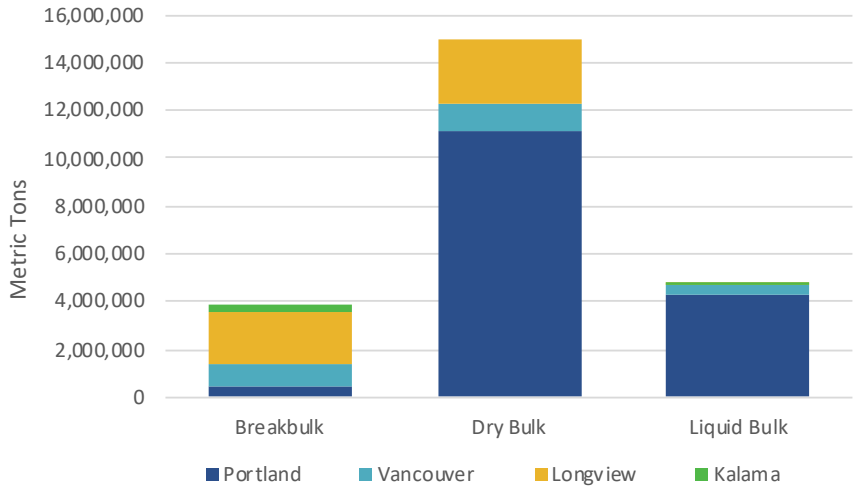



## OTHER CARGO TYPES · · · Portland maintains a large edge in market share for dry bulk and liquid bulk products. Portland's portfolio of dry bulk cargo is well balanced between domestic movement of sand and gravel, imports of construction products and fertilizers, and exports of potash, metallic salts, and scrap metal.

**In 2019 Portland captured 74 percent of non-grain dry bulk and 91 percent of liquid bulks. Dry bulk is driven by international trade while liquid bulks are primarily the movement of petroleum products through domestic locations.**

Portland only captures 13 percent of the break bulk market on the Lower Columbia, most of this is Georgia Pacific. Evraz Steel moved its iron and steel imports to Vancouver in 2015.

Exhibit 11. Total Commodity Flows from All Sources for Break Bulk, Dry Bulk, and Liquid Bulk Cargo Types at Lower Columbia Ports, 2018.
Source: USACE



# 3. Competitiveness Characteristics

In this section, we compare and contrast the physical and regulatory characteristics impacting the competitiveness of port areas on the Lower Columbia. This analysis will include an assessment of land availability and readiness, marine terminal characteristics, underutilized water-access sites, and recent and planned investment activity. Analysis in this section is supplemented by a detailed profile of each port included at the end of this chapter. The objective of this analysis is to determine the competitive advantages and disadvantages of each port area, and their ability to position and respond to changing market conditions and emerging regional demand for marine handling as well as marine-dependent production and service sectors.

## Rail Characteristics and Access

The Portland Harbor is the nexus of a multi-modal transportation system. Relative to other Lower Columbia port areas, Portland's position along two Class I railroads is among its most marketable competitive advantages. This advantage offers greater flexibility, less congestion, and a competitive pricing environment. Within the harbor roughly 90 percent of harbor access sites have access to rail. However, for terminal development, small sites may limit Portland's ability to offer flexible or optimal rail configurations for future development. Creative design and operational efficiency will be necessary to provide competitive site level rail capacity.

RAIL COMPARISON · · · Portland Harbor benefits from superior regional accessibility and a dual provider cost advantage.

Exhibit 12. Comparison of Lower Columbia Port Rail Competitiveness
Source: ECONorthwest Research, Interviews with Port Staff

| Location | Rail Advantages | Rail Disadvantages |
|---|---|---|
| Portland | Location along both Union Pacific and BNSF Class I rail lines. Multiple rail yards within industrial areas. | Small sites limit the ability to deploy high-capacity rail configurations on existing and new terminals. |
| Vancouver | The West Vancouver Freight Access project ($250 million) added capacity and a loop track increasing the competitiveness of Terminal 5. | Single-service rail provider creates cost disadvantage relative to Portland. |
| Longview | On-dock rail for Longview Central Berth. High-capacity loop tracks for EGT and Berth 5 Terminals. North Rail Connection Project will add capacity. | Mainline congestion. Limited internal capacity and congestion. |
| Kalama | Third Rail project relieved congestion, expanded local capacity, and facilitated expansion at Temco. Rail capacity at Temco and Kalama Export offer capacity advantages. | Mainline congestion. Crossings in South Port limit access. |

[36] Unit data from 2019 was not readily available. In 2016 Portland exported roughly 50,000 units followed by 87,000 units in 2017 and 58,000 units in 2018.

| | | |
|---|---|---|
| Port Westward | Large sites will allow flexibility to accommodate a broad range of rail configurations | Only served by the PNWR Shortline. Politics around cargo types. |

## Berths and Draft Depths

An inventory of reported berths, drafts depths and characteristics are included in individual port profiles included at the end of this report. Here we summarize key findings.

### BERTHS AND DRAFT DEPTHS · · · Portland Harbor benefits from superior regional accessibility and a dual provider cost advantage.

Exhibit 13. Summary of Comparative Berth Characteristics for Lower Columbia Ports
Source: ECONorthwest Research, Interviews with Port Staff

| Port | # of Berths | Draft Depth | Terminal Types | Vacant/ Underutilized Terminals | Comments |
|---|---|---|---|---|---|
| Portland | 11 (Port) | 35' to 43' for port berths. Varies more broadly for private sites on the Willamette River. | Grain, Auto, Dry Bulk, Liquid Bulk, Containers, Ro/Ro | The future use of Terminal 2 is unclear. It has emerged as a candidate for a range of non-marine uses. Grain silo at Terminal 4 to be demolished. LD grain terminal currently not operational. Temco grain terminal under capacity. | The Port has 11 berths at Terminals 4, 5, and 6. More than a 50 private access berths exist throughout the harbor serving barge, grain, dry bulk, paper, steel, and other commodities. The Port of Portland is the only container terminal on the Lower Columbia and the only auto export facility. |
| Vancouver | 13 | 40' to 43' most at 43' | Grain, Dry Bulk, Break bulk, Auto, Ro/Ro, Liquid Bulk | Terminal 5 is an 80-acre property with a loop track and 40 acres available and actively marketed. | The Port of Vancouver markets five terminals with 13 berths. The Port operates 6 berths. Berth 10 is the only other major auto facility on the Lower Columbia (Subaru). It has a floating auto Ro/Ro. Vancouver has specialized in heavy break bulk in recent years, including wind energy equipment. |
| Longview | 9 | 40' to 43' most at 43' | Dry Bulk, Breakbulk, Grain, Ro/Ro | Berth 4 grain elevator to be demolished, Millennium Bulk Terminal | Predominately export driven. Longview Central has 2 berths, a heavy lift crane, a Ro/Ro and 35-acre yard. Loop tracks at EGT and Berth 5. Bridgeview lease began in 2017. |
| Kalama | 5 | 40' to 43'. Only 23' | Grain, Lumber, | North Port has 100 vacant acres. | The Port operates North Port, other terminals are private. Loop track at Kalama Export. |

| | | | | | |
|---|---|---|---|---|---|
| | | barge at RSG | Liquid Bulk, GC | Planned methanol export. | Berth lengths (excluding RSG) range from 680' to 1,088'. |
| Port Westward | 1 | 60' | Liquid Bulk | Additional dock proposed. | The Global Clatskanie berth was reconstructed with Global Partners purchased the Columbia Pacific Bio-refinery. |

## Portland Harbor River Access Sites

Relative to other port areas on the Lower Columbia, the Portland Harbor has the distinct competitive advantage of many non-port marine access sites. These sites include private terminals for cargo transport, bargeways, dry docks, commercial moorage, and other berths offering river access. Many of these assets serve marine production and service users that rely on river access as an essential function of their business. However, some of these berths are currently idle or underutilized, presenting a unique competitive advantage for the Portland Harbor. Exhibit 14 below presents map of the major port and non-port river access points in Portland Harbor. Exhibit 15 is an associated table of identified uses and users.

Exhibit 14. Summary of Comparative Berth Characteristics for Lower Columbia Ports

Source: ECONorthwest Research

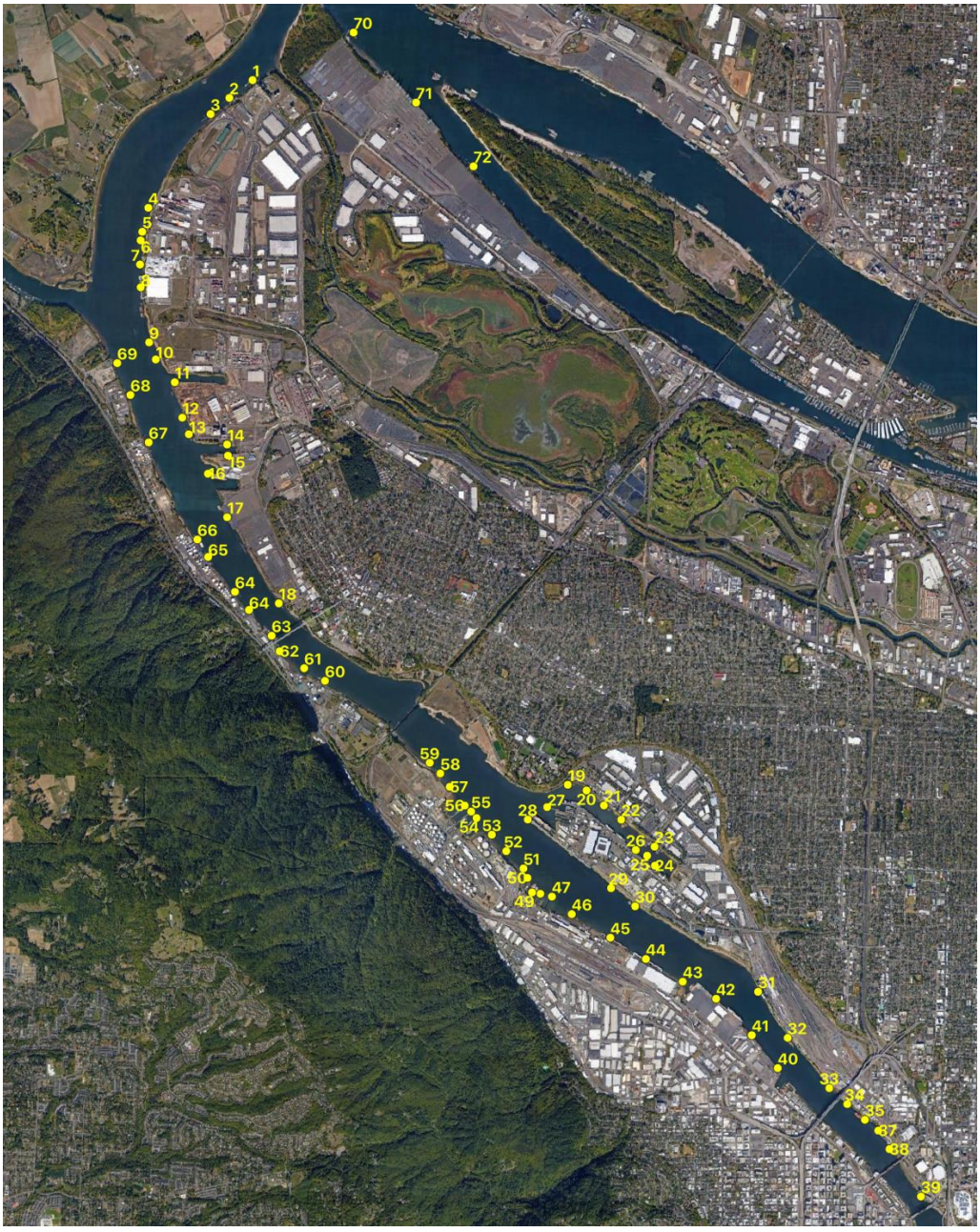



Exhibit 15. Table of Portland Harbor Major Water Access Sites/Uses
Source: ECONorthwest Research

| ID | Name/Use |
|---|---|
| 1 | Port of Portland (Columbia Gran Lease) |
| 2 | Port of Portland (Millbank Materials Lease) |
| 3 | Portland Bulk Terminals |
| 4 | EVRAZ |
| 5 | Simplot |
| 6 | Simplot |
| 7 | Ash Grove |
| 8 | Georgia Pacific |

| | |
|---|---|
| 8 | Time Oil |
| 10 | Burgard is listed owner of taxlot, otherwise unknown. |
| 11 | Schnitzer Steel |
| 12 | Schnitzer Steel |
| 13 | Port of Portland (multiple leases) |
| 14 | Port of Portland (multiple leases) |
| 15 | Port of Portland (multiple leases) |
| 16 | Port of Portland (Kinder Morgan Lease) |
| 17 | Port of Portland (Toyota Lease) |
| 18 | Langley St. Johns is listed owner of taxlot. Green Anchors Eco-Industrial Park? |
| 19 | US Coast Guard |
| 20 | US Coast Guard |
| 21 | Marine Salvage Consortium |
| 22 | Port of Portland (multiple leases) |
| 23 | NW Paper Box? Otherwise unknown |
| 24 | Port of Portland |
| 25 | Portland Shipyard |
| 26 | Portland Shipyard |
| 27 | Portland Shipyard |
| 28 | Portland Shipyard |
| 29 | Port of Portland (Cadman Lease) |
| 30 | Port of Portland (Cadman Lease) |
| 31 | Ash Grove |
| 32 | Ash Grove |
| 33 | SAKRETE |
| 34 | Jacobsen? Otherwise unknown. |
| 35 | Glacier/Cal Portland |
| 36 | Glacier/Cal Portland |
| 37 | Temco |
| 38 | Temco |
| 39 | LD Commodities |
| 40 | Lithia (Former Terminal 1) |
| 41 | Sulzer Pumps |
| 42 | Port of Portland (Terminal 2) |
| 43 | Sause Bros |
| 44 | Georgia Pacific |
| 45 | Gunderson |
| 46 | Gunderson |
| 47 | Gunderson |
| 48 | Lakeside |
| 49 | Lakeside |
| 50 | Shaver |
| 51 | Hampton Lumber |
| 52 | Glacier/Cal Portland |
| 53 | McCall Oil |
| 54 | Phillips |
| 55 | Chevron |
| 56 | Kinder Morgan |
| 57 | Atofina |
| 58 | Atofina |
| 59 | Atofina |
| 60 | NW Natural Gas |

| | |
|---|---|
| 61 | US Army Corps of Engineers |
| 62 | Advanced American Construction |
| 63 | Foss |
| 64 | NuStar |
| 65 | NuStar |
| 66 | Pacific |
| 67 | BP |
| 68 | Owens Corning |
| 69 | Knife River/Morse Brothers |
| 70 | Port of Portland Terminal 6 |
| 71 | Port of Portland Terminal 6 |
| 72 | Port of Portland Terminal 6 |

**High reuse potential.** Among all identified water-access berths, the greatest opportunity for redevelopment and reuse are Berths 13 through 15 at Terminal 4 (former Cargill Terminal). The Port of Portland is actively planning investments to reposition this site for terminal development.

**Possible reuse potential.** Among non-brownfield sites, possible opportunities for long-term reuse intensification exist for Berths 29, 33-34, 40, and 42. Berth 29 is a Port of Portland site at Swan Island that is underutilized. Berths 33-34 are the vacant Sakrete/Ross Island Sand sites that are not operational. Berth 4 is owned by Lithia Motors, and actively marketed for sale in the year. Berth 42 is the Port of Portland's Terminal 2. Prior to the COVID-19 pandemic, Terminal 2 was being held for potential use for the Portland Diamond Project. The Portland Diamond Project has reportedly stopped paying rent on the property. If the project is abandoned, the likelihood of Terminal 2 being used for industrial uses increases considerably.

**Brownfield reuse potential.** Berths 8 (TimeOil), 18 (Langley), and 57-59 (Atofina) are all unutilized brownfield sites. Their redevelopment and reuse of these sites will be contingent on the resolution of the Superfund Cleanup and tools to facilitate brownfield redevelopment. Both factors are reasonably possible over the next 20 years.

**Idle Berths**. Both Berth 4 (EVRAZ) and Berth 41 (Sulzer) are idle underutilized berths with rail access. The 2020 Marine Cargo Forecast identified a reasonable likelihood that EVRAZ moves its imports back to Portland over the forecast period. While a benefit to the harbor, this would not directly impact on-site land need.

**Active/Unlikely Reuse.** All other berths identified have existing active uses that are not likely to change over the forecast period or have a very low likelihood of redevelopment.

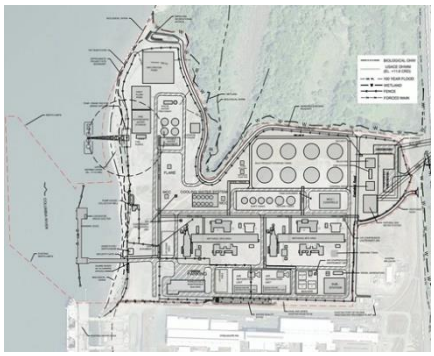
## Inventory of Vacant/Underutilized Terminals

Vacant or underutilized terminals may offer the greatest ability for a port to respond to shifts in market conditions or new market opportunities. However, vacant terminals may also be indicative of obsolete or uncompetitive assets. We found that every port on the Lower Columbia has at least one vacant or underutilized site at various phases of rehabilitation or market positioning. Each property is discussed individually below.

### Terminal 5—Port of Vancouver

Terminal 5 is an 80+ acre property with over 40 acres available for development. The site includes an 8,500' loop track that is designed to accommodate multiple unit trains and a variety of cargo types. The port has been marketing the site for several years.

### North Port—Port of Kalama



The North Port property is a roughly 100-acre site with deep water access at the north end of the Port of Kalama. The site is currently being planned by NW Innovation Works for a $2 billion methanol production and export facility. The project has been in the permit review and appeal process for several years. If this project ends up getting abandoned, the port will look to reposition the site for alternative uses. However, it expects that the site would sit vacant until market opportunities rebound in the next economic cycle.

## Berth 4—Port of Longview

Longview's Berth 4 is the former Continental Grain Terminal at the Port of Longview. The terminal has been vacant for decades. The port is in the process of planning and permitting work to demolish the existing grain silos and reposition the site. Demolition is expected by 2022. At least one user has expressed interest in the site for a potential soda ash export terminal. The 705' berth has a 43' draft depth, according to port reports.

## Terminal 4—Port of Portland

The Port of Portland is in the process of planning and permitting the demolition of the non-operational grain elevator at Terminal 4. This process would make the site available for repositioning for a new terminal. Uses would be limited due to the site's size.

## Terminal 2—Port of Portland

The Port of Portland's Terminal 2 is a 53-acre facility with on-dock rail potential offering direct ship-to-rail transfer. The site has not been operational for several years. A draft depth that is limited to 37' or less has limited the site's competitiveness and marketability. It's position close to Downtown Portland coupled with conflicting uses encroaching on the site have led to interest in redeveloping the site for a non-industrial use. The site was identified as a preferred alternative for the Portland Diamond Project, an effort to bring a Major League Baseball team to Portland.

### LD Commodities Grain Terminal—Portland Harbor

Despite investing more than $20 million to remodel and update the grain terminal on the Willamette River in 2014, LD Commodities ceased operation on the terminal in 2019. It was subsequently sold to Rabin Worldwide. It is not currently operational. The site is unique in that it sits otside of the Army Corps of Engineers deepwater Navigation Channel and is located in the Central City. It's long-term use as a cargo facility is uncertain.

## Recent Investments

Recent investments in infrastructure, terminal development, private investment, or investments to improve capacity are indicative of shifts in the competitive landscape and ability to capture market share. This inventory of recent and planned investments was derived from media reports, port budget documents, press releases, and interviews with port staff. Given the qualitative nature of the source data, it is not an exhaustive inventory of all investment activity but is representative of major investment activity. Exhibit 16 presents a qualitative summary of our assessment of the magnitude of investments by category. Key observations and more details of investments by Port follows.

### RECENT INVESTMENT CAPTURE · · · Portland has captured its fair share of terminal upgrades, which have been concentrated in grain and bulk capacity investments. It has fallen behind on new or planned investment share.

Exhibit 16. Summary of Share of Regional Investment Activity
Source: ECONorthwest Research, Interviews with Port Staff

| Port | Rail | Terminal Development | | | Land Acq. Or Planning | Non-terminal Development |
|---|---|---|---|---|---|---|
| | | New | Upgrade | Planned | | |
| Portland | Some | None | Significant | Terminal 4 redev. | None | Some to significant |
| Vancouver | Significant | None | Significant | Terminal 5 | Columbia Gateway | Significant |
| Longview | Significant | EGT, IRM | Some | Millennium Bulk, Terminal 4 | Barlow Point | Limited |
| Kalama | Significant | None | Significant | NW Innovation | North Port | Some |
| Port Westward | None | None | Some | NW Innovation | PWW Industrial Park | None |

**Rail Investment.** Washington ports have made considerable investments in rail infrastructure. Recent and planned investments including the West Vancouver Freight Expansion, Kalama Third Rail Expansion, The North Rail Connection, and the Longview Industrial Rail Corridor, among other projects. These projects amount to nearly $350 million in investment. Portland's rail infrastructure is in a much better position and has not necessitated similar investments. In 2020, construction commenced on the $23 million Rivergate Rail Overpass project.

**New or Planned Terminals.** Two new terminals have begun operation in Longview in recent years. The EGT Terminal was a $200 million new grain terminal built in 2012. IRM Bridgeview was a new lease at a previously vacant terminal. Every port with the exception of Portland has a major sited marketed or planned for a new terminal development. Collective "potential" new terminal investments at Port Westward, Kalama, and Longview exceed $4.6 billion. This excludes Vancouver's vacant Terminal 5 and Port Westward's Next Renewables Project.

**Long-Term Planning.** Every port with the exception of Portland has a major site or area planned for future expansion. Collectively, other Lower Columbia ports have over 1,750 acres in various planning stages. The Port of Kalama's North Port area has almost 100 acres. The NW Innovation Works project is currently planned for this site but if it does not get approval the Port of Kalama would look to other uses, most likely dry bulk commodities. At the port of Longview, Barlow Point is 280-acre property with the potential to add 2-3 berths. The Port of Vancouver's Columbia Gateway site would offer over 535 acres of greenfield development. And Port Westward is currently looking to add over 800 acres dedicated to deep water-dependent uses.

**Production, Service, and Logistics Investment.** The Trends Analysis section of this report documented recent non-terminal investment activity in Portland Harbor. Investment has included new distribution centers (FedEx, Amazon), and medium-scale expansions or retrofits of existing facilities (Maletis, Maruchi Steel).

### Vancouver

**Terminal 1 Redevelopment.** Redevelopment of Terminal 1 is currently underway. The project will total $300 million in estimated construction investment to create 950,000 sf of mixed-use space.

**Christensen Facility.** The former Christensen Yachts facility was purchased by Vigor in 2019 for immediate expansion following award of $1 billion Army contract. An unknown amount of investment went into retrofitting and expanding the facility.

**West Vancouver Freight Expansion.** A $250 million effort between 2007 and 2018. The project resulted in the port increasing capacity to 400,000 railcars annually.

**Terminal 5.** A high capacity 8,500' loop track was added to the site in 2010 as a part of the West Vancouver Freight Expansion.

**Centennial Industrial Park.** Since 2015 the upland industrial park adjacent to the port's marine terminals has developed over 1 million square feet of industrial space.

**Farwest Steel.** Construction of a new 335,000 square foot warehouse at the Port in 2012.

## Longview

**EGT Grain Terminal.** A new $200 million grain terminal with storage capacity of 130,000 metric tons. The terminal began operations in 2012.

**IRM Bridgeview Terminal.** International Raw Materials acquired a lease of the Bridgeview terminal and began operations in 2017. The lease included a $1.25 million investment commitment.

**North Rail Connection.** A $3.4 million project to expand access, reduce congestion, and increase rail capacity by 90 railcars.

**Industrial Rail Corridor Expansion.** Ongoing project and planning work including design alternative for a $76 million expansion that would add 10 miles of rail and allow capacity for internal flow of long unit trains.

**North American Pipe & Steel Expansion.** A doubling of the size of the Warehouse at 7 International Way at the Port of Longview.

**Terminal 4 Redevelopment.** The Port is in the process of planning demolition of the grain silos and positioning Terminal 4 for redevelopment.

**Barlow Point.** Ongoing master planning for the 280-acre Barlow Point property.

**Millennium Bulk Terminal.** Ongoing planning and investment to redevelop a former aluminum plant into a coal export terminal.

## Kalama

**Temco Expansion.** A $200 million expansion of **the Temco export terminal in 2015. The project doubled export capacity. The Port also invested $6 million** in rail capacity upgrades.

**Third Rail Project.** Rail expansion to add a third rail line along 3.7 miles through Kalama to relieve congestion.

**Kalama Export Terminal.** A $36 million expansion in 2011 added eight silos and cleaning/procession equipment.

**NW Innovation Works**. A proposed $2 billion methanol export terminal on nearly 100 acres at the North Port property. As a part of the project the Port of Kalama would construct a new $3 million berth.

**Kalama River Industrial Park.** Completion of an $8 million and 110,000 sq. ft. spec building in 2019.

**Kalama Marina T-Barge.** A $1.1 million project at Kalama Marina to add a T-barge dock.

**Property Acquisition.** The Port has allocated $2.5 million in the current budget for strategic acquisitions. The Port is looking at the Chemtrade building and Kalama Export properties.

### Port Westward

**Global Partners.** Global partners purchased the Columbia Pacific Bio-refinery in 2013 and committed $20 million for access roads and a new berth.

**NW Innovation Works.** W Innovation works has proposed a $2 billion methanol production and export facility similar to the facility proposed in Kalama.

**Global Partners Expansion.** In 2018 Global Partners acquired 1.2 million barrels of storage capacity from PGE.

**Global Partners Renewable Diesel Conversion.** Global partners is currently in the process of switching from ethanol export to export of renewable diesel. This will require plant investments and will also result in lower train capacity needs (40 railcars compared to 100+ railcar unit trains).

**Port Westward Industrial Park Expansion.** The Port has been attempting to get a rural industrial zone change for over 800 acres at the port. It remains in appeal. Uses would be limited to deep water-dependent users.

**Next Renewables.** Next Renewables has a planned $1 billion renewable diesel refinery with the capacity for 13.3 million barrels. The investment is contingent on approval of Port Westward's proposed rural industrial zone change expansion.

## Vacant/Redevelopable Land for Development

In instances where a vacant or underutilized terminal requires demolition of existing structures and/or environmental remediation, vacant land may be more capable responding to market opportunities—so long as vacant sites do not share similar incumbrancers. Here we inventory opportunities in the region to accommodate growth through new terminal development on vacant or clearly redevelopable property.

### Time Oil—Portland Harbor

The "Time Oil" site is a loosely defined site on the east bank of the Willamette River in the Portland Harbor. According a 2017 report[37], the Time Oil site is a 51.7-acre parcel with roughly 39 acres of net developable land. The site is considered a "Tier 3" site, indicating that considerable encumbrances to development exist. An existing berth exists at the site. The site has recently been considered for a marine-industrial development associated with facilitating the Harbor Cleanup project.

### Columbia Gateway—Port of Vancouver

The Port of Vancouver promotes Columbia Gateway as the largest contiguous tract of undeveloped industrial and deep-water marine property on the West Coast. The 535-acre property is zoned for heavy industrial and will accommodate both marine terminal and non-

[37] Mackenzie. Regional Industrial Site Readiness Update. 2017.

terminal industrial production and service uses. The Port envisions opportunities for dry bulk and automobile export/import uses. The combination of permitting, infrastructure, and fill necessary to develop the site puts its development 10-15 years out at a minimum.

### Emerald Kalama Chemical—Port of Kalama

Emerald Kalama Chemical owns nearly 90 acres of waterfront land immediately north of their property. The site is vacant but has suspected contamination and is heavily encumbered by wetlands. A long-term effort to get the site into a useable condition would be required. However, the Port has actively tried to acquire the property and would purchase it if it became available.

### Barlow Point—Port of Longview

Barlow Point is a 282-acre property with an estimated 4,000' of riverfront suitable for wharf development. The site was purchased by the Port of Longview in 2010 and master planning of the site has been ongoing. A 2016 draft of the master plan included concept alternatives for two to three terminals with loop track capacity38. The site is still in the early planning phases and development is not likely to occur until 2030 or later.

### Millennium Bulk Terminal—Port of Longview

Millennium Bulk Terminals has proposed to construct a coal export terminal at the site of the former Reynolds aluminum plant Longview. The export terminal would be developed on 190 acres within the broader 540-acre site. It would be the largest export coal dock on the west coast. The coal export terminal would consist of one operating rail track, eight rail tracks for storing up to eight unit trains, rail car unloading facilities, a stockpile area for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and ship loading facilities on the two docks39. In March 2020 the project lost a key shoreline permit appeal from the State Department of Ecology. State and federal lawsuits impacting the future of the project are ongoing.

### Port Westward Industrial Expansion—Port of Columbia County

The Port of Columbia County has been seeking a rural industrial zone change for over 830 acres of property at Port Westward since 2012. The port's application limited future uses to marine-dependent users only. The application was remanded to LUBA a second time in 2019. At this time the future of marine terminal development at Port Westward remains unclear. If eventually approved, the site would offer large sites with a 60' draft depth.

### Austin Point—Port of Woodland

The Port of Woodland owns 200+ acres of waterfront industrial land at Austin Point. The Port has long considered development of marine terminal facilities at the site but lacked necessary

[38] Port of Longview. Barlow Point Master Plan, Appendix B: Barlow Point Conceptual Planning. 2016.

[39] Millennium Bulk Terminals Project Description. https://www.millenniumbulkeiswa.gov/project-details.html

easements to extend rail to the site. The Port recently acquired the "Kuhnis Road Property" that would allow it to extend rail infrastructure.

Exhibit 17: Examples of Vacant or Underutilized Land

Austin Point—Port of Woodland

Columbia Gateway—Port of Vancouver

Barlow Point—Port of Longview

Port Westward—Port of Columbia County

## Comments on Marine Terminal Trends and Competitiveness

To help inform our understanding of current and anticipated competitiveness dynamics, interviews were conducted with leaders at other Lower Columbia Port facilities. Interviews were conducted over the phone or by video conference. We interviewed the following representatives at the Ports of Vancouver, Kalama, and Columbia County. The Port of Longview declined to be interviewed for this study.

| Name | Title | Organization |
|---|---|---|
| Mike Bomar | Director of Economic Development | Port of Vancouver |
| Jim Hagar | Economic Development Project Manager | Port of Vancouver |
| Alex Strogen | Chief Commercial Officer | Port of Vancouver |
| Erik Yakovich | Economic Development Project Manager | Port of Kalama |
| Matt Miller | Real Estate and Business Development Manager | Port of Columbia Co. |

Interviewees were asked questions covering a range of factors. In this section we present information summarized by key themes relating to market trends, opportunities, and competitiveness.

## Expected Market Trends and Opportunities

- For future terminal development on the Lower Columbia, there are only six commodities that have demonstrated long-term demand growth, site needs that align with available sites, and are politically acceptable to get approval. These include:
    - Fertilizers
    - Cement
    - Mineral Bulk
    - Wood Pellets
    - Agriculture
    - Automobiles
- Grains and oilseeds will likely continue to have an ongoing regional advantage as an export commodity. The resiliency throughout the trade war/tariffs is a testament to market stability. Tariffs have had an impact but have not decimated the market.
- Over the long-term, the Lower Columbia grain market may see increased competition from lower cost export locations (i.e. South America).
- Conversely, the Pacific Northwest's position as a domestic grain exporter may improve as a result of climate change. Water resource constraints in the south may push agricultural production north, making the Pacific Northwest an increasingly competitive gateway.
- Global demand growth among Pacific Rim trading partners will continue raise the high-water mark for all Lower Columbia ports.
- The combination of political factors impacting domestic steel production and trade could have long-run impacts on steel imports.
- Prospects for wind energy component imports is likely to deteriorate in the intermediate term. This market is highly reliant on public subsidy for financial viability. The combination of lower cost solar imports and expiring production tax credits may depress wind energy development. Beyond 3-5 years this market will be increasingly reliant on importing components for transfer to Canadian wind farm development where subsidy is likely to remain.
- Growing regulatory mandates in the U.S. to convert to full electric automobiles will create new import markets for automobiles. California established a goal of full electric vehicle sales by 2035. Other West Coast states may follow suit. China is expected to be the largest manufacturer of electric vehicles in the world. This creates long-term opportunity for auto import growth on the Lower Columbia.

## Relative Competitiveness

- Relative to Portland, most ports see availability of land as their primary competitive advantage, especially Vancouver.
- Portland's competitive advantages include labor access, a diversity of established industries and employers, and a rail advantage that is distinct and considerable. Rail the most important advantage over Vancouver.
- Portland also maintains an advantage of name recognition in addition to an agglomeration of a broader variety of uses in the harbor.
- Looking at all the available sites in the region, the Port of Vancouver may have the best opportunity at Terminal 5 to be immediately responsive to market opportunities. However, it's single-provider rail service continues to be a limiting disadvantage.
- Continued support to improve the Northern Rail Corridor will be essential preserving cost-effective transportation and maintaining competitiveness for the Ports of Kalama and Longview. Lack of investment will see a decline in regional advantage.
- Responses were mixed on if there is an advantage to being downriver. Input was mixed on if this translates into a measurable cost/time savings advantage vis-à-vis other factors.
- The recent increase in market share captured by the Port of Kalama grain facilities has been a function of significant investments in state-of-the-art facilities that have increased loading speed and capacity. It has been operator driven in connection with the port's business friendly climate.
- Every Port indicated that they feel they have a superior business and political climate compared to Portland. While most reported they have their own challenges, it was generally agreed that regulatory and permitting processes along with political factors in Portland are among its disadvantages.
- All ports paying attention to potential increased capacity and competition from the Port of Woodland over the intermediate- to long-term. Most expect Austin Point to develop at some point.
- Long-term terminal planning areas like Columbia Gateway and Barlow Point are still more than a decade off. In all likelihood Barlow Point will be the first to market because master planning is already underway, and it has better access to fill necessary to make the site suitable for development.
- Major development sites at Kalama, Port Westward, and Longview are being considered for uses that would not be viable in Portland Harbor (methanol production, coal export) even if there was a site large enough to accommodate them.
- The urban terminal sites in Portland Harbor like Terminal 2 and LD Commodities are likely to continue to see increased pressure for conversion to other uses due to decreased competitiveness (i.e. draft depth) and encroachment of non-complementary uses. This is even happening in Vancouver at Terminal 1.

- Maintaining and improving inland connections will be essential in preserving the Lower Columbia cost-competitiveness. As river ports that are 60 to 100 miles upstream, additional costs are measurable from both a river pilot and time cost perspective.
- Responses were mixed on if there would be a potential substitution effect of liquid bulk terminal demand as a result of Portland's Fossil Fuel Ordinance and other political influences. Most ports indicated they have their own regulatory challenges. Only the Port of Columbia County is likely to have a competitive advantage.
- Ports have not reported an increase in business leads or inquiries directly resulting from competitiveness factors as Portland Harbor, specifically the Harbor Superfund Cleanup Project.
- Generally, ports reported that each port has developed a unique market niche specific to their own physical and operational factors. We heard consistently that Lower Columbia Ports complement each other more than compete.

## Non-terminal Industrial Competitiveness

Beyond land suitable for marine terminal development, we also inventory land available for industrial development that is suitable—by physical characteristics and proximity to port facilities—to accommodate users that may be reliant on marine/water accessibility or prefer sites in a port industrial district.

### Vacant Land for Industrial Development

#### Portland Harbor

Land available for future industrial development in Portland Harbor is very narrow. We find the breadth of available land to be limited to sites that have "land banked" acreage intended for future use of existing users, medium-sized vacant parcels in the Rivergate District, and redevelopment of underutilized sites. Examples include:

- Georgia Pacific has over 10 acres adjacent to its existing site in the Rivergate District.
- The Port of Portland has two parcels totaling 22 acres on three sites in Rivergate District
- Sites along the Columbia Boulevard, Marine Drive, and Highway 30 corridors have lower value improvements and may be long-term redevelopment candidates.
- Private sites with water access documented in Exhibit 15 above that are currently underutilized or have the potential to redevelop into more intensive production or service uses over the planning period.

#### Vancouver

The Port of Vancouver has over 15 acres remaining at Centennial Industrial Park, just north of the Port's marine facilities. The park has been highly successful and has seen over 1 million square feet of industrial development since 2015. A 200,000+ sq. ft. development is currently proposed. The Port also has a 22-acre site currently listed for lease directly north of its auto import terminal. Over the longer-term, an unknown portion of the 535-acre Columbia Gateway

property is slated for non-marine industrial uses serving advanced manufacturing, assembly, or warehousing users.

### Kalama

The Port of Kalama completed a 110,000 sq. ft. spec industrial building at the Kalama River Industrial Park in 2018. An adjacent parcel had a second 120,000 sq. ft. building planned before the COVID-19 pandemic gave pause to the project. A third site has the capacity to accommodate another 100,000 to 120,000 square feet of industrial space. The Port is not intending to consider development of this site until the future of the NW innovation works project is resolved. It is being reserved for a potential construction lay-down yard in the event the project progresses. The Port has also been working to develop the 60+ acre Spencer Creek Business Park. This property is on the east side of Interstate-5 and would not likely serve directly marine-depended users.

### Longview

The Mint Farm Site is a greenfield property just north of the former Reynolds Alumunum Plant (Millennium Bulk Site). There are currently three properties totaling 145-acres listed for sale. The site is marketed by Cowlitz Economic Development Co. (CEDC) as suitable for 5-10 acres parcels and having high-capacity utilities and rail services. The 133-acre parcel is listed for $72,000 per acre. Rivergate Scrap Metals has attempted to sell or lease a 25-acre parcel it owns at the Port of Longview, just north of Longview Central. The site is flat, has utilities, access easements, and is served by an existing rail spur. Site A at the Port's East Industrial Park is currently vacant and available for lease, according to the Port's website. The 49-acre site is adjacent to the EGT Terminal and is marketed as shovel-ready site with rail access.

## Port of Vancouver

The Port of Vancouver has five terminals offering 13 deep draft berths maintained to a 40'to 43' depth. The Port has over 1,600 acres of industrial and marine terminal property, 700,000 square feet of waterfront warehousing space, and over 250 acres of open yard storage. The Port is handles close to 10% of all U.S. wheat exports and offers specialization in heavy lift break bulk cargo.

### Terminal Characteristics:

| Name | Type | Depth | Length | Operation/ Ownership | Rail | Notes/ other |
|---|---|---|---|---|---|---|
| T2 (VET) | Grain | 43' | 715' | United Grain | Loop track | Largest storage capacity in the west. |
| T2 Berth 7 | Dry Bulk | 43' | 800' | Kinder Morgan | Direct to storage | 125,000 sf covered storage |
| T2 Berth 2 | Bulk Scrap | 43' | 550' | Port of Vancouver | Limited | 1,000 lb/sf dock |
| T2 Berth 5 | Liquid Bulk | 41' | 400' | NuStar/Tesoro | Ladder | 3 mil. barrel capacity. |
| T2 Berth 1 | Break Bulk | 40' | 450' | Port of Vancouver | Not direct | 750 lb/sf dock |
| T2 Berth 3 | Break Bulk | 43' | 750' | Port of Vancouver | Single spur | Multi-purpose crane with 51 MT capacity. |

| | | | | | | |
|---|---|---|---|---|---|---|
| T2 Berth 4 | Ro/Ro | 43’ | 285’ | Port of Vancouver | Not direct | 750 lb/sf dock |
| T8 & T9 | Multi-use | 43’ | 1,250’ | Port of Vancouver | Ladder on-dock | 258,000 sf covered storage |
| T4 Berth 10 | Auto | 40’ | 1,140’ | Subaru | Ladder | Floating auto Ro/Ro |
| T5 | Break bulk/ Vacant | | | Port of Vancouver | Loop | 8,500’ train capacity, Underutilized. |
| **Other Terminals** | | | | | | |

Tidewater Barge Lines, Lafarge

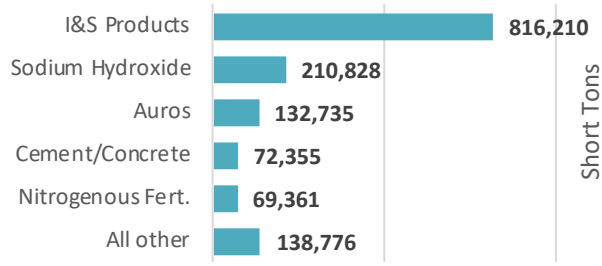
### Major Tenants/Companies

- Subaru
- Kinder Morgan
- NuStar
- Farwest Steel
- Tidewater
- CalPortland

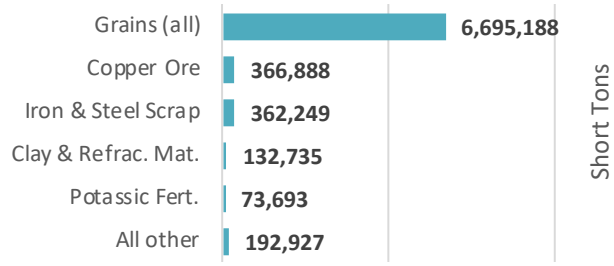
### Vacant/Underutilized Land

- Terminal 5: 80+ acre property with 40 acres available for development. Currently marketed for new bulk facility. Offers 8,500’ loop track completed in 2010.
- Columbia Gateway: 535 acres of greenfield owned by the port for future expansion.

### 2018 Imports: 1.4 million Tons




### Top Exports: 7.8 million Tons




### Recent News, Investments, or Planned Development

- The Port has emerged as a leader in importing wind energy equipment. In 2019 384 blades were off-loaded. In 2020 the Port received the largest blades ever handled in the United States.
- Completion of the West Vancouver Freight Rail Expansion. A $250 million effort from 2007 to 2018.

## Port of Longview

The Port of Longview has eight marine terminals and waterfront industrial property spanning 835 acres. Berths at the port are maintained to a 43’ depth, with berth lengths ranging from 600 to 1,500 feet. Longview is a predominately export terminal, specializing in the export of grains, wood products, and petroleum coke.

### Terminal Characteristics:

| Name | Type | Depth | Length | Operation/ Ownership | Rail | Notes/ other |
|---|---|---|---|---|---|---|
| Bridgeview | Dry Bulk | 43’ | 1,200’ | International Raw Materials | Ladder Stub | Potash, soda ash. Two berths. 22+ acres. |
| Berth 4 | Vacant | 43’ | 705’ | Port of Longview | None | Existing silos to be demolished. |
| Berth 5 | Bulk | 43’ | 720’ | Port of Longview | Direct Rail Transfer | Covered storage tanks |

| | | | | | | |
|---|---|---|---|---|---|---|
| Longview Central | Bulk, Break Bulk | 40’ | Up to 1,500’ | Port of Longview | On dock ladder | Two berths, Ro/Ro. Heavy lift cranes. 35-acre yard. |
| Berth 8 | Break Bulk | 43’ | 617’ | Port of Longview | None | 4.5 acre staging area |
| EGT | Grain | 43’ | 1,000’ | Export Grain Terminal | Loop (multiple) | 4.7 million MT storage. 3,000 MT/hr, loading. |
| **Other Terminals** | | | | | | |

Millennium Bulk Terminal, Weyerhaeuser, Westlake Chemical

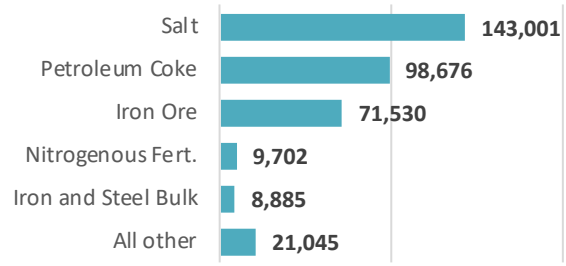
## Major Tenants/Companies

- International Raw Materials
- Export Grain Terminal (EGT)
- BP West Coast Products
- Westlake Chemical
- Millennium Bulk Terminals
- Skyline Steel
- Weyerhaeuser

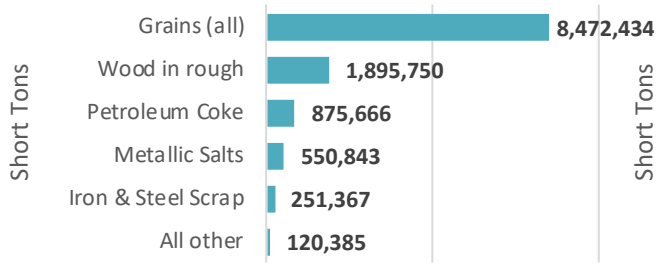
## Vacant/Underutilized Land

- Terminal 4: Redevelopment of unused grain terminal.
- Barlow Point: Master planned terminal development. 280+ acre multi-use terminal. Two berths planned.
- East Industrial Park: Two vacant parcels (30+ acres)
- Millennium Bulk: Former aluminum smelter. Proposed 270-acre coal export terminal.

## 2018 Imports: 352,000 Tons




## Top Exports: 12.1 million Tons




## Recent News, Investments, or Planned Development

- IRM Bridgeview Lease (2017): $1.25 million investment. Commitment of 500,000 ST throughput.
- Terminal 4 (2022): Redevelopment underway. Port is working to demolish derelict grain silos.
- Barlow Point Planning (ongoing): Master planning of new 280+ acre greenfield expansion.
- Millennium Bulk Terminals (2018-current): Proposed $680 million coal export terminal.
- North Rail Connection project will realign existing track and expand access. The $3.4 million project will allow additional storage of 90 railcars.

# Port of Kalama

The Port of Kalama as five public and private berths, with four berths maintained to deep water depths. Marine trade in Kalama has two functions, import of iron and steel products to support local manufacturers, and exporting grains. Despite these limited functions, the port is the third largest bulk exporter on the West Coast and the largest exporter by volume on the Lower Columbia.

## Terminal Characteristics:

| Name | Type | Depth | Length | Operation/ Ownership | Rail | Notes/ other |
|---|---|---|---|---|---|---|
| North Port | General Cargo | 43’ | 900’ | Port of Kalama | Stub ladder | 1,000 lb/sf dock. Largely steel imports |
| Emerald Kalama | Liquid Bulk | 40’ | 680’ | Kalama Chemical | Stub ladder | Private ownership. Imports Toluene for manufacturing use. |
| Temco | Grain | 43’ | 840’ | Temco (lease) | through | 6.5 million bushel storage. T6 million MT capacity. |
| RSG | Lumber | 23’ | 85’ | RSG Forest Products (lease) | Stub ladder | Export of lumber to ocean-going barges. |
| Kalama Export | Grain | 43’ | 1,088 | Kalama Export | Loop track | 2 million bushel storage. Four loading spouts. 10 million MT capacity. |
| **Other Terminals** | | | | | | |

None

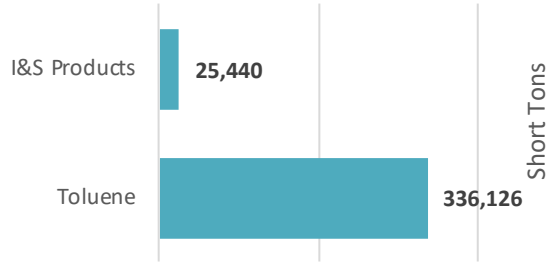
## Major Tenants/Companies

- RSG Forest Products
- Emerald Kalama Chemical
- Temco
- Kalama Export
- Steelscape

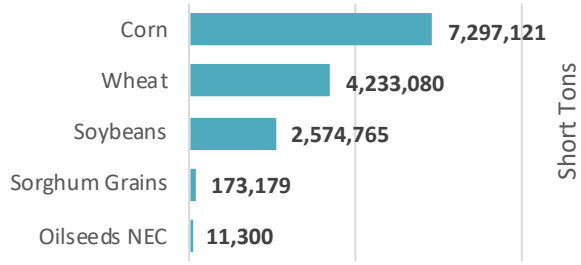
## Vacant/Underutilized Land

- North Port: 100 acres vacant. Site of NW Innovation Works methanol export terminal.
- Kalama River Industrial Park: Vacant land at industrial park near the North Port Terminal.

## 2018 Imports: 387,000 Tons




## Top Exports: 14.3 million Tons




## Recent News, Investments, or Planned Development

- The proposed $2 billion NW Innovation Works methanol export facility would export 3.6 million tons annually. $3 million dock construction planned if approved.
- $200 million capacity expansions at Temco (2015) and $36 million at Kalama Export (2011).
- Rail expansion to add a third rail line along 3.7 miles through Kalama to relieve congestion.

# Port Westward (Port of Columbia County)

Port Westward is a 1,700-acre industrial park operated by the Port of Columbia County. It's only marine operating tenant is Global Partners (Global Clatskanie) which exports ethanol to markets in Asia. The Port owns 837 acres it has been trying to rezone for industrial development since 2012.

## Terminal Characteristics:

| Name | Type | Depth | Length | Operation/ Ownership | Rail | Notes/ other |
|---|---|---|---|---|---|---|
| Global Clatskanie | Liquid Bulk | 60' | 1,500' | Port of Columbia County | Ladder | Unit train capacity. |
| **Other Terminals** | | | | | | |

None

## Major Tenants/Companies

- Portland General Electric
- Global Clatskanie

## Vacant/Underutilized Land

- Port Westward Industrial Park: Existing available industrial land.
- Port Westward Industrial Park Expansion: Roughly 837 acres for a rural industrial park.

## Trade Data:

Global Clatskanie receives ethanol by train and exports it from its Port Westward facility. It exported 185,000 short tons in 2018.

## Recent News, Investments, or Planned Development

- Global Partners purchased the Columbia Pacific Bio-refinery in 2013. Initial investment of $20 million included access road development and construction of a new berth.
- NW Innovation works has planned a methanol export facility similar to the $2 billion plant proposed in Kalama.
- Planned rail upgrades will allow Global Partners to expand train capacity from 24 to 38 trains per month.
- In 2018 Global Partners acquired 1.2 million barrels of storage capacity from PGE.
- In 2020, Global Partners received approval to switch from ethanol export to the export of renewable diesel. This change will result in Global sending shorter trains of around 40 cars compared to current 100+ car trains.
- Next Renewables has planned a $1 billion renewable diesel refinery at the port. The facility would have capacity to produce 13.3 million barrels of renewable diesel.

# Appendix E

## An Assessment of the Economic Function of the Marine-Dependent Industry on the Regional Economy

May 31, 2021

Prepared for: City of Portland Bureau of Planning and Sustainability

Final Report

ECONorthwest
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# 4. Literature Review Findings

**Highlight: Maritime activities have high job multipliers**
For every maritime job in the Portland Harbor, 1.6 jobs are created elsewhere in the economy

The standard metrics of economic impact (employment, output, wages, etc.) are not complete measures of the importance of the marine industry on the regional economy. Many traded-sector industries rely on access to marine facilities to cost-effectively move cargo in and out of the region. This literature review, from a preselected set of reports, will assess the marine industry's role in facilitating trade and logistics in the regional economy.

## Economic Impacts of Port Activities at the Port of Portland and The Portland Harbor

Millions of tons of freight and cargo flow through the Port of Portland each year. A 2016 study from Martin Associates conducted for the Port found that maritime activities at the Port generated 7,133 jobs in the Portland metropolitan area. Of these jobs, 2,685 were direct (employed directly by the Port), 3,048 were induced (employed by other firms as a result of the Port's employees' local purchases) and 1,400 were indirect (employed by other firms as a result of the Port's local purchases and activities).

Exhibit 1: Summary of Impacts from Port Maritime Activities in 2015
Source: Martin Associates (2016)

| Impact | Jobs | Personal Income | Taxes |
|---|---|---|---|
| Direct | 2,685 | $165 million | $61 million |
| Indirect/Induced | 4,438 | $464 million | |
| Total | 7,133 | $629 million | |

In addition to jobs, the Port's maritime activities generated $629 million in personal income in the 2015 fiscal year; $165 million was salaries paid directly to workers at the Port, $402 million was generated through re-spending or local consumption, and $62 million was generated indirectly. The Port's maritime activities also generated $629 million in business revenue, $135 million in local purchases, and $61 million in state and local taxes.

The study notes that the maritime activity of Port of Portland facilities capture only a portion of the Portland Harbor's impact. Because a number of privately-owned businesses are located within the Harbor, they also generate economic impacts. In sum, the study estimates that maritime activities in the Portland Harbor generated 14,056 jobs (5,199 direct, 5,551 induced, and 3,306 indirect).

In total, the Portland Harbor generated nearly $1.2 billion in personal income effects ($295 million direct, $720 million re-spending / local consumption, and $144 million indirect). The Portland Harbor generated about $1 billion in business revenue, $355 in local purchases, and $111 in state and local taxes.

More recent trends highlight the importance of Harbor activity to the regional economy. According to the 2020 Marine Cargo Forecast, the Portland Harbor is exhibiting a slight decline in throughput volume and measurable decline in Lower Columbia market share. This directly correlates to observed declines in employment in the Harbor. Over the last five years, employment in Marine Cargo Handling is down 24 percent with a broader range of marine/rail dependent sectors falling 4.1 percent and shedding nearly 400 jobs.

**Highlight: Maritime impacts on transportation costs**
The loss of container service in Portland cost firms over $15 million annually in additional transportation costs.

These costs were small in comparison to missed economic opportunities.

## Impacts of Port Activities on Economic Development

Prior to 2015, three major container shipping lines serviced the Port of Portland. In 2015, two of these shipping lines (Hanjin and Hapag-Lloyd) abruptly discontinued their calls to Portland. These service changes came at a time when western ports were already experiencing congestion and delays due to longshore labor issues. Although some ocean container service has since returned to the Port of Portland, the challenges caused by the loss of service in 2015 illuminate the importance of a robust and efficient trade and transportation network in keeping Oregon producers competitive in an increasingly global market.

The sudden service changes in 2015 left Portland shippers scrambling to get their goods to Asia and Europe. Most shippers chose to route their goods through the Seattle and Tacoma ports in the Puget Sound. As a result, shippers incurred direct costs.

A 2016 report from Tioga Group estimated that Oregon shippers and receivers incurred a total of $15.1 million in additional annual trucking costs to move their goods from Portland to the Puget Sound. Oregon shippers also faced additional rail and barge service costs. Although these costs were lower and more variable. In addition, Oregon customers had to allow for the additional time it took to move goods between Portland and the Puget Sound, putting them at an additional competitive disadvantage.

The Tioga report found that Oregon shippers were more seriously affected by the service lapses, delayed shipments, and missed opportunities that resulted from the loss of the Portland calls than they were by direct cost impacts. Shortly after the direct Portland calls were discontinued, reliability was extremely poor. In the years since, a reduction in west coast port congestion and the return of limited container service has improved reliability in the short-term, but increased congestion along the I-5 corridor may pose long-term reliability challenges for shippers still transporting their goods to the Puget Sound.

The Tioga report also found that the impact of the loss of Portland calls was asymmetrical across Oregon customers and varied by region. While larger shippers were mostly able to absorb the loss of Hanjin and Hapag-Lloyd calls, smaller and more rural shippers struggled. The report states:

*The loss of direct Portland calls is likely to pose its greatest challenges to Willamette Valley exporters of low-value, low-margin agricultural and forest products, and other small and medium- sized shippers unable to negotiate favorable ocean and drayage rates. Such shippers face the highest additional costs to use Puget Sound ports and the most price competition in the global marketplace. Exports account for a significant part of annual production in these market segments.* (2016).

**Highlight: Disproportionate Impacts**
Reductions in maritime service disproportionately impacts small and medium-sized shippers in the Willamette Valley and the upper Columbia.

**Highlight: Traded-Sector Importance to the Regional Economy**
Work currently underway by Metro and Greater Portland Inc. to update the regional Comprehensive Economic Development Strategy (CEDS) is evaluating the health of Portland's traded-sector clusters. While some of these sectors are service based, others involving the manufacturing and distribution of metals, machinery, retail goods, and agricultural products rely heavily on the regional transportation network to move both production inputs and finished products. According to data from EMSI, Portland's traded sectors account for nearly 25 percent of the region's GDP and have added over 25,000 jobs in the region over the last five-years.

The loss of direct Portland calls had several implications for Oregon's trade industry and economy. As the Tioga report states: "Containerized trade is a large and vital part of the Oregon economy, linked to the health of [the] agricultural, forestry, manufacturing, and distribution sector[s]." Furthermore, the fact that smaller and more rural producers faced greater challenges when Hanjin and Hapag-Lloyd calls were discontinued raises equity concerns.

City and state leaders have prioritized growth in Oregon's export markets in recent years. Research from the Brookings Institute's "Greater Portland Export Plan" (2012) highlighted Portland as a strong trading region. Intentional and strategic investment in shipping and export industries could "position Greater Portland as a leader in the 'next economy'" (Brookings Institute).

However, encouraging economic development through international trade will require sustained intention and effort from political and business leaders. As evidenced by the challenges Oregon shippers faced in 2015, reduced reliability limits Portland's competitiveness in attracting business investment and limits existing firms' ability to grow through access to export markets.

## Value-add of Traded-Sector Marine Activity on the Metropolitan Region and Periphery Markets

The maritime industry is deeply intertwined with many industries in the Portland region, the state, and beyond. A 2013 report from the Portland Business Association (PBA) emphasized the importance of the Portland Harbor and the maritime industry in supporting and contributing to the local and state economy.

The Portland Harbor and maritime industry connects Oregon businesses to the global economy and also supports the local economy, supporting between 14,000 to 18,000 jobs as reported by

studies using varying methodologies. In 2011 and 2012 alone, five marine industrial businesses spent over $1 billion dollars, with more than 50 percent of that money spent with local firms.

Overall, PBA estimates that all marine industrial businesses spend between $6-7 billion dollars each year. According to the report:

> *Local firms supported by these dollars include those involved in planning and architecture, engineering, law, transportation, graphic arts/media production, software and information technology, advanced manufacturing plant production equipment, energy and utilities, and skilled trades such as electricians.* (2013).

**Highlight: Strategic Advantage**
Portland is the only market where two Class I railroads converge alongside deepwater marine service.

In addition, 90 percent of Oregon exporters dependent on the Portland Harbor are small- to medium-sized businesses with fewer than 500 employees; many of these firms are involved in traded-sector industries. Historically, trade and exports have made up a sizable share of Oregon's economy. The Portland Harbor and related marine activities support this trade activity while also contributing substantially to Oregon's local economy.

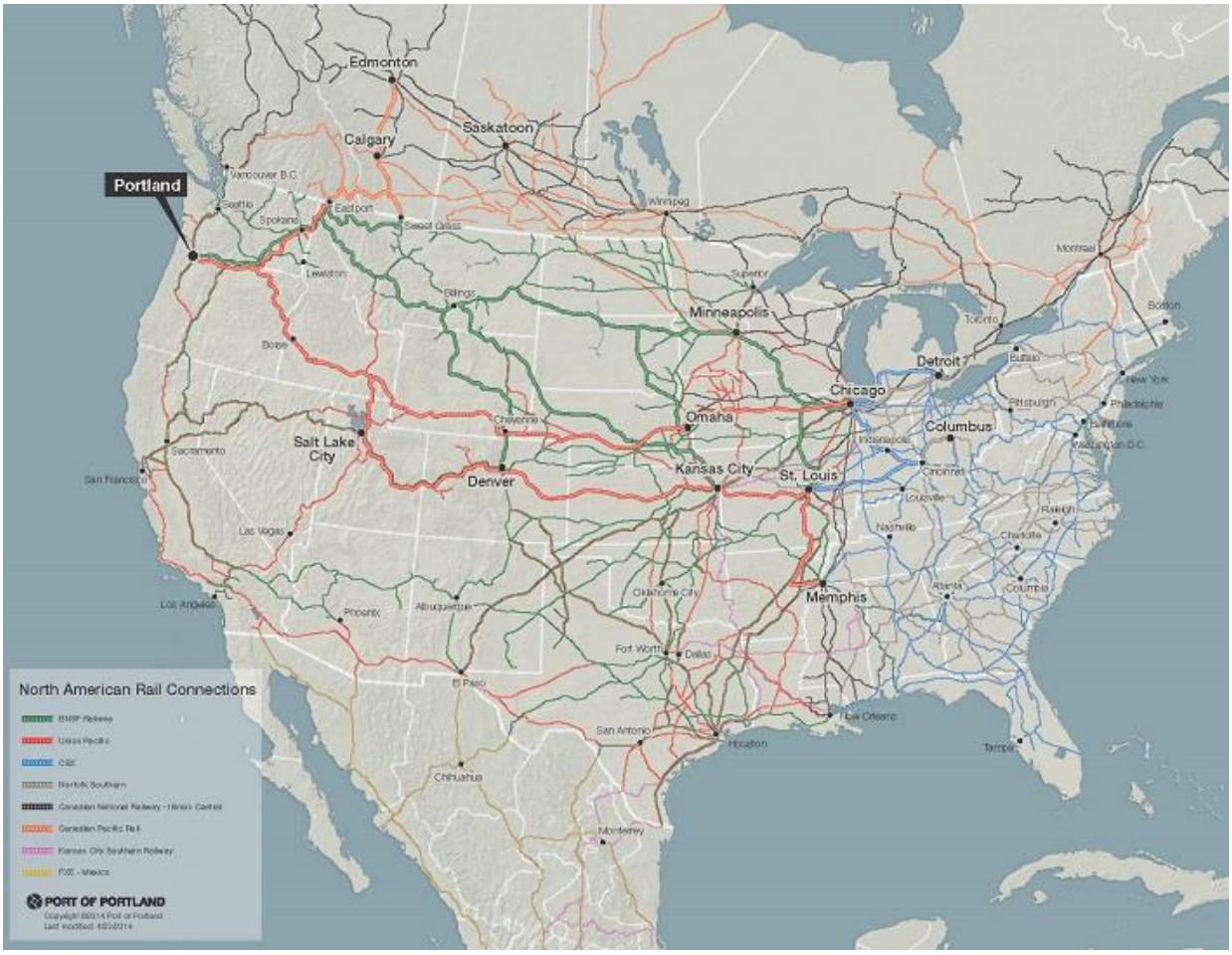
## Portland Harbor's Role in State and Regional Trade and Logistics

The Portland Harbor is part of an interconnected freight network. While the Portland Harbor and the Port of Portland (along with the Portland International Airport operated by the Port) generate substantial economic activity on their own, they are reliant on other trade and logistical networks to connect them to the regional economy and beyond.

According to Metro's 2018 Regional Freight Strategy, trucks are and will likely remain the predominant mode of freight transport in the Portland region. In 2015, 74 percent of the commodities (as measured by value) traveling in the Portland region were moved by truck. However, over 90 percent of regional trucking trips begin and end in the region and over half of truck trips originating outside the region are through traffic (Regional Freight Strategy 2018). Despite this, trucks still bring a substantial amount of goods through the Portland Harbor, making a healthy highway and roads system a vital intermodal connection.

Much of the commodities flowing through Marine Terminals in the Portland Harbor are brought via rail. The greater Portland region is the only west coast metro market where two Class I railroads (Union Pacific and Burlington Northern Santa Fe) converge (Greater Portland 2020). The Portland region's unique rail options allow companies the ability to negotiate costs and facilitate commodity flows into the Portland Harbor from across the United States and North America.

Exhibit 2: Western US Rail Map
Source: Port of Portland




Barges and river service are an important freight transport mode for the regional economies of Oregon, Washington, and Idaho. In particular, the Columbia Snake River system is an essential transportation link. River transport for bulk commodities, such as wheat, remains the most efficient way to bring products to and from ports in the tri-state area. The 2018 Regional Freight Strategy reports that Oregon exported $209 million worth of wheat in 2014 and that wheat was the second most valuable commodity export in the state with 85 percent of Oregon wheat being exported. In 2019, export value of wheat departing Oregon totaled $558 million[40].

The Portland Harbor does not operate in a vacuum, making strong intermodal networks for freight transport essential for its function and for the health of the regional economy. The Regional Freight Strategy states:

[40] US. Census Bureau, Exports by Origin State Series
https://www.census.gov/foreign-trade/statistics/state/data/or.html

> *Industry needs tangible and continuous improvements in the operating efficiency, capacity, modal redundancy and reliability of the regional goods movement system to remain competitive globally. Government must do its best to work with private sector stakeholders to accomplish this in a sustainable, environmentally sensitive and cost-effective manner.* (2018).

The region's intermodal trade network faces issues that could hamper growth into the future if not addressed. Worsening congestion in interstate corridors, a capacity-constrained rail system with infrastructure ill-suited to the evolving requirements of railroads, and a deep draft channel on the Columbia Snake River system that is too shallow to accommodate the newest cargo vessels all pose challenges.

By 2040, the Regional Freight Strategy reports that trade volumes in Portland are expected to double to 600 million tons annually. With intermodal rail to truck transfer facilities and freight transport infrastructure already nearing capacity, careful and targeted investments will be needed to maintain healthy growth in the sector while also balancing community and environmental needs.

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# Appendix F

# Race and Educational Equity in Harbor-Dependent Sectors of the Portland Economy

May 31, 2021

Prepared for: City of Portland Bureau of Planning and Sustainability

Final Report

ECONorthwest
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# 6. Introduction

This report investigates the socioeconomic composition of the workforce in Portland's harbor-related industries, with a focus on the racial, ethnic, and educational background of workers. It is hypothesized that marginalized populations, predominantly people of color and individuals with less than a college education, are make up a larger share of employment in this industry sector. As the City of Portland prepares an update to its Economic Opportunities Analysis (EOA), it is interested in exploring how growth alternatives would disproportionately impact segments of the workforce.

Using US Census Public Use Microdata Sample (PUMS) data, it is possible tabulate the regional population by detailed person-level attributes, including race, ethnicity, education, and industry of employment. We analyzed harbor sector industry employment using the American Community Survey (ACS) 2014-2018 5-year PUMS dataset, which provides averaged population estimates taken from a weighted 5% sample of the US population.

## Summary of Findings

While BIPOC workers in the Portland MSA are proportionately represented in harbor-dependent industries relative to all industries, BIPOC workers earn higher median incomes in harbor-dependent industries relative to other sectors. In addition, harbor-dependent jobs have a low barrier to entry and are among the last low barrier middle-income jobs in Portland.

Worker's with educational attainment below a college degree ("lower educated") are make up a larger share of employment in the harbor-dependent sector, and like BIPOC workers, enjoy higher median incomes compared to alternative sectors.

Combined, these factors indicate that the harbor-related industrial sector offers a sizeable benefit to the Portland region's different marginalized communities in the form of lower educational barriers to higher-than-average wages. Slower growth in harbor-related employment sectors may have a disproportionate impact on the wealth, and therefore stability, of BIPOC workers and workers without a higher educational attainment.

# 7. Methodology and Limitations

As mentioned above, we used the most recent available census microdata for this analysis, due to the dataset's unique ability to allow for cross-tabulations of employment by dozens of different personal and household attributes.

However, a key limitation of PUMS data is that it does not provide detailed geographic *workplace* location, only place of residence, making it impossible to filter for only individuals who work in *Portland's* harbor lands. This analysis therefore looks at a subset of detailed NAICS industries and their workers for the entire region. The selection of NAICS subsectors in this report is consistent with harbor-related subsectors identified in the employment trends chapter of the Portland Marine Industrial Lands Analysis[41]. We isolated a handful of sectors that represent the bulk of harbor-dependent industries in the region. These sectors include:

- Heavy and Civil Engineering Construction
- Petroleum and Coal Products Manufacturing
- Chemical Manufacturing
- Primary Metal Manufacturing
- Fabricated Metal Product Manufacturing
- Machinery Manufacturing
- Transportation Equipment Manufacturing (ships, boats, and railroad rolling stock)
- Metal and Mineral (except Petroleum) Merchant Wholesalers
- Miscellaneous Durable Goods Merchant Wholesalers
- Petroleum and Petroleum Products Merchant Wholesalers
- Miscellaneous Nondurable Goods Merchant Wholesalers
- Support Activities for Transportation (marine cargo handling, support for water transportation)

Of course, not all of the firms located in these sectors are harbor-dependent, just as there are likely to be firms in other sectors that are dependent on harbor/rail functions. The sectors identified here reflect a representative profile of harbor-dependent industries in the Portland Harbor. Some sectors (marine cargo handling, ship and boat building) have a stronger "connection" to the harbor than others (primary metal manufacturing).

Another limitation of PUMS data lies in the fact that, since it is a weighted sample of the population, any summary taken from it will have a sampling error that increases as the population of interest shrinks, making highly granular cross-tabulations statistically unreliable. Some census-designated race and ethnicity groups, Pacific Islander or "Other" for instance,

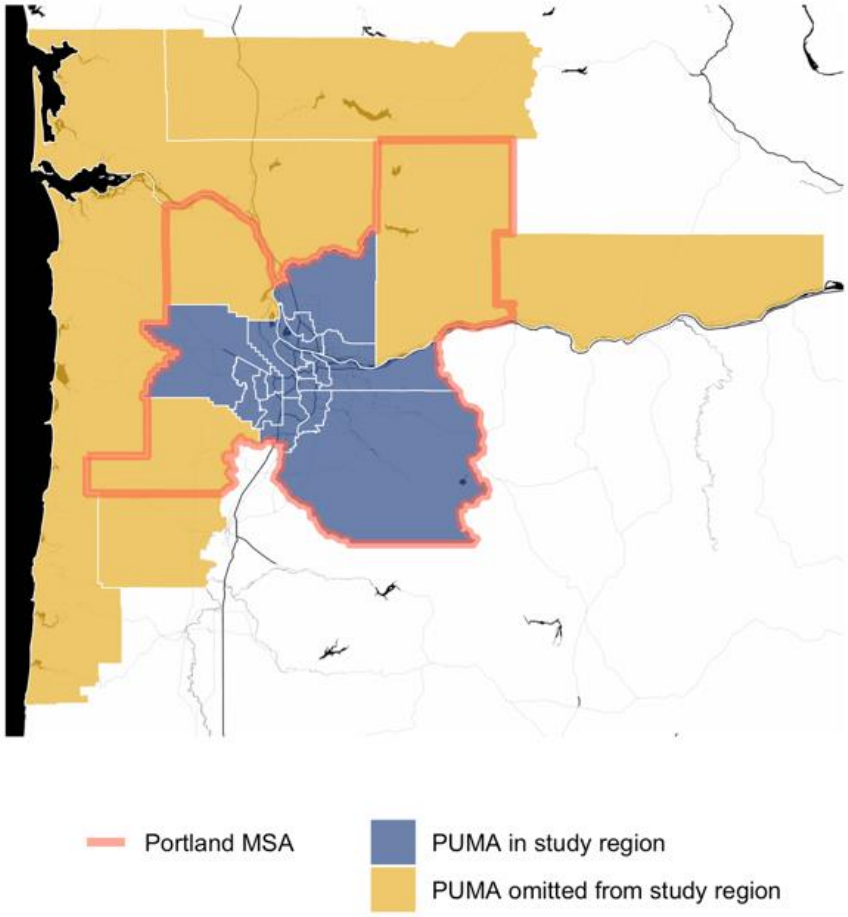
[41] ECONorthwest. *"Portland Marine Industrial Lands Analysis: Economic Shifts in the Portland Harbor; An Evaluation of Wages, Employment, and Investment.* 2020.

have such relatively small populations within the harbor sector that, by extension, any summary of their attributes (income, education, etc.) is likely to have wide margins of error.

## Geographic Extent

The study region for this report was determined by the boundaries of census Public Use Microdata Areas (PUMAs) within the Portland-Vancouver-Hillsboro metropolitan statistical area (MSA). PUMAs are the most granular geographic unit available within the census microdata, though they can grow to encompass multiple counties. This results in instances where PUMAs do not conform with MSA boundaries. In the Portland MSA, sections of Clark and Yamhill counties are within several large PUMAs that extend well out of the MSA, encompassing fairly large sections of the Washington and Oregon coast, while Skamania County is part of a larger PUMA that also includes Klickitat and Lewis counties. We decided to only study PUMAs that were completely contained by the Portland MSA's boundary, that way maintaining greater applicability of any results.

Exhibit 2: Study Area Geography
Source: US Census



# 8. Findings

## Race & Ethnicity

Analysis of the most recent PUMS data shows that White non-Hispanic workers constitute a slightly higher share of the harbor sector's workforce (77.5%) than other industries (76.2%). In other words, non-white racial & ethnic groups *are not overrepresented* in the workforce. However, people of color employed in the harbor-dependent sectors have significantly higher median work-related incomes than those in all other sectors of the economy. As an example, multiracial, non-Hispanic harbor sector workers earn a median income that is 1.48 times higher than that of multiracial, non-Hispanic workers outside the sector – the highest statistically reliable ratio of any race/ethnicity group, including White, non-Hispanic workers.

Exhibit 3: Portland Region Distribution of Workforce by Race/Ethnicity and Sector
Source: 2014-2018 ACS PUMS

| | Share of workforce by sector | | | |
|---|---|---|---|---|
| Race/ethnicity | Harbor-dependent | (+/-) | Other | (+/-) |
| White, non-Hispanic | 77.5% | *0.6%* | 76.2% | *0.2%* |
| Black, non-Hispanic | 2.3% | *0.3%* | 2.8% | *0.0%* |
| Amer. Indian & Alaskan Native, non-Hispanic | 0.3% | *0.1%* | 0.5% | *0.0%* |
| Asian, non-Hispanic | 6.8% | *0.4%* | 7.1% | *0.1%* |
| Pac. Islander, non-Hispanic | 0.7% | *0.2%* | 0.5% | *0.0%* |
| Other, non-Hispanic | 0.2% | *0.1%* | 0.2% | *0.0%* |
| Multiple races, non-Hispanic | 3.0% | *0.3%* | 3.0% | *0.1%* |
| Hispanic, any race | 9.3% | *0.6%* | 9.7% | *0.0%* |

Exhibit 4: Average Work-Related Income by Race/Ethnicity and Sector
Source: 2014-2018 ACS PUMS

| *Margin of error exceeds reliability threshold | Median annual pay by sector | | | | |
|---|---|---|---|---|---|
| Race/ethnicity | Harbor-dependent | (+/-) | Other | (+/-) | Diff. |
| White, non-Hispanic | 53,062 | *863* | 41,119 | 229 | *1.29* |
| Black, non-Hispanic | 36,254 | *3,272* | 28,306 | 1,134 | *1.28* |
| Amer. Indian & Alaskan Native, non-Hispanic | 33,495 | *13,309* | 34,420 | 3,147 | *0.97* |
| Asian, non-Hispanic | 48,607 | *2,539* | 40,524 | 970 | *1.20* |
| Pac. Islander, non-Hispanic | 29,805 | *5,640* | 31,837 | 1,933 | *0.94* |
| Other, non-Hispanic | 64,684 | *32,351* | 24,860 | 4,984 | *2.60* |
| Multiple races, non-Hispanic | 42,827 | *4,192* | 28,908 | 1,182 | *1.48* |
| Hispanic, any race | 34,671 | *2,028* | 25,327 | 397 | *1.37* |

On its own, a higher per-person median income would not necessarily confer significant benefits to the BIPOC workers throughout the region. Because the harbor-related industries do employ a sizeable portion of BIPOC workers throughout the region (though, as mentioned, not

a disproportionate share), these higher median incomes are able to extend beyond individual workers themselves.

For instance, 6.7% of the study region's Hispanic/Latino residents (aged 18 and over) work in the sector, but that 6.7% brings home 8.4% of all Hispanic/Latino wage-related income from the region. Conversely, 7.2% of Asian, non-Hispanic residents work in the harbor sector, but only constitute 7.0% of all Asian, non-Hispanic wage-related income – the difference likely due to equal or higher incomes available in other sectors.

Exhibit 5: Share of Income vs Share of Population of Industries
Source: 2014-2018 ACS PUMS

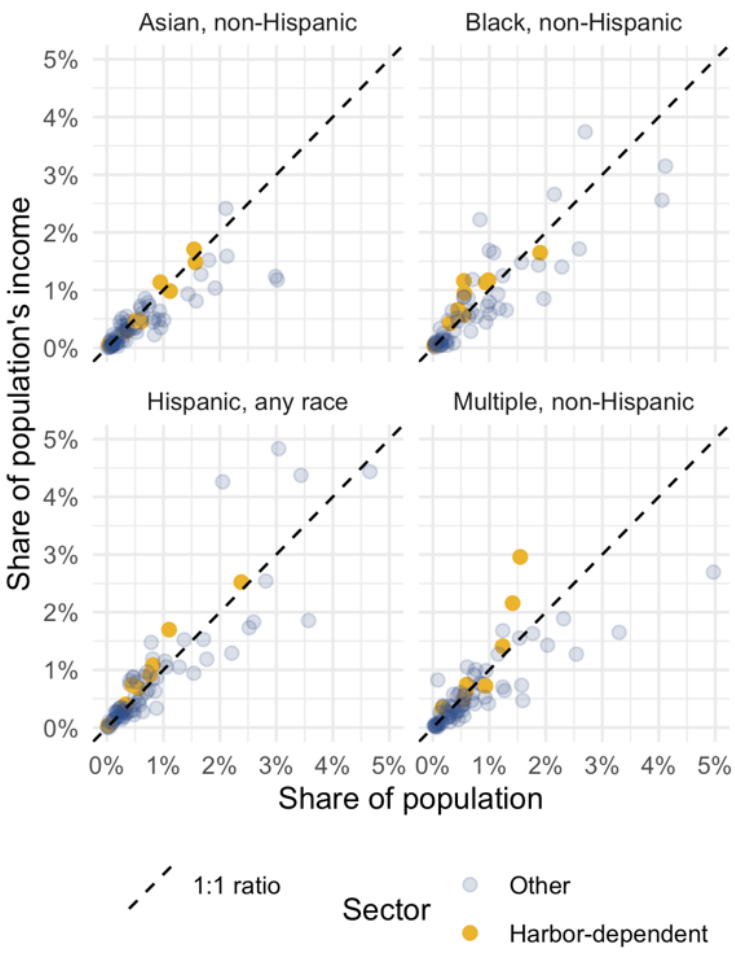



Exhibit 4 visualizes individual industries (both within and outside the harbor-dependent sector) and the differences between workforce size and aggregate income, both represented as shares of a community of color's population. Each point represents a 3-digit NAICS industry, colored by whether it is a harbor-dependent industry or not. Most harbor sector industries tend to bring in disproportionately large (above a 1:1 ratio) shares of income compared to their share of the population, though the relationship varies depending on the race/ethnicity and the specific industry.

Despite the relative benefits of employment in the harbor sector compared to other industries as a whole, there are still racial disparities in income within the sector; people of color still earn lower median incomes than those of White, non-Hispanic workers in the sector.

## Educational attainment

We grouped educational attainment into three tiers: up to and including a high school degree or GED; some college or an associate's degree (AA); and a bachelor's degree or higher.

Exhibit 6: Average Income by Educational Attainment
Source: 2014-2018 PUMS

| | Median wage by sector | | | |
|---|---|---|---|---|
| Education | Harbor-dependent | (+/-) | Other | (+/-) |
| Up to high school or GED | 39,031 | 951 | 25,354 | 104 |
| Some college or AA | 47,126 | 1,380 | 31,630 | 198 |
| BA or higher | 80,274 | 2,107 | 58,368 | 436 |

Around 70% of the harbor sector workforce has less than a college degree, compared to 62% of the workforce in all other sectors of the economy, but the median work-related income of workers with less than a college degree is around 1.5 times larger in the harbor sector than it is for workers with the same attainment outside the sector.

At each of these three tiers, the average personal income of all harbor workers is higher than that of workers with similar education in other industries. In fact, the average wage of a harbor-dependent sector worker with up to a high school degree or GED is *higher* than the average wage of a worker with some college or an AA outside the harbor-dependent sector.

## Combined education and race/ethnicity

The interrelationship between education and race/ethnicity has varying effects on worker's income within the harbor-dependent sector, but successively higher levels of education tend to yield higher wage increases to people of color than compared to outside industries. Within the harbor-dependent sector, the largest education-related "boost" in pay tends to occur between the "some college/AA" and the "BA or higher" tiers of educational attainment.

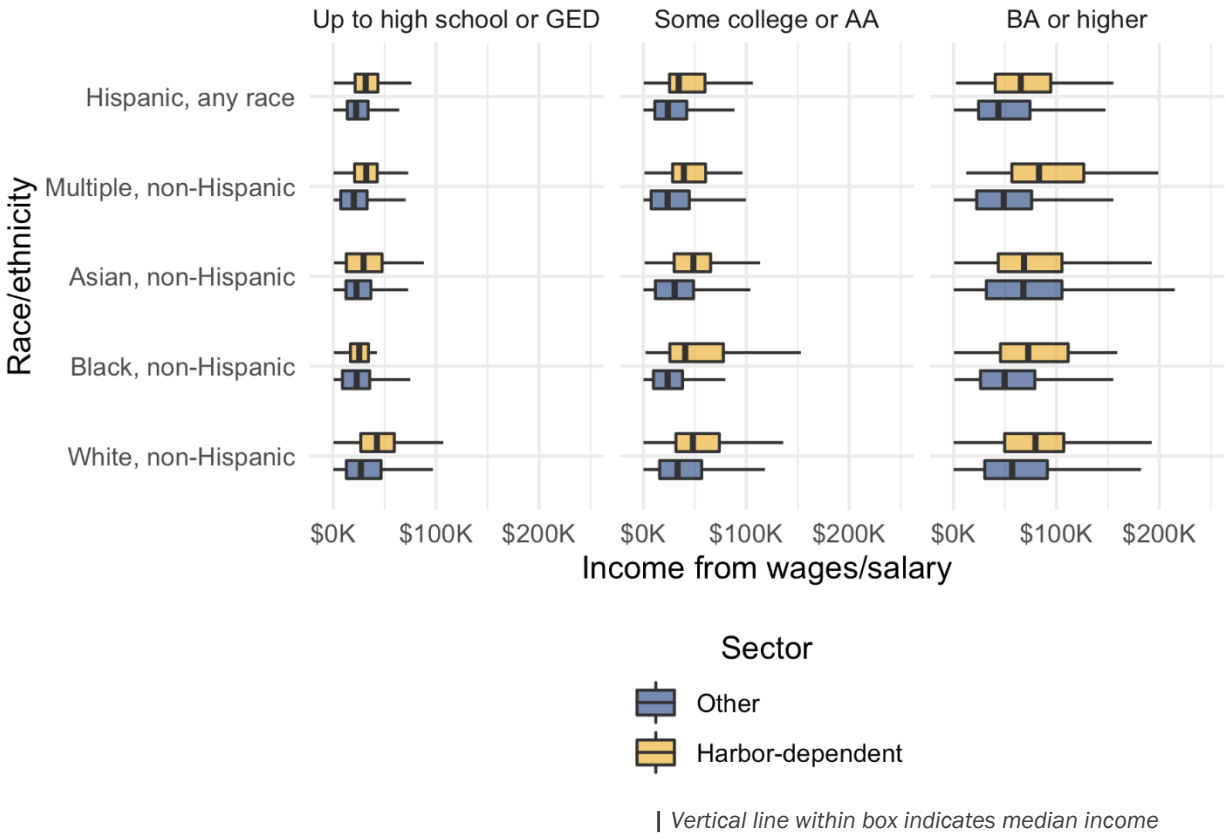
**Highlight: Housing stability and the harbor sector**
One side-effect of the harbor sector's higher wages is greater housing stability, in the form of a lower rate of housing cost burden among people of color. As a whole, 21% of all harbor sector workers are housing cost-burdened, compared to 29% of workers in all other sectors of the economy. When cross-tabulated with race and ethnicity, the differences can become more pronounced. For example, 31% of Black, non-Hispanic harbor-related industry workers are housing cost burdened (paying more than 30% of their gross income towards housing costs), compared to 43% of Black, non-Hispanic workers outside the sector – the highest statistically reliable difference among all race/ethnicity groups.

When combined with race and ethnicity attributes, the overall trend of "higher education, more pay" continues, but there are notable variations in the scale of that boost depending on the race/ethnicity and education attainment of the worker. For example, the median pay of a Black, non-Hispanic worker in the harbor sector, with some college or an AA degree, is estimated at around $40,400, whereas the same worker outside the harbor sector earns a median pay of $23,195. That 174% difference is the highest statistically reliable estimated difference in median

pay besides that of White, non-Hispanic workers with a high school/GED attainment ($42,170 in the harbor sector vs. $22,780 outside).

Exhibit 6 demonstrates the relationship between race, and education by visualizing the relative distributions (the black bisecting lines representing medians) of each group's work-related income. Some groups, Asian non-Hispanic workers with a BA or higher for example, show little tangible difference in the distribution between the harbor sector and other industries. Others, like multiracial non-Hispanic workers with a BA or Black non-Hispanic workers with an AA, demonstrate measurably higher incomes compared to non-harbor-dependent industries.

Exhibit 7: Distribution of Income by Race/Ethnicity and Education
Source: 2014-2018 ACS PUMS




| *Vertical line within box indicates median income*

# 9. Conclusion and Future Considerations

While there is room for deeper investigation into the particulars of harbor sector employment and its impact on different marginalized communities, current data suggests that, all else equal, slower growth in the sector would have inequitable impacts on the economic mobility BIPOC

workers throughout the region and residents without a college degree that work in industries related to the harbor. Jobs within harbor-dependent industries seem to offer a path upwards, especially for BIPOC workers with less than a college degree, usually providing higher floor and ceiling pay to workers at each major step of educational attainment.

There is still much to explore within this topic. Our research revealed as many questions as answers. Research questions for future consideration may include:

- **An investigation into household-level effects.** Are there significant differences in household size and composition for employees in the harbor-sector compared to other industries?
- **An assessment of non-wage compensation.** Does the harbor-sector offer higher or lower rates of non-wage benefits and/or employee-provided health insurance?
- **The influence of unionization.** It is hypothesized that many harbor-dependent sectors are unionized at a higher than average rate. What is the impact of unionization on access, mobility, and wages within the sector? Do different marginalized communities have equitable access to union jobs?
- **Consideration of safety and scheduling factors.** Are higher than average incomes in harbor-sectors associated with mitigating safety risks? Are higher wages a function of longer hours and overtime? Are more swing shift/off-hour schedules more prevalent? If so, does this have adverse impacts on family households?
- **A study of occupational characteristics.** A similar approach to the analysis deployed in this report could be assessed on select occupational categories within harbor-dependent industries.
- **Research into the value of training and education.** What are the common college degree fields or training certifications of harbor sector employees? Are some more "valuable" or have lower barriers than others? To what extent are STEM degrees valued within the sector?
- **A study of variance in mobility.** Is there variance by racial category or educational tier in promotions and wage increases?
- **An assessment of geography, displacement, and access to transit.** Harbor industries tend to be located in industrial areas that are farther removed from housing centers and typically have lower access to public transit. Is this a meaningful barrier to the sector's workforce? How has displacement in North and Northeast Portland's impacted access to harbor employment?