Tioga

T6 Container Service
Value and Growth Potential

Report to:

PORT OF PORTLAND

The Tioga Group, Inc.
Hacket Associates, LLC.

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Purpose

Oregon shippers and receivers have repeatedly testified to the importance of direct Port of Portland Terminal 6 (T6) container vessel service at public forums and in writing. The role of T6 in Oregon's exports, imports, and overall economy has been documented in multiple studies. This study provides updated answers to three vital questions:

- What is the current value of T6 shipping activity to Oregon and its population?
- What value would be lost if T6 loses direct calls permanently?
- What is the cargo growth potential if T6 continues to operate?

To address these questions Tioga and subcontractor Hackett Associates used 2021-2023 shipment data, current trucking cost estimates, current vessel schedules, Port financial data, shipper interviews, and insights from previous studies.

Background

In 2021-2023 about 284,000 twenty-foot equivalent units (TEU) of loaded imports and exports moved through T6, for an annual average of about 95,000 loaded TEU. These flows were predominantly cargo moving to or from points in Oregon but included small amounts of Washington and Idaho cargo and some moving to and from other states via rail. A substantial volume of empty containers also moves through T6. The full volume contributes to the economic value of T6 shipping.

Table 1: 2021-2023 T6 Container Trade in TEU

Trade	Oregon	Share	WA/ID Inland	Share	Total
Imports	140,880	84%	26,050	16%	166,930
Exports	105,795	90%	11,478	10%	117,273
Total	**246,675**	**87%**	**37,528**	**13%**	**284,203**

The consultant team separated the Oregon portion for analysis of shipping cost changes and other Oregon impacts. The major export commodities included hay and forage, metal and paper scrap, and grass seed, while imports were concentrated in tires, furniture, and toys.

Oregon shippers have four basic options for containerized ocean shipping:

- Direct vessel service at T6
- The NorthWest Container Services (NWCS) rail intermodal service from Portland to Seattle or Tacoma
- Portland Container Repair (PCR) truck service from Portland to Seattle Tacoma
- Truck drayage to and from Seattle or Tacoma

The first three options typically give the customer a Portland Bill of Lading for ocean carrier service and are priced similarly. The fourth option gives the customer a Seattle or Tacoma Bill of Lading at a lower ocean carrier rate, but that lower rate is exceeded by the additional trucking cost making it the costliest alternative. Loss of service at T6 would eliminate the first option, leaving Oregon's imports and exports split between the other three.

T6 Service's Value to Oregon

Container vessel operations at T6 benefit the State of Oregon and its population in three basic ways.

Economic Activity at the Port of Portland

Employment and purchasing attributable to container operations at T6 yield direct, indirect, and induced economic activity not unlike a factory or distribution center on a similar scale. BST Associates estimates indicate that T6 generated 1,567 total jobs in 2022, with over $200 million in personal income, as shown in Table 2. This estimate compares favorably to benchmarks from other port economic impact studies.

Table 2: Estimated T6 Economic Activity - BST Associates

Year	Category	Jobs	Avg. per Job	Personal Income
2022	Direct	696	$79,236	$55,148,000
	Indirect/Induced	871	$176,061	$153,349,000
	Total	**1,567**	**$133,055**	**$208,497,000**

Source: BST Associates

Transportation Cost Saving and Efficiency

Direct ocean carrier service to T6 allows Oregon shippers to truck their containers to and from the terminal more efficiently than at Seattle or Tacoma. At present all Oregon imports and exports that moves through T6 are moved by truck drayage to and from the terminal. The estimated current total annual cost of drayage to Oregon importers and exporters is $43.9 million. An export cycle typically entails picking up an empty container in Portland and delivering it to the exporter for subsequent loading. Once loaded, which may be a day or more later, the export container is trucked back to T6 for ocean transport. An import cycle is the reverse, with the trucker picking up the loaded import container at T6 and delivering it to the importer for unloading, and later returning the empty container to the Port. Occasionally an empty import container may be used for an export load without returning to the Port, but logistics barriers make this reuse uncommon. The cost of truck drayage is primarily a function of time, as the distances are usually short and considerable time is required at both ends of the trip. The number of round trips drivers can make in their limited hours of service is also a critical factor in drayage efficiency. Depending on their distance from Portland, shippers report that their drivers can make 2-3 trips ("turns") per day at T6 versus one at most driving to Seattle or Tacoma. Recurrent terminal congestion at the Washington ports has led some trucking firms to impose a $100 per trip congestion fee there. Oregon exports are unique in that many are moved to and from the Port using trucks owned by the producers or processors rather than by commercial trucking firms. This practice is particularly common for grass seed and hay shipments, and holds down the cost of transportation for those commodities while boosting productivity of the drivers and the equipment.

Oregon Trade Facilitation and Productivity

In 2021-2023 an average of about $0.5 billion in Oregon exports and $2.6 billion in Oregon imports passed through T6 annually. Beyond the transportation cost factors cited above, direct service to T6 provides Oregon shippers with faster and more reliable access to container shipping services. The availability in Portland of empty containers for export loads is considered a particular advantage. Every shipper contacted for this study prefers to ship via T6 whenever possible, often emphasizing the greater productivity of their operations and the greater ease of meeting the requirements of foreign customers. While these factors could not be quantified within our study scope, they are nonetheless real and vital to Oregon shippers.

Value Lost if T6 Closes

Lost Economic Activity at the Port of Portland

Over 800 jobs and about $455 million in total economic activity would be lost to Oregon were container operations to cease, as shown in Table 3[i]. The main direct impact would be the loss of the 169 jobs now attributable to T6 shipping activity. This loss would reverberate through the Oregon economy. The supply chain jobs and retail purchasing attributable to container operations at T6 would disappear if service there ends, just as if a factory or distribution center on a similar scale closed.

Table 3: Lost Economic Activity with T6 Closure - IMPLAN Estimate

Impact	Jobs	Labor Income	Value Added	Total Output
1 - Direct	169	$40,079,549	$90,612,532	$326,974,036
2 - Indirect	478	$36,103,783	$50,105,049	$85,651,539
3 - Induced	222	$14,646,442	$26,565,060	$42,321,908
Total	**869**	**$90,829,774**	**$167,282,641**	**$454,947,483**

Higher Transportation Costs and Reduced Efficiency

Absent direct service to T6, all those containers would have to be handled at Seattle or Tacoma, and would be moved primarily by truck. Based on an assumption of 75% direct trucking to and from the Washington ports, we estimate that Oregon importers and exporters will incur **$19.2 million in additional net trucking costs**, an average of about $585 per container. This additional cost burden will reduce the competitiveness and profitability of Oregon exports and reduce the attractiveness of Oregon locations for import and distribution business. There would be 43,000 more round trips by truck annually between Portland, and another 14,000+ by a mixture of truck and rail. The need to add drivers, trucks, and container chassis would be an additional burden on the shipping industry. Many Oregon exporters rely on trucks registered for agricultural use for drayage, and cannot use those trucks to serve Washington ports.

Closure of T6 would reduce this competition and open the way to ocean carrier rate increases for the remaining alternatives. While the amount of the increases cannot be predicted, it is noteworthy that ocean carriers imposed large increases for West Coast services during the 2020-2021 pandemic-induced import surge and are doing so again as U.S. imports rise in 2024. **Each $100 increase in ocean rates would cost Oregon shippers $4.3 million.**

Increased Barriers to Oregon Trade

Loss of direct T6 service would make it more difficult and less profitable for Oregon exporters to compete in world markets and for Oregon importers to supply Oregon and U.S. markets. With higher transportation costs and reduced reliability, exporters would have to accept lower prices for their goods, particularly agricultural exports subject to competition from other sources and nations. Exporters contacted for this and previous studies have expressed concerns over having to ship goods as much as a week earlier to allow for rail or truck shuttle service to Washington ports, and the disruption caused by changing vessel schedules there. Perishable and other time-sensitive agricultural shipments are particularly vulnerable to delays, congestion, and service variability at Washington ports.

[i] Indirect jobs were reduced by excluding industries unlikely to be affected. Induced jobs were reduced to align with the new total of direct and indirect jobs.

Impacts by County

Table 4 shows the estimated total annual trade value and trucking cost impact by county. The greatest impacts would be felt in the greater Portland area and in the Willamette Valley.

Table 4: Estimated Annual Trade Value and Increased Drayage Cost by County

County	Estimated Annual Total Value	Avg. Annual Truck Trips @ 75 %	County to T6 Miles	County to Sea/Tac Avg.	Estimated Net Additonal Cost per Container	Annual Additonal Drayage Cost*
Baker	$ 3,023,310	10	314	381	$ (171)	$ (1,790)
Benton	$ 965,754	8	102	257	$ 661	$ 4,985
Clackamas	$ 232,069,297	1,835	60	204	$ 557	$ 1,022,856
Clatsop	$ 3,450,055	20	89	181	$ 66	$ 1,281
Columbia	$ 1,004,187	8	37	149	$ 255	$ 1,985
Coos	$ 1,626,974	25	249	397	$ 600	$ 14,722
Crook	$ 10,662,932	158	201	346	$ 572	$ 90,106
Deschutes	$ 203,397,886	2,045	186	332	$ 576	$ 1,178,842
Douglas	$ 1,346,518	15	202	350	$ 600	$ 8,838
Harney	$ 155,245	2	325	470	$ 572	$ 1,315
Hood River	$ 15,177,606	74	81	227	$ 581	$ 42,977
Jackson	$ 27,076,467	220	289	437	$ 595	$ 130,886
Jefferson	$ 1,565,498	6	123	270	$ 591	$ 3,540
Josephine	$ 3,487,151	38	269	417	$ 595	$ 22,607
Klamath	$ 8,910,484	54	284	432	$ 600	$ 32,545
Lane	$ 281,134,776	3,441	145	293	$ 595	$ 2,048,453
Lincoln	$ 123,724	2	139	287	$ 600	$ 1,098
Linn	$ 322,088,823	7,731	118	266	$ 600	$ 4,638,707
Malheur	$ 177,146	2	412	543	$ 434	$ 825
Marion	$ 139,456,248	2,278	80	224	$ 557	$ 1,269,681
Multnomah	$ 1,234,840,455	9,786	15	162	$ 586	$ 5,732,720
Polk	$ 21,796,234	1,306	81	229	$ 595	$ 777,624
Sherman	$ 831,310	9	128	255	$ 401	$ 3,569
Tillamook	$ 980,497	4	73	229	$ 676	$ 2,371
Umatilla	$ 3,745,312	87	222	271	$ (341)	$ (29,808)
Union	$ 206,602	1	280	345	$ (190)	$ (279)
Wasco	$ 1,009,707	21	102	248	$ 581	$ 12,287
Washington	$ 437,212,539	2,498	28	177	$ 609	$ 1,522,145
Yamhill	$ 79,112,440	1,173	53	201	$ 595	$ 698,436
Total	**$ 3,036,635,178**	**32,856**			**$ 585**	**$ 19,233,523**

* Est @ $175+ $ 3.38 /mile

T6 Cargo Growth Potential

The volume of trade through T6 depends on ocean carrier services and their capacity. Every shipper contacted for this study is moving as much cargo as they can through T6 and would move more were more vessel space made available and more foreign ports were served. There is more than enough Oregon cargo to expand T6 volumes, and Oregon cargo continues to grow. The volume through T6 depends on cargo share rather than cargo volume. The consultant team reviewed 2014 shipment data, previous reports, and recent outreach findings to identify the most productive candidates for new or restored service. Those include Japan, Central/South America, Mediterranean/Europe, Southeast Asia, and India. Four potential service scenarios follow.

- **Timberwave Corridor**. The Timberwave Corridor sees a return of a timber-focused trade that connects Portland to Japan, Korea, and China, similar to that previously operated by Westwood.
- **Pacific Produce Pathway**. The Pacific Produce Pathway would connect Oregon, Washington, and Idaho to the vibrant markets of Peru, Chile, and Ecuador. This route would carry commodities such as split peas and seeds to South America and return with fresh fruit and vegetables.
- **Southeast Asia Gateway**. The Southeast Asia Gateway would link Portland to the dynamic markets of Vietnam, Thailand, and Cambodia. A call at Singapore, Hong Kong, or another efficient transshipment hub would also improve Oregon's access to the growing Indian market.
- **AgriTrade Connection**. The AgriTrade Connection would offer connections between Portland and other PNW ports to Central America and Europe. With the transition to larger vessels globally, this service capitalizes on the availability of smaller ships and transshipment hubs to provide a reliable route for the region's agricultural exports, opening new markets and trade possibilities.

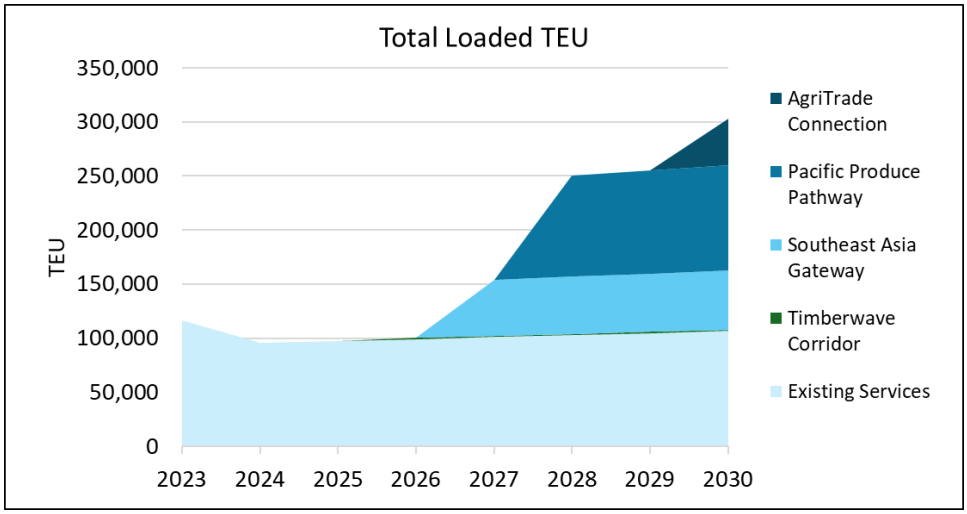
Assuming that SM and MSC remain at Portland at current levels (approximately 100k per year combined imports and exports), Table 5 shows the forecast scenarios extended to 2030. The timing of new services in Table 5 is an example rather than a prediction. Actual success and timing in obtaining new services will depend on trends in the carrier industry, Port marketing efforts, and perhaps most of all on the influence of major ocean carrier customers. While concern for the future of T6 service has often focused on exports, the far higher revenue from imports dominates ocean carrier service planning. Oregon importers will thus likely have greater influence than exporters in obtaining new services.

Table 5: T6 Cargo Growth Scenarios

Total	2023	2024	2025	2026	2027	2028	2029	2030
Existing Services	116,063	95,708	97,431	99,184	100,970	102,787	104,637	106,521
Timberwave Corridor	-	-	-	1,200	1,222	1,244	1,266	1,289
Southeast Asia Gateway	-	-	-	-	51,840	52,773	53,723	54,690
Pacific Produce Pathway	-	-	-	-	-	93,600	95,285	97,000
AgriTrade Connection	-	-	-	-	-	-	-	43,200
	116,063	**95,708**	**97,431**	**100,384**	**154,031**	**250,404**	**254,911**	**302,700**

As Figure 1 shows, a gradual addition of new or restored services would yield stepwise growth at T6. The timing and size of the steps would depend on the order of service introduction.

Figure 1: Total TEU from Growth Scenarios



Conclusions

Direct container vessel service to the Port of Portland and Terminal 6 has been a cornerstone of Oregon's economy, particularly its agricultural export sectors. Loss of that service would mean:

- Losing 169 jobs and $40 million of personal income at T6.
- Losing an additional 700 jobs and $455 million in annual economic output indirectly supported or induced by shipping through T6.
- Imposing an estimated $19.2 million in additional annual trucking costs on Oregon importers and exporters.
- Leaving Oregon importers and exporters with fewer competitive shipping alternatives and vulnerable to millions of dollars in additional ocean shipping costs.
- Raising logistics barriers to profitable Oregon import and export growth.

I. Introduction

Background and Purpose

For decades, direct container vessel service to the Port of Portland at Terminal 6 (T6) has been predicated on financial support from the Port, from the State, or both. Portland's inherent geography and market characteristics and the availability of alternative links to Tacoma and Seattle have led most ocean carriers to substitute rail or truck service for direct vessel calls at Portland, and direct calls have been subsidized through various means.

The Governor of Oregon has requested a report on T6 operations focusing on two key questions:

- What value do direct container vessel services at T6 bring to the State of Oregon?
- What happens if direct container vessel services to the Port of Portland cease and are not resumed?

Tioga has also been asked to forecast potential T6 cargo volumes under various ocean carrier service scenarios. Container vessel operations at the Port of Portland's Terminal Six (T6) create value for the State of Oregon in several ways.

- **Economic Activity.** Employment and purchasing at T6 benefits the state in the same way as a manufacturer of equivalent size. T6 payroll results in local spending and taxes, as do purchases of fuel, supplies, and equipment. T6 shipping results in additional activity along the supply chain. The total includes Direct, Indirect, and Induced economic activity.
- **Facilitating Oregon Exports.** Exporters contacted for this study prefer to use T6 whenever possible. Besides minimizing trucking costs, T6 services can offer faster transpacific transit times as the "last port out". Exporters also noted the lack of congestion at T6 compared to Tacoma and Seattle terminals. These factors make it easier for exporters to meet shipping requirements reliably and consistently, and to sustain and grow Oregon commerce.
- **Facilitating Oregon Imports.** Some major importers such as Lowes (Lebanon), Les Schwab (Lebanon), and Fred Meyer/Kroger (Clackamas) maintain major distribution centers in Oregon. The ability of those importers to move goods through T6 instead of Seattle or Tacoma helps them stay in Oregon, create jobs, and minimize longer truck trips.
- **Minimizing Truck Trips and Costs.** Oregon container trade that cannot be handled at T6 moves by truck or rail to and from the Ports of Tacoma or Seattle. Most containers that must be trucked (drayed) to and from Seattle/Tacoma instead of T6 require up to 300 miles of additional trucking, with additional fuel use and environmental impacts. With the heavy concentration of exporters in the Willamette Valley and importers in Multnomah County, most of these trips would pass through Portland.
- **Strengthening Oregon Business.** Having access to T6 improves the economic competitiveness of Oregon agricultural exports. Expanded access would improve the ability of the State's agricultural sector to compete in new international markets. Due to productivity gains from international trade and efficient import shipping, firms and consumers also benefit from improved productivity and reduced costs.

The outlook for future container volumes at T6 depends on the ocean carrier services provided and the space allocations made available. **Outreach to Oregon shippers consistently found that Oregon shippers have much more cargo they would like to move through T6. They are constrained by lack of service to key markets and insufficient vessel space allocations.**

II. Port of Portland Ocean Carrier Service and Shipping Options

Oregon Shipping Options

Oregon exporters have multiple shipping options, some unique to the Portland area.

Truck Drayage to T6. The most straightforward option is to truck containers to and from T6. "Drayage" is over-the-road movement of cargo containers using a tractor and chassis combination. All exporters and importers prefer this option, not only because it is less costly but because it is more reliable and allows Oregon drayage drivers to make multiple daily trips ("turns") yet be home at the end of their day. Direct drayage to T6 is also preferred by agricultural exporters using their own tractors with "farm" plates, which cannot legally operate far enough into Washington to reach the Ports a of Seattle or Tacoma. Drayage within Oregon is typically done by Oregon firms with Oregon drivers.

Truck drayage to Seattle/Tacoma. Trucking containers to/from the Ports of Seattle or Tacoma is straight forward but is the least favored alternative for Oregon shippers and receivers. Trucking to Seattle Tacoma is the costliest option, as the lower ocean transportation rates at Seattle/Tacoma do not typically offset the higher trucking cost. **Shippers contacted for this study cited additional net costs of $400-700 per container, as explained below.** Even more than the costs, Oregon shippers objected to the longer terminal queue times, the uncertainty of trucking service, and the inability of drayage drivers to make multiple daily trips. Seattle/Tacoma trips are reportedly more often made by Washington firms and drivers who can start their day at the Seattle/Tacoma ports.

Rail to/from Seattle/Tacoma. Northwest Container Services (NWCS) offers up to six-day per week rail intermodal service between their terminal at Portland (Figure 2) to the Ports of Seattle and Tacoma. The economics of this service are complex and unique. Shippers and receivers exchange containers with the ocean carriers at the NWCS Portland terminal as if it were an actual port terminal. Ocean carriers pay NWCS and bill the shippers and receivers. The ocean carriers effectively subsidize this service, billing shippers and receivers at less than their cost. NWCS is thus a substitute for direct vessel service to T6. In previous studies Tioga learned that the NWCS service does not always meet exporter requirements for meeting outbound vessel schedules, and in those cases shippers must truck containers to Seattle/Tacoma. Contacts with shippers for this report indicated that service inconsistencies and policy changes by the underlying rail carrier, Union Pacific, have recently limited NWCS capacity and reliability.

Figure 2: Northwest Container Service, Portland

Portland Container Repair Drayage. Since Tioga's earlier studies a new option has emerged. Portland Container Repair (PCR) operates a container storage and repair yard in Portland (Figure 3) and also offers drayage services. It is now possible for Oregon shippers and receivers to dray containers to/from the PCR facility while PCR performs drayage to/from Seattle/Tacoma.

Figure 3: Portland Container Repair

T6 versus Seattle/Tacoma Ocean Rates

Ocean carriers have historically set higher export and import rates at T6 than at Seattle and Tacoma to offset the higher cost of serving Portland. Based on recent contacts with Oregon shippers, the rates at T6 are typically $700-$1000 higher per container with an average of about $900. The difference will vary by customer, by foreign port, and over time.

Carriers offering rail service via NWCS have typically offered about the same rate there as at T6, positioning the rail connection as a competitive alternative to direct T6 calls. The PCR drayage option is reportedly priced similarly. Neither NWCS nor PCR set the ocean rates - the ocean carriers set the import/export rates and pay NWCS and PCR for the move between Portland and Seattle/Tacoma.

Since direct T6 service effectively establishes the competitive rate, there is a risk that ocean carrier rates via NWCS or PCR could rise in the long term without the direct service competition. The loss of T6 will reduce competition, and in the long term will likely lead to higher prices at alternative options.

Current Ocean Carrier Services

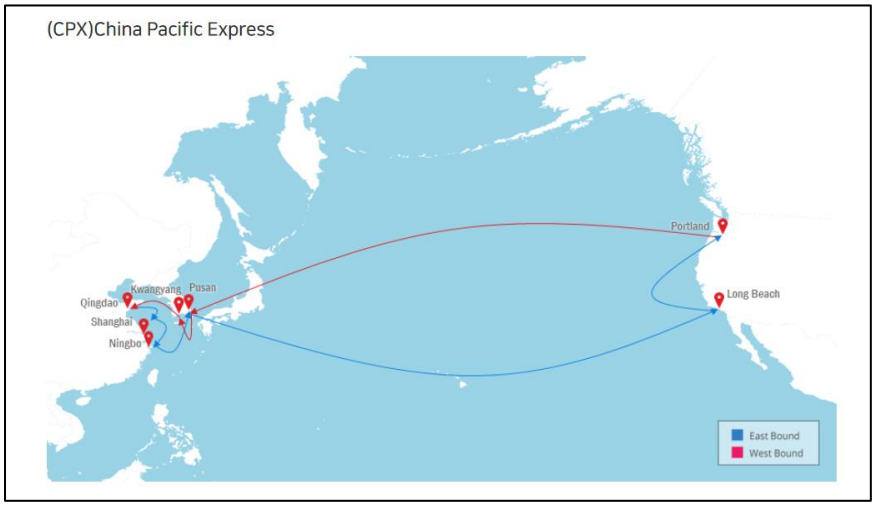
Terminal Six has had limited direct service over the last few years. As Table 10 indicates, SM Line and MSC both offer direct service to Korea and China, six ports in all. The routes are shown in Figure 1-Figure 3.

Table 6: Recent T6 Services

2024 T6 Services	Korea	China			
SM Lines	Busan	Qingdao	Shanghai	Ningbo	Kwangyang
MSC	Busan	Qingdao	Shanghai	Yantian	

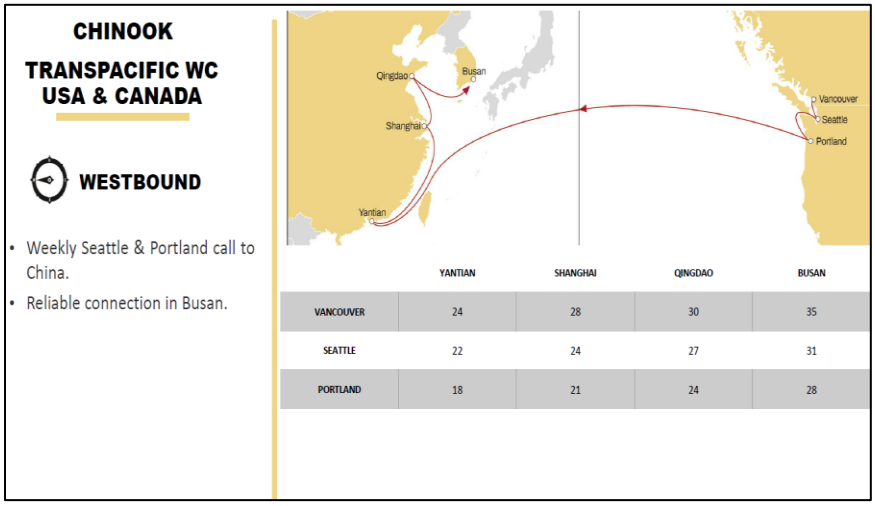
SM Line serves Busan first, arriving in 12 days from Portland (Figure 4). The China calls follow, with Asian calls ending back in Busan. From Busan eastbound to Portland via Long Beach takes 17 days.

Figure 4: SM Line T6 Service



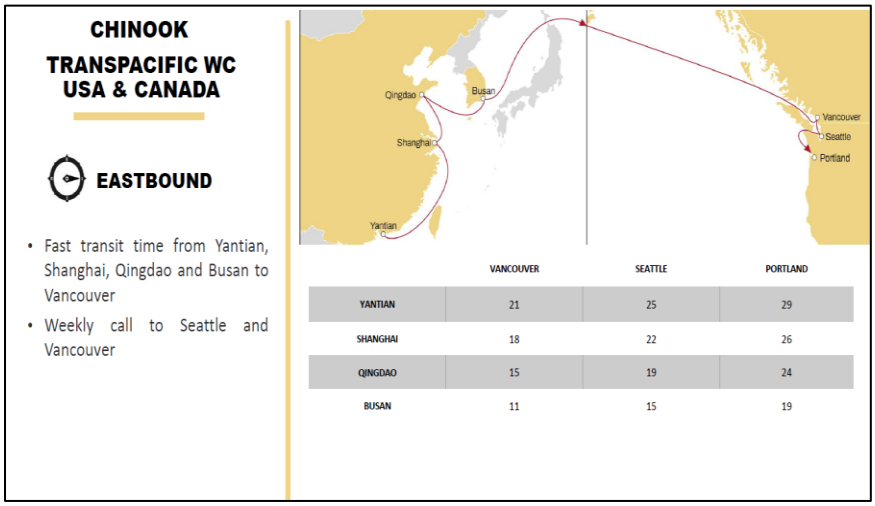
The westbound MSC Chinook service goes from Portland to Yantian in 18 days (Figure 5). The service ends Asian calls at Busan, and reaches Portland eastbound in 19 days (Figure 6).

Figure 5: MSC T6 Westbound Service



	YANTIAN	SHANGHAI	QINGDAO	BUSAN
VANCOUVER	24	28	30	35
SEATTLE	22	24	27	31
PORTLAND	18	21	24	28

Figure 6: MSC T6 Eastbound Service



	VANCOUVER	SEATTLE	PORTLAND
YANTIAN	21	25	29
SHANGHAI	18	22	26
QINGDAO	15	19	24
BUSAN	11	15	19

Portland's "last port out" position in both services is generally advantageous for Oregon exports. Exporters can ship from T6 2-3 days later than from Seattle/Tacoma with the same Asian arrival days. This "last call out" status is a disadvantage for imports, however, as it means importers will have to wait 2-3 days longer for their goods. This delay may be offset by the general lack of congestion at T6, which can allow importers to retrieve their goods sooner.

With this limited service choice Oregon's current trade through T6 is concentrated in Korea and China (Table 7). The other foreign origins and destinations are served via "transshipment", meaning unloading from the Portland vessel at an intermediate port and reloading on another vessel bound for the actual destination. The T6 SM Line or MSC moves the cargo between Portland and an Asian transshipment port, often Busan, where the cargo is transferred to or from an Asian feeder service or other vessel to the final origin or destination port. Transshipment is a routine practice but it can add a week or more to transit times for Oregon shippers and receivers. For relatively low value, non-perishable goods such as export hay the slower transit time may be relatively unimportant, but relying on transshipment does limit the ability of Oregon shippers to respond to short-term demands. For perishable, seasonal, or higher-value cargo the additional transit time and handling required for transshipment can be a barrier to routing via T6.

Table 7: 2021-2023 T6 Cargo by Foreign County

Ultimate Country	Value	Value Share	TEU	TEU Share
Exports				
Republic Of Korea	**$ 1,578,786,521**	**75%**	**95,187**	**81%**
China (Mainland)	**$ 239,936,305**	**11%**	**7,480**	**6%**
Malaysia	$ 103,614,084	5%	4,215	4%
Japan	$ 72,064,126	3%	4,134	4%
Thailand	$ 36,758,502	2%	2,294	2%
Indonesia	$ 20,229,859	1%	1,782	2%
Hong Kong	$ 29,375,721	1%	634	1%
All Others	$ 36,637,089	2%	1,547	1%
Export Total	**$ 2,117,402,207**	**100%**	**117,273**	**100%**
Imports	**Value**	**Value Share**	**TEU**	**TEU Share**
China (Mainland)	**$ 4,872,227,759**	**71%**	**115,058**	**69%**
Republic Of Korea	**$ 1,164,558,551**	**17%**	**24,152**	**14%**
Vietnam	$ 279,056,799	4%	8,680	5%
Thailand	$ 152,455,027	2%	6,807	4%
Japan	$ 205,543,955	3%	6,741	4%
Indonesia	$ 56,614,423	1%	2,320	1%
Malaysia	$ 39,049,956	1%	1,181	1%
Singapore	$ 54,577,387	1%	1,051	1%
All Others	$ 48,644,020	1%	948	1%
Import Total	**$ 6,872,727,877**	**100%**	**166,936**	**100%**
Total	**$ 8,990,130,084**		**284,209**	

Exporters contacted by Tioga have also noted that the need to transship can limit their ability to compete in growing markets such as India and Southeast Asia.

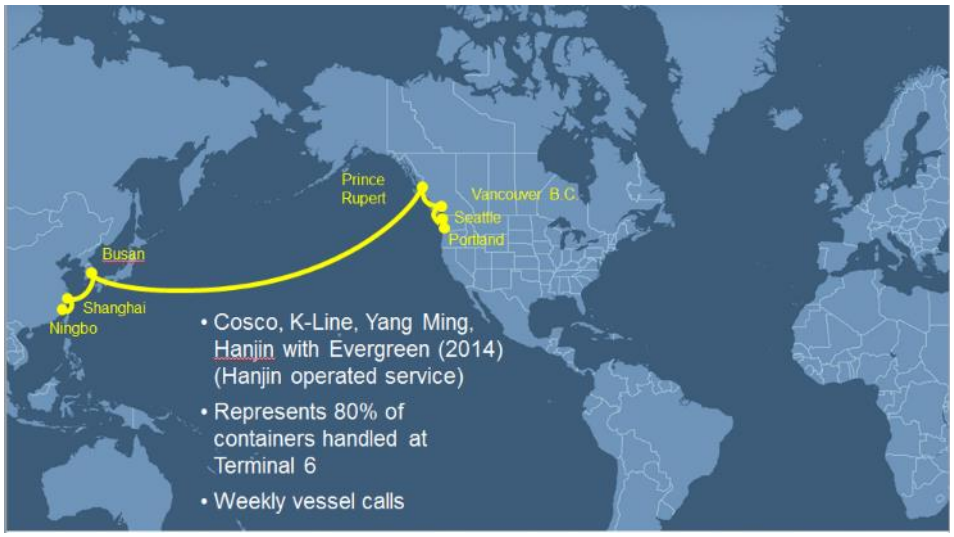
The lack of T6 service to Central America, South America, Europe, Mediterranean countries, or Africa means that Oregon exporters must use Seattle, Tacoma, or other ports to serve those markets. Multiple shipper contacts specifically mentioned the potential for increased T6 business if Mediterranean and/or Americas services were available.

Previous Shipping Services

Schedule convenience and service to and from specific foreign ports have always been significant factors in importer and exporter use of the Port of Portland. As of 2014, Hanjin (and the COSCO, "K" Line, Yang Ming, Hanjin, Evergreen "CKYHE" alliance) reportedly accounted for about 80% of Portland's container cargo, Hapag-Lloyd (APL, Hapag-Lloyd, Hyundai, MOL, NYK, OOCL – "G-6" Alliance) for about 17%, and Westwood for about 3%.

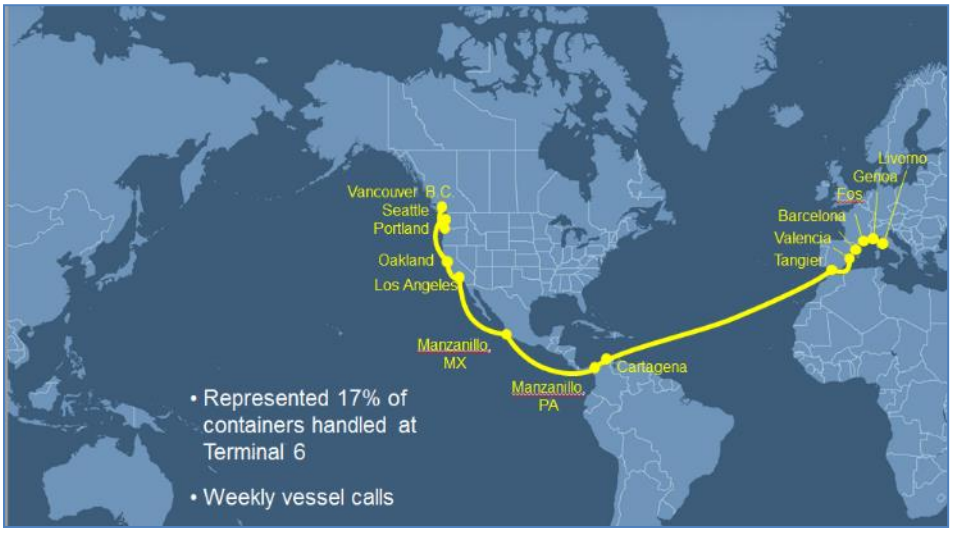
Hanjin. As shown in Figure 7, the service Hanjin and the CKYHE alliance offered at Portland also made West Coast calls at Seattle, Vancouver, and Prince Rupert, and served Busan, the major Korean port, and Shanghai and Ningbo in China. Interview results indicated that service to Korea was a major factor for Oregon agricultural exporters, particularly hay shippers.

Figure 7: Hanjin Service, 2014



Hapag-Lloyd. Prior to the early 2015 withdrawal, Hapag-Lloyd and Hamburg Süd offered the MedPac service linking West Coast, Mexican, and South American (Figure 8) ports with ports in the Mediterranean.

Figure 8: Hapag-Lloyd MedPac Service, 2014



Westwood. Westwood Shipping is a subsidiary of J-WeSco, which, in turn, is a holding company formed by a consortium of Japanese stevedore companies. The consortium succeeded Weyerhaeuser, which had begun Westwood in 1933 to carry forest products. Westwood's 2014 fleet consisted of four "ConBulk" vessels that could carry break bulk cargo as well as containers. Westwood provided a monthly export service at Portland serving Japanese ports and Busan (Figure 9). That service has continued to call at Portland under special handling arrangements, with sailings scheduled into 2015.

Figure 9: Westwood Shipping Service, 2014

Table 20 summarizes the difference between 2014 and 2024 market access through T6.

Table 8: 2024 versus 2014 T6 Port and Market Access

2024 T6 Services	**Korea**		**China**		
SM Lines	Busan	Qingdao	Shanghai	Ningbo	Kwangyang
MSC	Busan	Qingdao	Shanghai	Yantian	
2014 T6 Services	**Korea**		**China**		
	Busan		Shanghai	Ningbo	
			Americas		
		Manzanillio, MX	Manzanillo, PA		Cartagena
			Mediterranean		
		Tangier	Valencia	Barceloa	Fos
		Genoa	Livorno		
			Japan		
		Tokyo	Osaka	Nagoya	Shimizu

III. Container and Commodity Flows

Overview

Terminal 6 primarily handles containerized trade to and from Oregon, but also handles some trade to and from Washington, Idaho, and inland states. As Table 9 indicates, almost 90% of the T6 total is Oregon trade.

Table 9: 2021-2023 T6 Container Trade in TEU

Trade	Oregon	Share	WA/ID Inland	Share	Total
Imports	140,880	84%	26,050	16%	166,930
Exports	105,795	90%	11,478	10%	117,273
Total	**246,675**	**87%**	**37,528**	**13%**	**284,203**

The Oregon trade generates both valuable economic activity at the Port of Portland and transportation benefits for Oregon importers and exporters and their customers. Trade to and from other states contributes to the economic activity and jobs at T6 and helps the terminal attain a more efficient operating scale.

Recent Container Trade

Since reactivation in 2020, Port of Portland's Terminal 6 has been served by two ocean carriers: SM Line (SML) and Mediterranean Shipping Company (MSC). These carriers moved over 64,000 export containers worth over $2.1 billion in 2021-2023 on behalf of over 800 exporters. Exports were driven by Oregon's agricultural production, particularly animal feeds and grass seed, and by recycled metals and paper.

In that same period those carriers moved over 91,000 import containers worth over $6.8 billion for over 5,000 importers. Imports were heavily influenced by Oregon's consumer economy and by the presence of major distribution centers importing tires, building materials, etc.

Figure 10 shows the monthly loaded container flows at T6 for 2021-2023. The volume of container trade is commonly expressed in twenty-foot equivalent units (TEU). Most containers are 40 feet long, so each container is typically 2 TEU. Figure 10 also shows the variability of T6 container trade based on overall economic and trade conditions and the seasonality of Oregon's agricultural exports.

Figure 10: Monthly Loaded T6 TEU

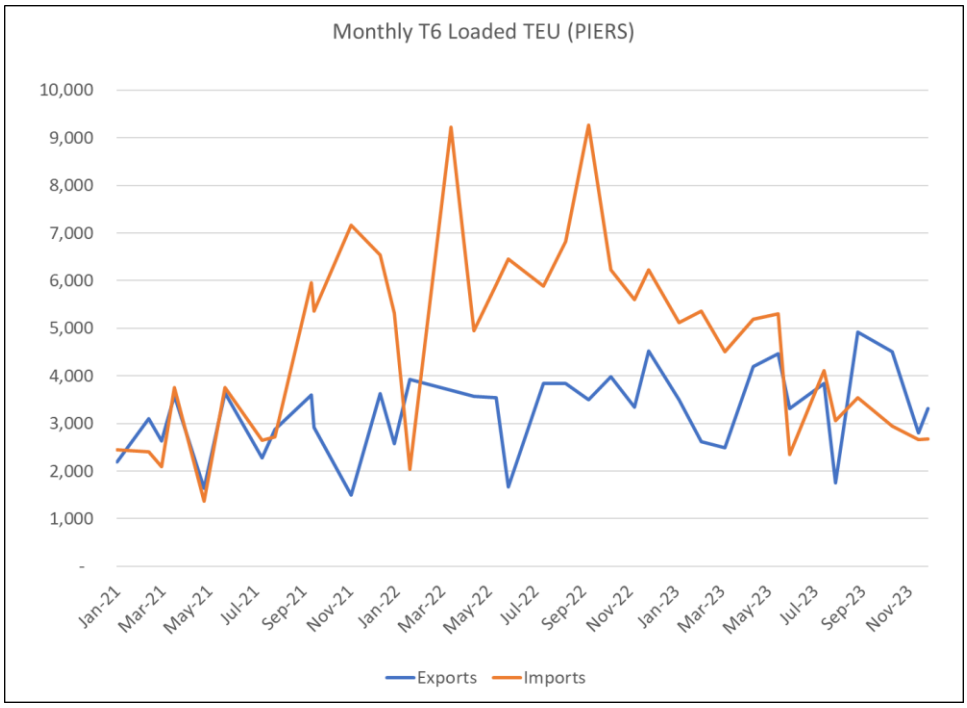
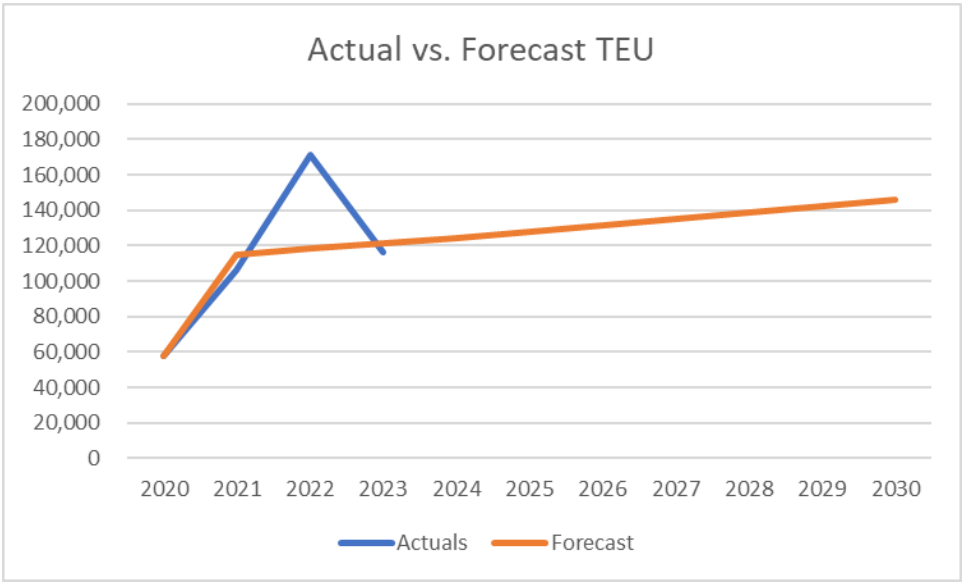


Figure 11 compares actual T6 TEU with the 2021 BTS forecast. As is evident in both Figure 10 and Figure 11, the 2022 total was well above forecast, in part due to intermodal traffic that passed through T6 on the way to inland points. The 2023 total was close to the BTS forecast.

Figure 11: Actual vs. Forecast TEU



Export Data

Table 10 shows the HS 4-digit commodities that make up 80% of T6 exports by TEU. As expected, the volume of export flows is dominated by hay and feeds, followed by metal scrap, grass seed, wood pulp, etc. These

commodities have relatively low value per TEU, but a high value in aggregate and are critical for key segments of the Oregon economy. Because trucking costs are based on the container count, the costs of trucking to Tacoma or Seattle are also dominated by those high-volume, low-value commodities.

Table 10: 2021-2023 Export Commodity TEU Summary

HS Code 5	HS Code 4 Description	TEU	TEU Share	Cumulative TEU Share	Value	Value Share	$/TEU
1214	RUTABAGAS, HAY, CLOVER & OTHER FORAGE PRODUCTS	61,246	52%	52%	$ 270,468,640	13%	$ 4,416
2309	PREPARATIONS USED IN ANIMAL FEEDING	20,353	17%	70%	$ 281,613,146	13%	$ 13,836
4707	WASTE AND SCRAP OF PAPER OR PAPERBOARD	5,400	5%	74%	$ 10,627,767	1%	$ 1,968
7602	ALUMINUM WASTE AND SCRAP	4,439	4%	78%	$ 84,434,589	4%	$ 19,020
2303	RESIDUES OF STARCH MFR OR SUGAR MFR OR BREWING ETC	4,072	3%	81%	$ 14,086,329	1%	$ 3,459
1209	SEEDS, FRUIT AND SPORES, FOR SOWING	3,991	3%	85%	$ 84,795,530	4%	$ 21,249
4703	CHEMICAL WOODPULP, SODA OR SULFATE, NOT DISSOLY GR	1,952	2%	87%	$ 14,928,417	1%	$ 7,650
7204	FERROUS WASTE & SCRAP; REMELT SCR IRON/STEEL INGOT	1,778	2%	88%	$ 16,311,054	1%	$ 9,176
7985	MISCELLANEOUS CARGO	1,755	1%	90%	$ 154,421,720	7%	$ 88,014
	All Others	12,288	10%	100%	$ 1,175,551,127	56%	$ 95,664
Total		**117,273**	**100%**	**100%**	**$ 2,107,238,319**	**100%**	**$ 17,969**

As is apparent in Table 11, there are some very high reported values per TEU. Beyond that, aggregate value is also dominated by the high-volume exports. This overall T6 volume includes exports from Washington and Idaho, as some of those flows typically use T6. There has also been a small amount of exports originating further inland and move to T6 by intermodal rail.

Table 11: 2021-2023 Export Commodity Value Shares

HS Code 5	HS Code 4 Description	Value	Value Share	Cumulative Value Share	$/TEU
8807	PARTS OF BALLOONS ETC, AIRCRAFT ETC	$ 559,788,895	27%	27%	$ 4,626,355
2309	PREPARATIONS USED IN ANIMAL FEEDING	$ 281,613,146	13%	40%	$ 13,836
1214	RUTABAGAS, HAY, CLOVER & OTHER FORAGE PRODUCTS	$ 270,468,640	13%	53%	$ 4,416
7985	MISCELLANEOUS CARGO	$ 154,421,720	7%	60%	$ 88,014
4202	TRAVEL GOODS, HANDBAGS, WALLETS, JEWELRY CASES ETC	$ 106,404,129	5%	65%	$ 178,008
1209	SEEDS, FRUIT AND SPORES, FOR SOWING	$ 84,795,530	4%	69%	$ 21,249
7602	ALUMINUM WASTE AND SCRAP	$ 84,434,589	4%	73%	$ 19,020
7404	COPPER WASTE AND SCRAP	$ 65,580,813	3%	76%	$ 72,058
7112	WASTE & SCRAP OF PREC METAL OR METAL CL W PREC MTL	$ 47,682,673	2%	79%	$ 1,766,025
8803	PARTS OF BALLOONS ETC, AIRCRAFT, SPACECRAFT ETC	$ 43,822,698	2%	81%	$ 2,577,806
8022	NUTS NESOI, FRESH OR DRIED	$ 36,983,509	2%	82%	$ 49,574
8507	ELECTRIC STORAGE BATTERIES, INCL SEPARATORS, PARTS	$ 32,442,223	2%	84%	$ 56,276
8506	PRIMARY CELLS & BATTERIES, PARTS	$ 25,514,422	1%	85%	$ 108,813
7204	FERROUS WASTE & SCRAP; REMELT SCR IRON/STEEL INGOT	$ 16,311,054	1%	86%	$ 9,176
4061	CHEESE AND CURD	$ 15,842,137	1%	87%	$ 57,818
4703	CHEMICAL WOODPULP, SODA OR SULFATE, NOT DISSOLY GR	$ 14,928,417	1%	87%	$ 7,650
4021	MILK AND CREAM, CONCENTRATED OR SWEETENED	$ 14,884,220	1%	88%	$ 39,169
2303	RESIDUES OF STARCH MFR OR SUGAR MFR OR BREWING ETC	$ 14,086,329	1%	89%	$ 3,459
8104	FRUIT NESOI, FRESH	$ 12,964,960	1%	89%	$ 50,595
1201	SOYBEANS, WHETHER OR NOT BROKEN	$ 11,059,198	1%	90%	$ 6,827
4707	WASTE AND SCRAP OF PAPER OR PAPERBOARD	$ 10,627,767	1%	90%	$ 1,968
	All Others	$ 202,581,250	10%	100%	$ 31,031
Total		**$ 2,107,238,319**	**100%**	**100%**	**$ 17,969**

There are over 800 individual exporters shown in the data. Table 12 shows exporters that accounted for 1% or more of the export volume. Beyond the hay and feed export firms the volume drops off rapidly. PIERS data is the best available public source, but cannot be more accurate than the original information submitted to Customs, which can be error-prone. The data in Table 12 should thus be considered indicative of overall export patterns but not precise reflections of individual company shipments.

Table 12: 2021-2023 Exporter TEU Summary

US Company Name	TEUS	TEU Share	Cumulative TEU Share
NH HAY	12,817	11%	11%
GILMOUR PACIFIC TRADING	11,129	9%	20%
SUNRISE TRADING	7,643	7%	27%
BOUNDS HAY	7,631	7%	33%
FARMERS DIRECT	4,703	4%	37%
VIA GLOBAL LOGISTICS	4,088	3%	41%
EXIM NORTH AMERICA TRADING	4,041	3%	44%
ANDERSON HAY AND GRAIN	3,565	3%	47%
PACIFIC TRADING USA	3,488	3%	50%
BOSSCO TRADING	3,169	3%	53%
VA LLEY HAY	2,502	2%	55%
QUALITY TRADING	2,274	2%	57%
PR TRADING	2,072	2%	59%
WESTERN HAY	1,968	2%	61%
EL TORO EXPORT	1,903	2%	62%
NEXUS TRADING	1,793	2%	64%
NEWFIA ENTERPRISE	1,673	1%	65%
CASCADE PACIFIC PULP	1,652	1%	67%
SCHNITZER STEEL INDUSTRIES	1,601	1%	68%
ASHNOL ORGANIC HAY	1,565	1%	69%
GTRANS USA	1,416	1%	71%
CELLMARK	1,416	1%	72%
WEST COAST HAY MANAGEMENT	1,375	1%	73%
CALAWAY TRADING	1,326	1%	74%
MAINFREIGHT	1,230	1%	75%
SAM AND JENNY	1,202	1%	76%
METRO METALS NORTHWEST	1,020	1%	77%
SEALINK INTERNATIONAL	1,017	1%	78%
CALBAG METALS	983	1%	79%
VALLEY HAY	934	1%	79%
NEWPORT CH INTERNATIONAL	900	1%	80%
All Others	23,178	20%	100%
Total	**117,273**	**100%**	**100%**

Table 13 shows major exporters by value[ii].

[ii] ZIMEX GLT appears to be a third-party broker/forwarder in Cypress, CA that also exports under other names, e.g. ZIMEX Logitech. The extremely high value shipment appear to be aircraft parts.

Table 13: 2021-2023 Exporter Value Summary

US Company Name	Value	Value Share	Cumulative Value Share	$/TEU
ZIMEX GLT	$ 468,045,986	22%	22%	$ 1,238,217
GILMOUR PACIFIC TRADING	$ 89,081,236	4%	26%	$ 8,004
UTL INTERNATIONAL	$ 74,926,264	4%	30%	$ 1,469,142
NH HAY	$ 66,429,808	3%	33%	$ 5,183
BOUNDS HAY	$ 60,425,690	3%	36%	$ 7,918
SEALINK INTERNATIONAL	$ 60,286,357	3%	39%	$ 59,280
KL LOGISTIC	$ 46,417,106	2%	41%	$ 1,160,428
SUNRISE TRADING	$ 44,379,345	2%	43%	$ 5,807
DLF USA	$ 43,266,460	2%	45%	$ 134,368
DETROIT SCRAP CONSULTING SERVICES	$ 42,562,624	2%	47%	$ 73,770
CALBAG METALS	$ 41,912,860	2%	49%	$ 42,632
KORAB INTERNATIONAL	$ 40,623,824	2%	51%	$ 71,270
EXIM NORTH AMERICA TRADING	$ 38,554,644	2%	53%	$ 9,541
FARMERS DIRECT	$ 37,577,285	2%	55%	$ 7,991
PACIFIC TRADING USA	$ 36,265,576	2%	57%	$ 10,398
SCHNITZER STEEL INDUSTRIES	$ 36,202,503	2%	58%	$ 22,612
MAINFREIGHT	$ 33,903,087	2%	60%	$ 27,553
FR MEYERS SOHN	$ 30,432,746	1%	61%	$ 59,205
FAR WEST RECYCLING	$ 29,271,884	1%	63%	$ 1,829,493
METRO METALS NORTHWEST	$ 27,436,371	1%	64%	$ 26,899
EXPEDITORS INTERNATIONAL	$ 25,539,672	1%	65%	$ 53,207
NORTHWEST HAZELNUT	$ 24,285,309	1%	66%	$ 49,560
ORDER	$ 23,108,301	1%	67%	$ 31,063
IMPORT AND EXPORT GLS	$ 22,580,544	1%	69%	$ 96,912
PR TRADING	$ 21,514,225	1%	70%	$ 10,385
VA LLEY HAY	$ 21,249,407	1%	71%	$ 8,493
BOSSCO TRADING	$ 20,174,873	1%	71%	$ 6,366
EL TORO EXPORT	$ 20,102,170	1%	72%	$ 10,563
ANDERSON HAY AND GRAIN	$ 19,451,758	1%	73%	$ 5,456
VIA GLOBAL LOGISTICS	$ 18,775,571	1%	74%	$ 4,593
ALLSTATE INT L FREIGHT USA 172	$ 18,762,117	1%	75%	$ 318,002
NEXUS TRADING	$ 17,659,162	1%	76%	$ 9,849
DARIGOLD	$ 17,045,741	1%	77%	$ 33,292
ALL STATE INTERNATIONAL FREIGHT	$ 14,649,728	1%	77%	$ 252,582
WEST COAST HAY MANAGEMENT	$ 14,498,268	1%	78%	$ 10,546
SEA SHIPPING LINE	$ 14,388,457	1%	79%	$ 35,440
DSV	$ 13,956,860	1%	80%	$ 22,731
CALAWAY TRADING	$ 13,792,964	1%	80%	$ 10,402
All Others	$ 417,701,536	20%	100%	$ 13,007
Totals	**$ 2,107,238,319**	**100%**	**100%**	**$ 17,969**

Table 7 shows the distribution of exports by destination region in 2014 compared to 2021-23. Exports to Korea have increased and those to Southeast Asia have been relatively level. There has, however, been a marked drop in exports to China, Japan, the Americas, Europe, and India resulting in a lower 2021-2023 average than in 2014. While there are multiple factors at work, most of this decline is likely due to the loss of Japan, Americas, Southeast Asia, and Mediterranean/Europe services that were offered in 2014. The restoration of these connections thus becomes one key to future cargo growth at T6.

Table 14: 2014 vs 2021-2023 Export Destinations

Region	2014 TEU	2014 Share	2021-2023 Avg TEU	2021-2023 Avg. Share
Republic of Korea	20,293	36%	31,729	81%
China	13,167	23%	2,493	6%
Japan	5,624	10%	1,378	4%
South/Central America	4,780	8%	-	0%
Mediterranean	3,371	6%	-	0%
Southeast Asia	3,220	6%	2,746	7%
Europe	2,983	5%	31	0%
India	1,503	3%	116	0%
Austrailia/NZ	450	1%	4	0%
Africa	16		-	0%
Canada	2	0%	-	0%
Unknown	1,095	2%	-	0%
Total	**56,502**	**100%**	**39,091**	**100%**

Import Data

Table 15 lists import commodities by TEU count. The volumes drop off rapidly after tires and furniture. Most imports are consumer goods, other finished goods, or parts and supplies for manufacturers in the US.

Table 15: 2021-2023 Import Commodity TEU Shares

HS 4 Code	HS Code 4 Description	TEU	TEU Share	Cumulative TEU Share
4011	NEW PNEUMATIC TIRES, OF RUBBER	14,901	9%	9%
9403	FURNITURE NESOI AND PARTS THEREOF	13,645	8%	17%
9503	TOYS NESOI; SCALE MODELS ETC; PUZZLES; PARTS ETC	6,453	4%	21%
3604	FIREWORKS, SIGNALLING FLARES, RAIN ROCKETS ETC.	6,438	4%	25%
8443	PRINTING MACHINERY; MACHINES ANCIL TO PRINTING, PT	6,404	4%	29%
8609	CONTAINERS FOR ONE OR MORE MODES OF TRANSPORT	5,500	3%	32%
8708	PARTS & ACCESS FOR MOTOR VEHICLES (HEAD 8701-8705)	4,668	3%	35%
3926	ARTICLES OF PLASTICS (INC POLYMERS & RESINS) NESOI	3,885	2%	37%
9401	SEATS (EXCEPT BARBER, DENTAL, ETC), AND PARTS	3,314	2%	39%
3924	TABLEWARE & OTHER HOUSEHOLD ARTICLES ETC, PLASTICS	3,012	2%	41%
9506	ARTICLES & EQUIP FOR SPORTS ETC NESOI; POOLS; PTS	2,547	2%	42%
7010	GLASS CONTAINERS FOR PACKING ETC & GLASS CLOSURES	2,517	2%	44%
9505	FESTIVE, CARNIVAL OR OTHER ENTERTAINMENT ART, PTS	2,364	1%	45%
8418	REFRIGERATORS, FREEZERS ETC; HEAT PUMPS NESOI, PTS	2,315	1%	47%
3923	CONTAINERS (BOXES, BAGS ETC), CLOSURERS ETC, PLAST	2,026	1%	48%
7315	CHAIN & PARTS, OF IRON OR STEEL	1,678	1%	49%
8507	ELECTRIC STORAGE BATTERIES, INCL SEPARATORS, PARTS	1,630	1%	50%
95	TOYS, GAMES & SPORT EQUIPMENT; PARTS & ACCESSORIES	1,595	1%	51%
3918	FLOOR COVER (ROLLS & TILES) & WALL COVER, PLASTICS	1,456	1%	52%
4202	TRAVEL GOODS, HANDBAGS, WALLETS, JEWELRY CASES ETC	1,442	1%	53%
9405	LAMPS & LIGHTING FITTINGS & PARTS ETC NESOI	1,432	1%	53%
7304	TUBES, PIPES ETC, SEAMLESS, IRON NESOI & STEEL	1,309	1%	54%
7326	ARTICLES OF IRON OR STEEL, NESOI	1,267	1%	55%
8516	ELEC WATER, SPACE & SOIL HEATERS; HAIR ETC DRY, PT	1,256	1%	56%
4421	ARTICLES OF WOOD, NESOI	1,181	1%	56%
8544	INSULATED WIRE, CABLE ETC; OPT SHEATH FIB CABLES	1,093	1%	57%
6307	MADE-UP ARTICLES OF TEXTILE MATERIALS NESOI	1,077	1%	58%
8409	PARTS FOR ENGINES OF HEADING 8407 OR 8408	1,034	1%	58%
8415	AIR CONDITIONING MACHINES (TEMP & HUM CHANGE), PTS	1,021	1%	59%
7321	STOVES, RANGES ETC, NONEL DOMEST & PTS, IR & STEEL	1,016	1%	60%
7308	STRUCTURES NESOI & PARTS THEREOF, OF IRON OR STEEL	965	1%	60%
8716	TRAILERS ETC; OTHER VEHICLES, NOT MECH PROPELD, PT	944	1%	61%
8422	MACHINES, DISHWASH, CLEAN ETC CONT & FILL, PAK ETC	903	1%	61%
9404	MATTRESS SUPPORTS; ARTICLES OF BEDDING ETC	897	1%	62%
	All Other	63,751	38%	100%
Total		**166,936**	**100%**	**100%**

By value, imports are dominated by printers, tires, batteries, and toys as shown in Table 16.

Table 16: 2021-2023 Import Commodity Value Shares

HS 4 Code	HS Code 4 Description	Value	Value Share	Cumulative Value Share	Value Per TEU
8443	PRINTING MACHINERY; MACHINES ANCIL TO PRINTING, PT	$ 669,226,308	10%	10%	$ 104,501
4011	NEW PNEUMATIC TIRES, OF RUBBER	$ 319,641,903	5%	14%	$ 21,451
8507	ELECTRIC STORAGE BATTERIES, INCL SEPARATORS, PARTS	$ 280,095,220	4%	18%	$ 171,806
9503	TOYS NESOI; SCALE MODELS ETC; PUZZLES; PARTS ETC	$ 268,166,731	4%	22%	$ 41,554
2852	COMPOUNDS INORGANIC OR ORGANIC MERCURY	$ 205,865,207	3%	25%	$ 780,591
9403	FURNITURE NESOI AND PARTS THEREOF	$ 197,693,700	3%	28%	$ 14,488
8708	PARTS & ACCESS FOR MOTOR VEHICLES (HEAD 8701-8705)	$ 161,684,653	2%	31%	$ 34,640
8609	CONTAINERS FOR ONE OR MORE MODES OF TRANSPORT	$ 153,099,680	2%	33%	$ 27,836
3604	FIREWORKS, SIGNALLING FLARES, RAIN ROCKETS ETC.	$ 151,079,323	2%	35%	$ 23,468
3918	FLOOR COVER (ROLLS & TILES) & WALL COVER, PLASTICS	$ 137,115,028	2%	37%	$ 94,176
8517	ELECTRIC APPARATUS FOR LINE TELEPHONY ETC, PARTS	$ 134,700,804	2%	39%	$ 282,753
8415	AIR CONDITIONING MACHINES (TEMP & HUM CHANGE), PTS	$ 125,086,550	2%	41%	$ 122,469
8544	INSULATED WIRE, CABLE ETC; OPT SHEATH FIB CABLES	$ 91,817,071	1%	42%	$ 83,991
7315	CHAIN & PARTS, OF IRON OR STEEL	$ 85,637,624	1%	43%	$ 51,029
3926	ARTICLES OF PLASTICS (INC POLYMERS & RESINS) NESOI	$ 79,371,663	1%	45%	$ 20,431
8528	TELEVISION RECEIVERS (INCL MONITORS & PROJ RECEIV)	$ 72,495,500	1%	46%	$ 147,139
9506	ARTICLES & EQUIP FOR SPORTS ETC NESOI; POOLS; PTS	$ 69,551,693	1%	47%	$ 27,312
8471	AUTOMATIC DATA PROCESS MACHINES; MAGN READER ETC	$ 65,174,479	1%	48%	$ 328,683
8518	MICROPHONES; LOUDSPEAKERS; SOUND AMPLIFIER ETC, PT	$ 61,877,819	1%	48%	$ 112,407
9401	SEATS (EXCEPT BARBER, DENTAL, ETC), AND PARTS	$ 61,592,275	1%	49%	$ 18,586
3924	TABLEWARE & OTHER HOUSEHOLD ARTICLES ETC, PLASTICS	$ 57,526,679	1%	50%	$ 19,100
8516	ELEC WATER, SPACE & SOIL HEATERS; HAIR ETC DRY, PT	$ 54,475,523	1%	51%	$ 43,361
9505	FESTIVE, CARNIVAL OR OTHER ENTERTAINMENT ART, PTS	$ 52,632,742	1%	52%	$ 22,260
8714	PARTS & ACCESS FOR CYCLES & INVALID CARRIAGES	$ 49,143,231	1%	52%	$ 116,404
8481	TAPS, COCKS, VALVES ETC FOR PIPES, TANKS ETC, PTS	$ 48,884,244	1%	53%	$ 84,437
6110	SWEATERS, PULLOVERS, VESTS ETC, KNIT OR CROCHETED	$ 48,504,214	1%	54%	$ 105,527
9405	LAMPS & LIGHTING FITTINGS & PARTS ETC NESOI	$ 48,220,081	1%	55%	$ 33,678
4202	TRAVEL GOODS, HANDBAGS, WALLETS, JEWELRY CASES ETC	$ 43,821,551	1%	55%	$ 30,394
8425	PULLEY TACKLE & HOISTS (EXC SKIP); WINCH ETC; JAKS	$ 42,824,137	1%	56%	$ 59,724
7304	TUBES, PIPES ETC, SEAMLESS, IRON NESOI & STEEL	$ 38,990,289	1%	56%	$ 29,784
95	TOYS, GAMES & SPORT EQUIPMENT; PARTS & ACCESSORIES	$ 37,456,794	1%	57%	$ 23,489
6307	MADE-UP ARTICLES OF TEXTILE MATERIALS NESOI	$ 37,299,064	1%	57%	$ 34,624
8504	ELECTRIC TRANSFORM, STATIC CONVERTERS & INDUCT, PT	$ 37,238,546	1%	58%	$ 108,716
8414	AIR OR VAC PUMPS, COMPR & FANS; HOODS & FANS; PTS	$ 37,015,110	1%	59%	$ 54,654
8418	REFRIGERATORS, FREEZERS ETC; HEAT PUMPS NESOI, PTS	$ 36,469,453	1%	59%	$ 15,753
8483	TRANSMISSION SHAFTS, BEARINGS, GEARS ETC; PARTS	$ 35,128,668	1%	60%	$ 81,621
	All Others	$ 2,776,124,320	40%	100%	$ 39,160
Total		**$ 6,872,727,877**	**100%**	**100%**	**$ 41,170**

The PIERS data used in this study are the best publicly available source, but the data in Table 17 would not be expected to match company records. There are over 5,600 importers listed in the PIERS data, but as Table 17 shows few have more than 1% of the import volume. Moreover, several have more than one listing due to spelling or name variations (e.g. “Fred Meyer Stores“ and “The Kroger”, or the duplicate listing for FujiFilm). “Order” presents a special problem. Major importers such as Walmart and Target are allowed to use this convention to conceal their import business details. Schneider International, a trucking firm, shows up as they imported goods in 53’ containers for one or more major retail chains during the pandemic.

Table 17: 2021-2023 Importer TEU Shares

US Company Name	TEU	TEU Share	Cumulative TEU Share
ORDER	49,855	30%	30%
FRED MEYER STORES	6,522	4%	34%
LES SCHWAB	3,783	2%	36%
SCHNEIDER NATIONAL	3,179	2%	38%
LG ELECTRONICS	2,904	2%	40%
SUBARU	2,440	1%	41%
XEROX	2,371	1%	43%
JAKES FIREWORKS	1,980	1%	44%
BIMART	1,830	1%	45%
FUJIFILM BI INTERNATIONAL OPERATION	1,634	1%	46%
THE KROGER	1,206	1%	47%
HANKOOK TIRE	1,170	1%	47%
TOYO TIRE AND RUBBER	1,112	1%	48%
XEROX LCI	1,100	1%	49%
CHAUCER FOODS	1,090	1%	49%
QUALITY CHAIN	989	1%	50%
FX GLOBAL SUPPLY SOLUTIONS	986	1%	50%
HYUNDAI MOTOR MANUFACTURING	954	1%	51%
NAUTILUS	860	1%	51%
All Other	80,974	49%	100%
Total	**166,936**	**100%**	**100%**

Table 18: 2021-2023 Importer Value Shares

US Company Name	Value	Value Share	Cumulative Value Share	Value per TEU
ORDER	$ 1,972,349,167	29%	29%	$ 39,562
XEROX	$ 203,904,691	3%	32%	$ 85,998
S AND N 71 STRYKER STREET	$ 203,705,709	3%	35%	$ 635,092
FUJIFILM BI INTERNATIONAL OPERATION	$ 183,011,513	3%	37%	$ 111,999
FRED MEYER STORES	$ 125,193,599	2%	39%	$ 19,197
HUB CITY TERMINALS	$ 111,414,534	2%	41%	$ 265,583
FX GLOBAL SUPPLY SOLUTIONS	$ 104,527,431	2%	42%	$ 106,023
XEROX LCI	$ 79,188,969	1%	43%	$ 72,020
SCHNEIDER NATIONAL	$ 71,401,696	1%	44%	$ 22,461
LES SCHWAB	$ 67,951,074	1%	45%	$ 17,961
BOSCH THERMOTECHNOLOGY	$ 65,935,096	1%	46%	$ 197,748
NEXTERA ENERGY CONSTRUCTORS	$ 61,774,101	1%	47%	$ 261,755
QUALITY CHAIN	$ 57,567,885	1%	48%	$ 58,223
JAKES FIREWORKS	$ 57,489,706	1%	49%	$ 29,041
SUBARU	$ 50,125,877	1%	50%	$ 20,548
LG ELECTRONICS	$ 49,725,778	1%	50%	$ 17,122
LEXMARK INTERNATIONAL	$ 45,764,165	1%	51%	$ 460,126
BIMART	$ 44,803,504	1%	52%	$ 24,486
FUJIFILM BI INTERNATIONAL	$ 43,311,081	1%	52%	$ 74,036
PACIFIC CARGO CONTROL	$ 40,519,845	1%	53%	$ 70,745
HYUNDAI MOTOR MANUFACTURING	$ 36,450,903	1%	53%	$ 38,209
THE KROGER	$ 35,068,540	1%	54%	$ 29,084
All Other	$ 3,161,543,013	46%	100%	$ 38,257
Total	**$ 6,872,727,877**	**100%**	**100%**	**$ 41,170**

IV. Oregon T6 Trade by County

Overview

The main data source for our trade analysis were Port Import and Export Reporting Service (PIERS) records for 2021-2023 imports and exports through T6. PIERS data are derived from Customs shipment manifests. Because Customs is primarily interested in responsibility for shipments rather than physical location, many records give corporate headquarters addresses rather than shipping or receiving points (the so-called "headquarters bias"). Tioga reviewed the records to locate such instances and to assign the trade to an actual Oregon shipping or receiving location where possible. Many shipments, particularly exports, are arranged by shipper's agents, freight forwarders, customs brokers, or other third parties collectively known as Ocean Transportation Intermediaries (OTIs). One such firm described themselves as "travel agents for freight". Here too, the PIERS record will likely show the OTI address rather than the actual shipping or receiving location. Finally, PIERS records also contain misspellings, variations of company names, and other errors.

To minimize the effect of these data shortcomings, Tioga:

- Reviewed the records to correct company name spellings, incorrect addresses, etc., where possible.
- Used the same basic methodology as in our 2015-2016 studies to allocate OTI records or records with missing data to Oregon counties.

Addition information on the trade data analysis is provided in the Methodology appendix at the end of the report.

Trade by County

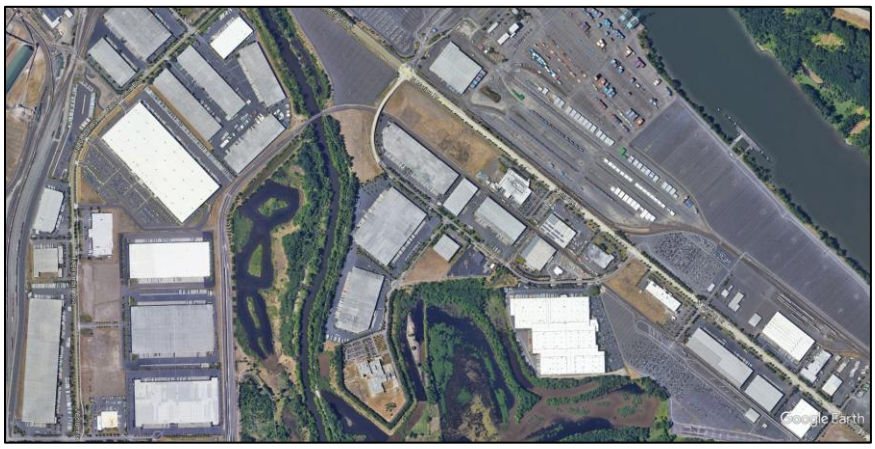
Table 19 summarizes the volume and value of Oregon trade through T6 by county. **The average annual total for 2021-2023 is estimated at about $3 billion. Imports in 2021-2023 were valued at about $2.6 billion annually. Exports were valued at about $449 million annually.**

Table 19: Estimated 2021-2023 Oregon County Loaded Container Moves from PIERS Data

County	Estimated Annual Export TEU	Estimated Annual Export Value	Estimated Annual Import TEU	Estimated Annual Import Value	Estimated Annual Total TEU	Estimated Annual Total Value
Baker	-	$ -	26	$ 3,023,310	26	$ 3,023,310
Benton	3	$ 158,705	16	$ 807,049	19	$ 965,754
Clackamas	1	$ 32,723	4,591	$ 232,036,574	4,592	$ 232,069,297
Clatsop	-	$ -	49	$ 3,450,055	49	$ 3,450,055
Columbia	-	$ -	20	$ 1,004,187	20	$ 1,004,187
Coos	43	$ 268,391	18	$ 1,358,582	61	$ 1,626,974
Crook	-	$ -	394	$ 10,662,932	394	$ 10,662,932
Deschutes	-	$ -	5,119	$ 203,397,886	5,119	$ 203,397,886
Douglas	-	$ -	37	$ 1,346,518	37	$ 1,346,518
Harney	-	$ -	6	$ 155,245	6	$ 155,245
Hood River	-	$ -	185	$ 15,177,606	185	$ 15,177,606
Jackson	-	$ -	550	$ 27,076,467	550	$ 27,076,467
Jefferson	-	$ -	15	$ 1,565,498	15	$ 1,565,498
Josephine	-	$ -	95	$ 3,487,151	95	$ 3,487,151
Klamath	-	$ -	136	$ 8,910,484	136	$ 8,910,484
Lane	4,283	$ 37,009,358	4,329	$ 244,125,418	8,612	$ 281,134,776
Lincoln	-	$ -	5	$ 123,724	5	$ 123,724
Linn	18,497	$ 197,488,757	850	$ 124,600,066	19,348	$ 322,088,823
Malheur	-	$ -	5	$ 177,146	5	$ 177,146
Marion	3,487	$ 54,692,008	2,214	$ 84,764,241	5,700	$ 139,456,248
Multnomah	3,323	$ 97,332,817	21,167	$ 1,137,507,638	24,490	$ 1,234,840,455
Polk	3,235	$ 20,162,745	35	$ 1,633,489	3,269	$ 21,796,234
Sherman	-	$ -	22	$ 831,310	22	$ 831,310
Tillamook	-	$ -	9	$ 980,497	9	$ 980,497
Umatilla	158	$ 699,406	61	$ 3,045,906	219	$ 3,745,312
Union	-	$ -	4	$ 206,602	4	$ 206,602
Wasco	-	$ -	53	$ 1,009,707	53	$ 1,009,707
Washington	104	$ 15,607,291	6,146	$ 421,605,248	6,250	$ 437,212,539
Yamhill	2,131	$ 25,310,285	805	$ 53,802,155	2,936	$ 79,112,440
Total	**35,265**	**$ 448,762,485**	**46,960**	**$ 2,587,872,693**	**82,225**	**$ 3,036,635,178**

Imports are concentrated in the countries with higher populations and greater concentrations of distribution centers and warehouses (Figure 12). Most often, containerized imports are brought to distribution centers, warehouses, or other logistics facilities rather than to individual retail stores or other end destinations. These facilities are most heavily concentrated in Multnomah County and within the broader Portland metropolitan area. There are also a few significant import distribution centers in other counties, such as Les Schwab in Prineville, Cook County, or Lowe's in Lebanon, Linn County.

Figure 12: Distribution Centers Adjacent to T6



Oregon's exports are concentrated in agricultural growing and processing areas (Figure 13), particularly in the Willamette Valley. Export containers are typically loaded at processing points such as packing houses or hay presses. Roughly half of the exports through T6 come from Linn County.

Figure 13: Agricultural Processing, Linn County

Imports typically consist of consumer goods (clothing, furniture, appliances, etc.) and industrial materials (metals, parts, etc.) to feed U.S. production plants. On the basis of volume, imports are typically far more valuable than exports.

T6 Value to Oregon

Overview

The economic activity at T6 itself is substantial, including:

- Labor, fuel, supplies, etc. purchased by the operator, Harbor Industrial.
- Contract labor supplied by the International Longshore and Warehouse Union (ILWU).

Jobs at T6 are largely highly skilled labor, clerical, supervisory, and managerial positions. Container terminal operations require highly trained heavy equipment operators, mechanics, gate clerks, and experienced management.

Beyond the activity at T6 itself, the provision of direct ocean carrier service to T6 benefits the State of Oregon and its importers and exporters in terms of trucking productivity, cost savings, reliability, container supply, and access to major markets for Oregon's agricultural exports.

Previous Impact Estimates

2023 Port of Portland Economic Impact Study

The October 2023 Steer study focuses on the economic impacts from the Port of Portland as a whole without a separate estimate for container operations. Overall, the report estimates that the combined direct and indirect effects of Public and Private marine operations are 12,696 jobs, $930m in labor income, $1.5B in value added, and $3.2B in output. For direct effects, these numbers are 7,526 jobs, $537m in labor income, $833M in value added, and $2B in output from marine operations. The marine terminals (Terminals 4, 5, and 6 combined) directly lead to 4,889 jobs, $321m in labor income, $465m in value added, and a $1.174B output. The average is about $65,660 in labor income per job. With indirect and induced impacts, these numbers for the marine terminals go up to 7,850 jobs, $546m in labor income, $836M in value added, and $1.9B in output. However, this study does not address containers or Terminal 6 specifically, instead analyzing all port marine operations. This study includes impacts for jobs outside of Oregon, as shown in Table 20.

Table 20: Steer Report Economic Impact Estimates

Economic Impact	Jobs	Labor Income	Value Added	Output
Oregon				
Portland MSA in Oregon	6,922	$ 475,000,000	$ 711,000,000	$ 1,603,000,000
Rest of Oregon	156	$ 10,000,000	$ 15,000,000	$ 34,000,000
	7,078	**$ 485,000,000**	**$ 726,000,000**	**$ 1,637,000,000**
Washington				
Portland MSA in Washington	543	$ 41,000,000	$ 71,000,000	$ 127,000,000
Rest of Washington	229	$ 20,000,000	$ 39,000,000	$ 95,000,000
	772	**$ 61,000,000**	**$ 110,000,000**	**$ 222,000,000**
Total	**7,850**	**$ 546,000,000**	**$ 836,000,000**	**$ 1,859,000,000**
Per Job		**$ 69,554**	**$ 106,497**	**$ 236,815**

Source: Streer Report Table 4.5

Table 20 highlights the value of port jobs. By this estimate, **each port job yields an average of $236,815 in total economic output.**

Port of Portland Container Service Forecast and Economic Contribution Assessment

This study was prepared by BST Associates for the Port of Portland in October 2021. It is the most comprehensive study focusing on the forecast impacts of container service in Portland that the consultant team has found thus far. At the time the report was written, a good amount of container service had resumed at Portland due to COVID-related congestion, but much of it was expected to continue. Table 21 displays the report's forecasts for Portland container trade growth by 2030 of 143,000 TEU in a Low estimate, 177,000 TEU in a Reference (mid or base) estimate, and 414,000 TEU in a High estimate.

Table 21: Portland Container Trade by Vessel (000 TEU)

		History			Forecast			Compound Annual Growth Rate	
Direction	Case	2000	2010	2020	2021	2030	2045	2000-2021	2021-2045
Total	Low	-	-	-	111	143	-	-	0.0%
	Reference	290.9	181.1	58	115	177	219	-4.3%	2.7%
	High	-	-	-	122	214	314	-	4.0%

Source: BST Associates

According to the BST report, the Reference estimate would result in 719 direct jobs and 1,619 total jobs (including indirect and induced) in 2030. "Direct income is projected to be $57 million in 2030" according to the report, with total income (including indirect and induced) at $215 million. Overall, the total value of containerized trade in 2030 is projected to be $1.98 billion ($408.4 million in exports and $1.57 billion in imports), which would support 11,388 direct jobs (4,722 related to exported and 6,666 to importers). Transportation cost savings (based on previous work by Tioga) are projected in the report to be $31.5 million in 2030, and the report includes the estimates in Table 22 on transportation costs:

Table 22: Transportation Cost Savings in 2030 (2021 dollars)

		Transportation Costs ($ million)		
Region	**Containers**	**With Service**	**Without Service**	**Savings**
Portland-North Willamette	26,297	$4.9	$18.0	$13.1
Middle Willamette	23,882	$11.1	$25.4	$14.3
Southern Oregon	879	$1.0	$1.6	$0.5
Central Oregon	5,230	$4.6	$7.7	$3.1
Eastern Oregon	743	$1.1	$1.6	$0.4
Oregon Total	**57,031**	**$22.7**	**$54.2**	**$31.5**

Source: BST Associates, Port of Portland, Tioga Group

The $31.5M in 2030 cost savings in Table 22 for 177,000 TEU translate to **$30.5 million for 171,000 TEU in 2023**.

The BST estimates included the full range of activity directly tied to shipping through T6, including:

- Rail transportation
- Truck transportation
- T6 Management
- ILWU longshoremen, clerks, mechanics, etc.
- Tug Assists
- Pilots
- Steamship Lines/Agents

- Other Services (forwarders et al.)
- Warehouse/Distribution Centers
- Government agencies

This full list includes what is often called the "port community" or "port ecosystem" of individuals and organizations whose work is generated by port shipping activity. Some of these jobs, such as the ILWU and Harbor Industrial jobs at T6, are entirely dependent on T6 and would disappear should T6 close. Others, such as trucking firms and distribution centers, may serve the Ports of Seattle and Tacoma as well as T6, and their business may shift rather than disappear.

BST updated the impact estimates to reflect 2022 actual volumes (Table 23).

Table 23: Estimated 2022 Jobs and Income from Updated BST Report

Year	Category	Jobs	Avg. per Job	Personal Income
2022	Direct	696	$79,236	$55,148,000
	Indirect/Induced	871	$176,061	$153,349,000
	Total	**1,567**	**$133,055**	**$208,497,000**

Source: BST Associates

Economic Benefits and Needs of Oregon Public Ports

This January 2024 report by the University of Oregon was prepared for Business Oregon, and analyzes Oregon ports overall, not just Portland (or Terminal 6) specifically. However, it includes some useful statistics, and references other useful reports. It describes Oregon as one of the most trade dependent states in the US, and states that:

> *"Oregon's ports provide critical transportation linkages between rural areas and domestic and global trading hubs. Agricultural, food and energy/biomass products move through eastern Washington ports and commercial fishing, seafood and wood products move southern Oregon and coastal ports to domestic and global markets."*

The report states that the Port of Portland accounts for 96% of Oregon's waterborne exports, and that the imports and exports increased significantly during the COVID-19 pandemic. It identifies hay and animal feed, frozen potatoes, paper and paperboard, metal scrap, wood pulp, softwood lumber, animal feed preparations, wastepaper, and grass seed as top containerized export cargoes, and furniture, tires, apparel, toys and games, glass articles, footwear, paper and paperboard, outdoor sporting equipment, and plywood as top containerized import cargoes. These observations agree with Tioga's data analysis.

Oregon Truck Drayage Cost

Existing Drayage

T6 trade flows now generate a substantial volume of business for drayage truckers, primarily Oregon firms and drivers. Most Oregon drayage is provided by:

- Owner-operators, as subcontractors to licensed motor carriers (LMCs) specializing in container drayage.

- Agricultural producers and processors, using their own trucks (often with “farm” plates).

While trade is typically measured in TEU or dollars, the value and impact of container truck drayage is measured in containers. A round trip usually means an empty container one way and a loaded container the other way. Table 24 estimates the volume of containers moving between T6 and Oregon counties in 2021-2023, and the annual average.

- TEU were converted to container counts at 1.83 TEU/container based on recent T6 data.
- Empty container moves were added at 95% of the loaded container count. While drayage operators and exporters try to reuse empty import containers, this is usually not practical, and Tioga allowed for 5% reuse.

As Table 24 shows, Tioga estimated that 2021-2023 T6 trade resulted in an average of nearly 44,000 annual round trip container moves.

Table 24: Estimated 2021-2023 Oregon County Total Container Moves from PIERS Data

County	Total Estimated Loaded Containers*	Estimated Empty Containers**	Estimated Container Moves	Estimated Round Trips	Annual Average
Baker	43	41	84	42	14
Benton	31	29	60	30	10
Clackamas	7,528	7,152	14,680	7,340	2,447
Clatsop	80	76	156	78	26
Columbia	32	30	62	31	10
Coos	101	96	196	98	33
Crook	647	614	1,261	631	210
Deschutes	8,391	7,972	16,363	8,181	2,727
Douglas	60	57	118	59	20
Harney	9	9	18	9	3
Hood River	303	288	592	296	99
Jackson	902	857	1,759	880	293
Jefferson	25	23	48	24	8
Josephine	156	148	304	152	51
Klamath	223	211	434	217	72
Lane	7,096	6,742	13,838	6,919	2,306
Lincoln	7,029	6,677	13,706	6,853	2,284
Linn	31,718	30,132	61,849	30,925	10,308
Malheur	8	7	15	8	3
Marion	9,345	8,877	18,222	9,111	3,037
Multnomah	40,148	38,140	78,288	39,144	13,048
Polk	5,359	5,091	10,451	5,225	1,742
Sherman	36	35	71	36	12
Tillamook	14	14	28	14	5
Umatilla	358	340	699	349	116
Union	6	6	12	6	2
Wasco	87	82	169	85	28
Washington	10,246	9,734	19,980	9,990	3,330
Yamhill	4,814	4,573	9,386	4,693	1,564
Total	**134,795**	**128,055**	**262,850**	**131,425**	**43,808**

*Avg TEU/CTR 1.83

** With 5% reuse 95%

Truck drayage rates can be complex. The overall rate can include:

- A base rate for the origin-destination pair.

- A Fuel Service Charge (FSC), currently 35-40% of the base rate.
- Congestion surcharges for long delays at port terminals.
- Chassis rental per day.

The rates shown in Table 25, obtained from a major Oregon drayage firm, include the base rate, a 40% FSC, and a $100 congestion surcharge for Seattle and Tacoma terminals.

Table 25: 2024 Oregon Drayage Rates

	Portland	Salem	Albany
Portland	$ 385	$ 665	$ 805
Seattle/Tacoma	$ 1,885	$ 2,165	$ 2,305
Difference	$ 1,500	$ 1,500	$ 1,500

Note that these are round-trip rates and do not include chassis rental, which may be the same for all options. The marginal $1500 difference is consistent because all three rates reflect the same mileage north of Portland. This marginal difference is equivalent to $3.38 per mile plus the 40% FSC. Table 26 uses these factors to estimate the annual drayage expenditure for T6 container trade flows.

Table 26: Estimated 2023 Oregon Drayage Costs

County	Annual Average Truck Trips	County to T6 Miles	RT Miles	Estimated Drayage Rate****	Estimated Annual Cost
Baker	14	314	628	$ 3,213	$ 44,853
Benton	10	102	204	$ 1,208	$ 12,137
Clackamas	2,447	60	120	$ 811	$ 1,983,390
Clatsop	26	89	178	$ 1,085	$ 28,271
Columbia	10	37	74	$ 593	$ 6,162
Coos	33	249	498	$ 2,599	$ 85,011
Crook	210	201	402	$ 2,144	$ 450,715
Deschutes	2,727	186	372	$ 2,003	$ 5,461,275
Douglas	20	202	404	$ 2,154	$ 42,302
Harney	3	325	650	$ 3,317	$ 10,176
Hood River	99	81	162	$ 1,009	$ 99,533
Jackson	293	289	578	$ 2,977	$ 872,729
Jefferson	8	123	246	$ 1,407	$ 11,242
Josephine	51	269	538	$ 2,788	$ 141,158
Klamath	72	284	568	$ 2,930	$ 211,874
Lane	4,588	145	290	$ 1,615	$ 7,408,844
Lincoln	2	139	278	$ 1,558	$ 3,803
Linn	10,308	118	236	$ 1,359	$ 14,012,238
Malheur	3	412	824	$ 4,140	$ 10,487
Marion	3,037	80	160	$ 1,000	$ 3,036,565
Multnomah	13,048	15	30	$ 385	$ 5,023,459
Polk	1,742	81	162	$ 1,009	$ 1,758,025
Sherman	12	128	256	$ 1,454	$ 17,237
Tillamook	5	73	146	$ 934	$ 4,368
Umatilla	116	222	444	$ 2,343	$ 272,920
Union	2	280	560	$ 2,892	$ 5,661
Wasco	28	102	204	$ 1,208	$ 34,057
Washington	3,330	28	56	$ 508	$ 1,691,572
Yamhill	1,564	53	106	$ 744	$ 1,164,641
Total	**43,808**			**$ 1,002**	**$ 43,904,707**
		**** Est. at $175+		$ 3.38 /mile	

Container trade through T6 is thus generating an estimate $43.9 million in annual truck drayage business, with the majority going to Oregon operators. The average rate is about $1002.

V. Oregon Impacts of T6 Closure

Overview

Exporters and importers contacted for this and previous studies emphasized their preferences for shipping through the Port of Portland whenever possible. Oregon shippers have consistently emphasized the value of direct T6 container service in reliability, responsiveness, container supply, "ease of doing business", and working conditions for drayage drivers. Yet the majority of Oregon's exports and imports move through Seattle or Tacoma due to the limited carrier service and space allocations. Seattle and Tacoma routings have thus become the norm for most Oregon trade flows, and most flows would not be jeopardized were T6 service to cease. Rather than loss of trade, the primary impact would be increased cost and reduced net revenue.

Direct Employment, Compensation, and Taxes at Risk

Some 169 FTE equivalent jobs and $40 million in earnings would be eliminated were T6 to cease handling container vessels. When in full operation, the equivalent of about 169 people reportedly work at or on behalf of T6 (Table 27):

- Harbor Industrial directly employs about 6 people on-site
- Typical ILWU manning at T6 is about 115 jobs.
- An average of about 11 additional ILWU members provide security.
- The equivalent of about 37 Port of Portland FTE are allocated to T6, including administration, IT, maintenance, engineering, etc.

While T6 has also handled break-bulk and project cargo in the past, those cargo movements are erratic.

Table 27: Estimated 2023 T6 Employment, Compensation, and Taxes

T6 2023/2024	Basis	Harbor Industrial	ILWU Marine	ILWU Security	Port of Portland Allocation*	Total
Est. Jobs		**6**	**115**	**11**	**37**	**169**
Wages		**$ 1,198,317**	**$ 16,024,871**	**$ 985,325**	**$ 3,065,935**	**$ 21,274,447**
Employment Benefits & Taxes	**25.5%**	**$ 305,495**	**$ 4,085,333**	**$ 251,196**	**$ 781,620**	**$ 5,423,644**
FICA	6.2%	$ 74,296	$ 993,542	$ 61,090	$ 190,088	**$ 1,319,016**
Fed Unimployment	0.6%	$ 7,190	$ 96,149	$ 5,912	$ 18,396	**$ 127,647**
Medicare	1.5%	$ 17,376	$ 232,361	$ 14,287	$ 44,456	**$ 308,479**
OR Unimployment	2.6%	$ 31,156	$ 416,647	$ 25,618	$ 79,714	**$ 553,136**
Worker's Comp.	10.3%	$ 123,427	$ 1,650,562	$ 101,488	$ 315,791	**$ 2,191,268**
Tri-Met Tax	0.8%	$ 9,511	$ 127,189	$ 7,821	$ 24,334	**$ 168,855**
County Tax	2.0%	$ 18,707	$ 250,168	$ 15,382	$ 47,863	**$ 332,121**
City Tax	2.6%	$ 23,833	$ 318,715	$ 19,597	$ 60,978	**$ 423,122**
Other Benefits			**$ 9,723,792**			**$ 9,723,792**
Total		**$ 1,503,812**	**$ 33,919,328**	**$ 1,236,520**	**$ 3,847,556**	**$ 40,507,216**
Average Earnings		$ 199,719	$ 139,347	$ 89,575	$ 82,863	$ 125,884
Average Orgeon State Income Tax		$ 16,905	$ 11,623	$ 7,268	$ 6,681	$ 10,445
Total Oregon State Income Tax		**$ 101,433**	**$ 1,336,626**	**$ 79,946**	**$ 247,179**	**$ 1,765,184**

*Labor portion 90%

The data and estimates assembled in Table 27 were compiled primarily from Port of Portland sources, and reflect Tioga's best understanding of the jobs, earnings, and taxes at risk if T6 closes. Note that these figures represent direct T6 activity, and do not include trucking or other activities that would continue in some form.

Estimated Economic Impact of Closure

The estimated annual economic value at risk from T6 closure encompasses 869 jobs, $91 million in annual earnings, and nearly $455 million in total economic activity. Using IMPLAN, a standard economic impact model, Port staff developed the estimates in Table 28 based on the estimated $40 million in earnings from Table 27.

Table 28: Estimated Economic Value Lost with T6 Closure

Impact	Jobs	Labor Income	Value Added	Total Output
1 - Direct	169	$40,079,549	$90,612,532	$326,974,036
2 - Indirect	478	$36,103,783	$50,105,049	$85,651,539
3 - Induced	222	$14,646,442	$26,565,060	$42,321,908
Total	**869**	**$90,829,774**	**$167,282,641**	**$454,947,483**

- **Direct effects** are the set of expenditures applied to the input/output multipliers for an impact analysis. Direct effects reflect production or expenditure changes made by producers/consumers as a result of an activity or policy, in this case the closure of T6.
- **Indirect effects** are the changes in business to business purchases in the supply chain that would take place in the region due to closure of T6.
- **Induced effects** stem from changes in household spending of labor Income, net of taxes, savings, etc., within the region.

Table 28 presents the most recent estimate available of economic impacts due to a loss of service at T6. In this estimate indirect jobs were reduced by excluding industries unlikely to be affected, such as real estate or postal services, from the IMPLAN indirect impact list. The exclusions were based on interview information on the jobs/industries unlikely to be impacted by a closure, as the containers would still need to be shipped using other methods. The percent of the job reduction was applied to labor income value added and output. The same approach was used for the induced impacts with the jobs being reduced based on the percent change.

Seattle/Tacoma Congestion

It is noteworthy that many drayage firms charge congestion fees for service to Seattle or Tacoma container terminals. Some firms apply a blanket fee across all terminals while others may vary the fee. In all cases the fee reflects the longer time required for a driver to wait in line and complete a transaction at Seattle or Tacoma versus T6. The longer time required may be a result of:

- Longer queues outside the terminals, regularly taking an hour or more.
- The need to visit more than one terminal to complete a transaction due to chassis-container mis-matches.
- Congestion within the terminal due to import surges from so-called mega-vessels.
- Longer container retrieval times due to deeper stacking.

These factors individually or in combination can extend terminal “turn time” from an optimum of around 30 minutes to over two hours. The extra time required is unproductive from the perspectives of the driver or his customer. The congestion fees attempt to recover some of the driver’s lost revenue.

The Ports of Seattle and Tacoma have substantial excess long-term capacity yet have still become congested during short-term cargo surges. Most recently, the 2020 pandemic-induced import surge congested both ports. The congestion was undoubtedly a factor in the decision of SM Lines and MSC to serve T6, initially together and

then separately. That congestion also led to ad hoc calls at T6 by bulk vessels temporarily pressed into container service.

The presence of an active T6 terminal and services are thus of significant potential value to Oregon shippers and receivers who would otherwise be vulnerable to short-term or event-driven congestion at the NWSA ports. This "option demand" is difficult to measure, but reflected in Oregon shipper commitment to using T6 where possible in recognition of its potential value in otherwise adverse conditions.

Truck Drayage Productivity

Oregon firms contacted for this study have expressed serious concerns regarding drayage truck and driver productivity should T6 close for good. In this and previous Tioga studies Oregon shippers have consistently emphasized the value of direct T6 container service in reliability, responsiveness, container supply, "ease of doing business", and working conditions for truck drayage drivers

Nominal driving time to the Port of Tacoma from a Willamette Valley exporter in, for example, Albany, is around 4 hours each way, or 8 hours round trip. With a permissible driving time of 11 hours in a day (now rigidly enforced with electronic logging devices) a driver has only 3 hours to complete transactions at both ends of the trip. Drivers can thus only make one round trip each day. In previous studies exporters have related instances in which heavy I-5 traffic and terminal delays made it legally impossible for a driver to complete the trip. In such cases the driver must either be relieved by another driver or rest at least 8 hours before driving back to Oregon.

An Albany to T6 trip entails around 1.5 hours driving each way, or 3 hours driving round trip. With 30 minutes to an hour of terminal or customer time on each end, a driver can expect to make two round trips in a day and end up at home. **Besides making better use of the driver's time and the truck tractors and chassis assets, the shorter cycle is more conducive to driver retention, safety, and well-being.**

The largest difference is for importers and exporters close to Portland. One firm about 50 miles away noted that they now use 6 trucks and 12 chassis to move containers to T6 and can often get 3 round trips daily, but would have to use 18 trucks and 36 chassis to move the same container volume if trucking to Seattle/Tacoma.

Truck Drayage Costs without T6 Service

Permanent loss of direct calls at T6 would force Oregon importers and exporters to choose between truck drayage to/from Seattle or Tacoma, substitute rail service via NWCS, and substitute drayage service via PCR. Each shipper will choose based on the cost and service options available at the time, which will vary. There are occasions when Oregon shippers and receivers have used California or British Columbia ports, but those options are rare and even more costly.

Table 29 estimates the additional round trip miles required to move Oregon container trade through Seattle or Tacoma instead of through T6, assuming 75% move by truck. Table 29 uses the average difference between Seattle and Tacoma versus the distance to T6 and doubles that difference to estimate the additional miles for each round trip. For example, Google Maps estimates that a central point of Baker County is 314 highway miles from T6, 385 miles to the Pierce County Terminal at the Port of Tacoma, and 376 miles to T18 at the Port of Seattle. The Seattle/Tacoma average of 381 miles is 66-67 miles farther than T6, yielding the estimate of 133 additional round trip miles. The differences in Table 29 vary with Oregon geography. The differences for Multnomah County and the critical Willamette Valley counties is about 295-296 miles because all those trips would pass through Portland.

Table 29 estimates the additional drayage costs incurred by Oregon shippers based on estimated marginal drayage rates for the additional miles to Seattle/Tacoma and typical ocean carrier rate offset of $900 at those ports. These estimates are based on current drayage quotes found online and obtained in interviews.

Note that some shippers would theoretically reduce cost in Table 29 by shipping via Seattle/Tacoma due to the mileage differences. Realistically, if they could save money at Seattle/Tacoma and if that were the deciding factor, they would have done so. The estimates in Table 29 are therefore conservative in that regard.

Table 29: Estimated Annual Truck Miles and Cost at 75% of Total

County	Avg. Annual Truck Trips @ 75 %	County to T6 Miles	County to Sea/Tac Avg.	Additional RT Miles	Estimated Additional Rate****	Estimated Ocean Rate Offset	Estimated Net Additonal Cost per Container	Annual Additonal Drayage Cost****
Baker	10	314	381	133	$ 729	$ 900	$ (171)	$ (1,790)
Benton	8	102	257	309	$ 1,561	$ 900	$ 661	$ 4,985
Clackamas	1,835	60	204	287	$ 1,457	$ 900	$ 557	$ 1,022,856
Clatsop	20	89	181	183	$ 966	$ 900	$ 66	$ 1,281
Columbia	8	37	149	223	$ 1,155	$ 900	$ 255	$ 1,985
Coos	25	249	397	296	$ 1,500	$ 900	$ 600	$ 14,722
Crook	158	201	346	290	$ 1,472	$ 900	$ 572	$ 90,106
Deschutes	2,045	186	332	291	$ 1,476	$ 900	$ 576	$ 1,178,842
Douglas	15	202	350	296	$ 1,500	$ 900	$ 600	$ 8,838
Harney	2	325	470	290	$ 1,472	$ 900	$ 572	$ 1,315
Hood River	74	81	227	292	$ 1,481	$ 900	$ 581	$ 42,977
Jackson	220	289	437	295	$ 1,495	$ 900	$ 595	$ 130,886
Jefferson	6	123	270	294	$ 1,491	$ 900	$ 591	$ 3,540
Josephine	38	269	417	295	$ 1,495	$ 900	$ 595	$ 22,607
Klamath	54	284	432	296	$ 1,500	$ 900	$ 600	$ 32,545
Lane	3,441	145	293	295	$ 1,495	$ 900	$ 595	$ 2,048,453
Lincoln	2	139	287	296	$ 1,500	$ 900	$ 600	$ 1,098
Linn	7,731	118	266	296	$ 1,500	$ 900	$ 600	$ 4,638,707
Malheur	2	412	543	261	$ 1,334	$ 900	$ 434	$ 825
Marion	2,278	80	224	287	$ 1,457	$ 900	$ 557	$ 1,269,681
Multnomah	9,786	15	162	293	$ 1,486	$ 900	$ 586	$ 5,732,720
Polk	1,306	81	229	295	$ 1,495	$ 900	$ 595	$ 777,624
Sherman	9	128	255	254	$ 1,301	$ 900	$ 401	$ 3,569
Tillamook	4	73	229	312	$ 1,576	$ 900	$ 676	$ 2,371
Umatilla	87	222	271	97	$ 559	$ 900	$ (341)	$ (29,808)
Union	1	280	345	129	$ 710	$ 900	$ (190)	$ (279)
Wasco	21	102	248	292	$ 1,481	$ 900	$ 581	$ 12,287
Washington	2,498	28	177	298	$ 1,509	$ 900	$ 609	$ 1,522,145
Yamhill	1,173	53	201	295	$ 1,495	$ 900	$ 595	$ 698,436
Total	**32,856**						**$ 585**	**$ 19,233,523**

The expected annual estimated net cost increase to Oregon shippers would be $19.2 million, between a low of $15.4 million and a high of $20.5 million. The estimated net additional annual trucking costs average $585 per container. Without direct T6 service, then Oregon importers and exporters would incur around $19.2 million in additional annual truck drayage costs if 75% of the containers were drayed. As Table 30 indicates, the annual net impact will depend on the share of current T6 containers that are drayed.

The average net cost estimate of $585 in Table 30 compares closely with the BST average of $552 per container in Table 22, with our higher number possibly due to fuel, insurance, and other cost increases since 2021.

Table 30: Summary of Drayage Cost Impacts

Option	Share	Annual Containers	Net Cost Impact Per Container	Annual Net Cost Impact
Expected				
Truck Drayage	75%	32,856	$585	**$ 19,220,904**
Low Impact				
Truck Drayage	60%	26,285	$585	**$ 15,376,723**
High Impact				
Truck Drayage	80%	35,047	$585	**$ 20,502,298**

Fuel Use

The 9.6 million annual miles of truck travel in Table 29 at an average of about 5 miles per gallon would require about 1.9 million additional gallons of diesel fuel at a cost of about $7.7 million dollars annually, a significant factor in the Table 30 overall cost estimates.

While Tioga did not conduct an emissions analysis, burning 1.9 million gallons of diesel fuel would release about 42.6 million pounds of CO_2 annually into the atmosphere[iii].

Driver, Truck, and Chassis Requirements

As noted in previous reports there is a shortage of truck drivers in Oregon and nationwide. The additional trips on Table 29 would require an additional 9.6 million round trip miles. Local/regional drivers may average about 48,000 miles annually[iv], so the additional drayage would require about 200 additional drivers in a period of persistent shortage, 200 trucks for them to drive, and 400+ chassis. Besides the questionable availability of 200 additional drivers on short notice, there would be a considerable capital cost burden on Oregon and Washington operators.

Shift of drayage business to Washington trucking firms

> "I hate writing checks to Washington"
>
> *– Oregon Exporter*

The burden of additional drayage requirements would likely fall most heavily on Oregon agricultural producers and processors that are using their own trucks with "farm plates" to dray containers. Some industry contacts have estimated that up to 80% of Oregon's critical hay and grass seed exports are moved that way at present. Trucks with "farm plates" do not have interstate registry, cannot be legally operated more than 50 miles into Washington, and thus cannot move containers between Oregon and the Ports of Seattle or Tacoma. These exporters would have to either register their trucks for interstate use or shift business to commercial truckers.

In that case a substantial portion of the existing Oregon drayage is likely to shift to Washington truckers with fleets and registration already in place. That shift would include the current drayage segments within Oregon as well as the new miles between Portland and Seattle/Tacoma.

[iii] https://www.eia.gov/environment/emissions/co2_vol_mass.php
[iv] https://www.caltrux.org/driver-faqs/

Potential Ocean Carrier Rate Increases

The presence of direct calls at T6 likely constrains rates on the rail and truck shuttle options. Customers have reported that carriers tend to equalize rates between direct, rail shuttle, and truck shuttle options at Portland, offering the rail service at below cost to do so. The profit margin of those carriers is thus constrained by the existence of a direct service alternative. Absent that competitive restraint, carriers may choose to reduce the rail and truck shuttle subsidies and improve their margins by raising rates. Recent carrier rate increases during the pandemic-induced import surge and more recent cargo upswings have demonstrated their ability and incentive to maximize revenue whenever possible. Opinions on the likelihood of rate increase differ, but some exporters see a distinct threat.

> "I think we will be paying much more if we lose direct service at T6. We're already in a market where every $100 matters...."
>
> *– Oregon Exporter*

The average additional drayage cost of $585 shown in Table 29 would create an opportunity for ocean carriers to raise the prices for NWCS or PCR service. For the 43,808 containers in Table 30, each $100 ocean carrier rate increase would cost Oregon customers an additional $4.3 million annually. Higher ocean rates would mean either loss of net revenue for Oregon shippers or loss of business where they cannot compete on delivered price.

Export Container Supply

Oregon exporters rely on T6 as a key supply point for empty containers. Ocean carriers are reluctant to move empty, non-revenue containers into Oregon or any other export market, so empty import containers are the primary source of export capacity. The import containers are not immediately reused for a variety of reasons, rather they are typically returned to T6 (or NWCS, PCR, or another depot) and then picked up later by truckers acting on behalf of exporters. **Exporters thus view the loss of T6 service as a threat to the timely and efficient supply of containers for Oregon exports**.

Summary Closure Impacts

Based on Tioga's analysis, closure of T6 and permanent cessation of direct container vessel service would have the following impacts:

- Loss of 169 direct jobs at T6 and 869 total Oregon jobs.
- Loss of $40 million in direct personal T6 income and $455 million in total economic activity attributable to discontinued T6 operations.
- Additional drayage costs to Oregon exporters and importers estimated at $19.2 million annually, and additional diesel fuel use of 1.9 million gallons.
- Decreased truck driver and tractor productivity and a need for up to 200 additional drivers and trucks in a tight market.
- Unknown additional Oregon shipper costs due to increased ocean carrier rates without direct Port of Portland vessel competition. An increase of $100 per container would cost Oregon shippers $4.3 million annually.
- Potential loss of Oregon export business or reduced profits due to higher transportation costs and reduced reliability, with the greatest threat to lower value agricultural exports.

VI. Growth Scenarios

Containerized Trade Analysis

Portland's container cargo potential depends heavily on the extent and nature of the ocean carrier and intermodal services offered at T6. Tioga and Hackett Associates reviewed the services previously offered (e.g. foreign ports served directly and via transshipment) and the associated cargo volumes as a guide to what might be achievable in the future.

Containerized imports at the major West Coast ports[v] have increased over the past decade while exports have decreased (Figure 39). The average annual growth rate for imports between 2014 and 2023 was 0.4 percent while exports decreased at an average rate of 3.6 percent. The Pacific Northwest lagged the West Coast as a whole on the import side, with an average annual decrease of 0.2 percent, although the pace of change on the export side was similar, with an average decrease of 4.0 percent.

Figure 14: Average Annual Growth Rate, 2014-2023

	Imports	Exports
West Coast	0.40%	-3.60%
PNW	-0.20%	-4.00%
Portland	-3.40%	-4.20%
NWSA	-1.30%	-4.70%
Vancouver BC	0.70%	-3.60%
Prince Rupert	0.30%	-2.50%

The experience of the major PNW container ports differed greatly between the U.S. and Canadian ports, with imports at the former declining over the period while the Canadian ports increased. Although exports have decreased throughout the PNW over the past decade, the rate of growth at the U.S. ports was greater than that experienced at the Canadian ports.

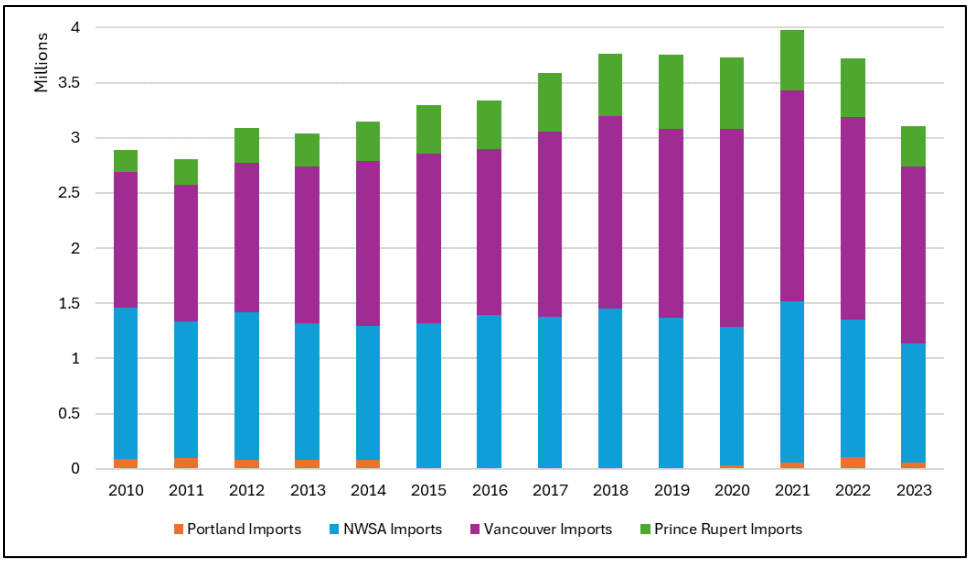
It is worth noting that North America has experienced a significant shift in import cargo with the West Coast losing market share to the East Coast and Gulf Coast following the Covid-19 pandemic and the accompanying global supply chain crisis. This was partially due to shippers seeking alternatives to congested West Coast ports and partially due to concerns over ongoing West Coast labor negotiations. The reverse has been true in 2024, where concerns over ongoing labor negotiations on the East and Gulf coasts has resulted in stronger import volume growth on the West Coast, with a 17.6 percent jump in the first half of 2024 over the same period of 2023.

Containerized imports to the West Coast have experienced slow growth overall in the years following the banking crisis (aside from a 10.1 percent jump in 2012, and four of the past five years have seen decreases compared to the previous year) (Figure 15). Import volumes peaked in 2021 as strong consumer spending fueled a surge of imports throughout the U.S., but 2023 saw a 16.6 percent drop in TEU volume. There is a direct relationship between the size of the port and the accompanying volume decline in 2023, with Vancouver suffering a 12.7

[v] Los Angeles, Long Beach, Oakland, Portland, NWSA, Vancouver, and Prince Rupert

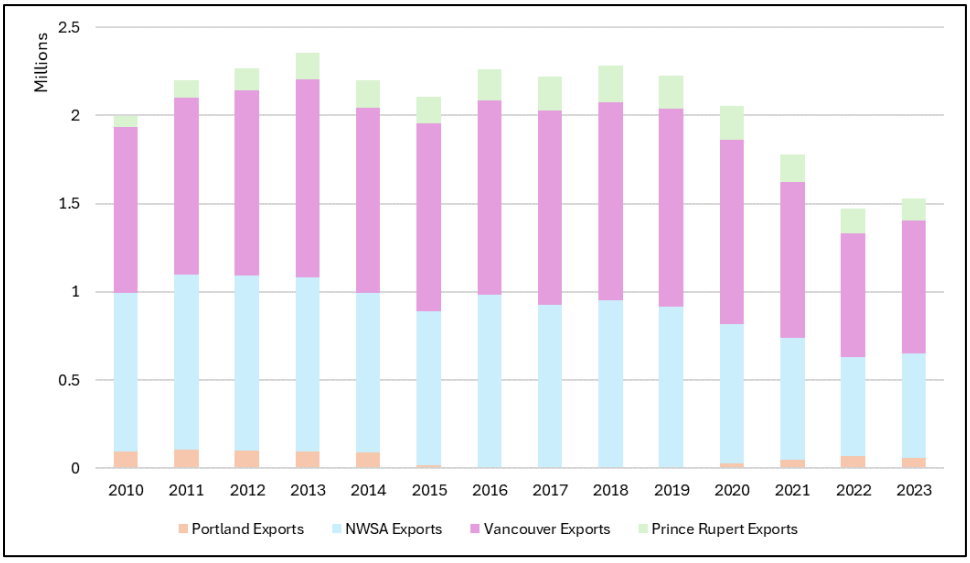
percent drop compared to 13.7 percent at the NWSA, 31.1 percent at Prince Rupert, and 45.1 percent at Portland. The first half of 2024 has seen export growth at the NWSA outpacing its regional peers with a 15.5 percent increase over the same period of 2023, compared to increases of 4.3 percent and 5.3 percent at the ports of Vancouver and Prince Rupert, respectively.

Figure 15: Loaded Imports Across PNW Ports, 2010-2023



Containerized exports to the Pacific Northwest have posted decreases in four of the past five years and seven of the past ten years (Figure 16). The pandemic/global supply chain crisis period in particular resulted in significant decreases, with a 7.7 percent decrease in 2020, a 13.4 percent drop in 2021, and a 17.4 fall in 2022. Combined this equates to a 34.0 percent drop in TEUs between 2019 and 2022. As with imports, larger ports fared better than smaller ports in 2023, with Vancouver posting a 7.4 percent increase compared to 4.9 percent gain at the NWSA, an 8.3 percent decrease at Prince Rupert, and a 13.3 percent decline at Portland. The first half of 2024 has seen export growth at the NWSA outpacing its regional peers with a 15.5 percent increase over the same period of 2023, compared to increases of 4.3 percent and 5.3 percent at the ports of Vancouver and Prince Rupert, respectively.

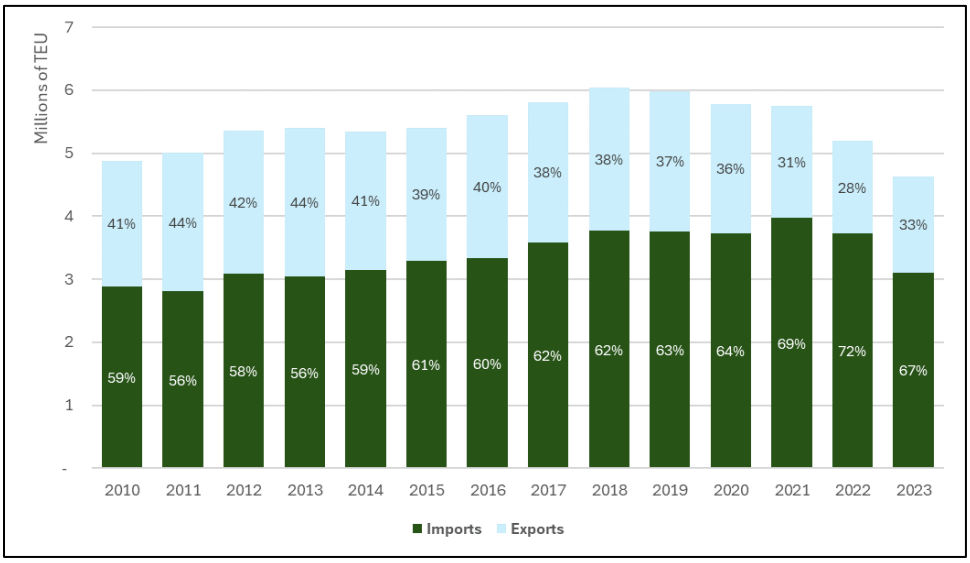
Figure 16: Loaded Exports Across PNW Ports, 2010-2023



Imports accounted for between 56 and 59 percent of international container volume each year between 2010 and 2015, followed by a period of between 60 and 64 percent between 2015 and 2020 (Figure 17). The supply chain crisis period saw the share of imports peak at 72 percent in 2022, with 2021 not far behind at 69 percent and 2023 recording a 67 percent share. There are multiple reasons for the shift in the balance of imports to exports, including supply chain congestion limiting available space onboard vessels and limited access to containers, increased shipping costs limiting the economic viability of exporting certain lower-value cargoes, the impacts of a strong U.S. dollar, and the impact of U.S. trade policies.

In stark contrast, in 2023 exports from the Port of Portland outpaced imports, with 51.4 percent of the total versus 48.6 percent for imports. This is not the case at the rest of the PNW ports, with imports outpacing exports at a rate of about two to one at Vancouver and the NWSA and a rate of three to one at Prince Rupert.

Figure 17: Share Between Imports and Exports Across PNW Ports, 2010-2023



Regional Commodity and Trade Partner Analysis

To gain a sense of potential services that might be successful at the Port of Portland it is helpful to examine the cargo that is imported to and exported from the NWSA. The consultant team reviewed containerized tonnage data from the U.S. Census Bureau for the 2014 through 2023 period, examining both commodity and trade partner data.[vi]

The top 25 categories of commodities imported to and exported from the NWSA at the two-digit level of the Harmonized Tariff Schedule (HS Code) are presented in the Appendix, while a summarized version is presented below.

Figure 18 illustrates the import market share trends for various product categories imported into the ports of Seattle and Tacoma between 2014 and 2023. Simplifying the categories into eight groups, the largest class of commodities is machinery and vehicles/vehicle parts, which consistently dominate the value ranking, peaking at 26 percent in 2022 and 2023, indicating their significant and growing importance. Plastics, Rubber, and Chemicals

[vi] Due to potential mis-coding of data, three categories of cargo typically not moved by container were excluded from the import analysis: Chapter 25 (salt; sulfur; earths and stone; plastering materials, lime and cement), Chapter 26 (ores, slag and ash), and Chapter 27 (Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes).

also show a slight upward trend, reaching 14 percent in 2023. In contrast, Metals and Articles exhibit a gradual decline, from 13 percent to 11 percent in 2022 and 2023. Furniture and Household Items fluctuate, peaking at 11 percent in 2017 and 2022 but dropping to 9 percent in 2023. Wood and Paper and Apparel and Textiles remain relatively stable in the 4 to 7 percent range. Toys, Games, and Sport Equipment increased from 3 percent in 2014 to 6 percent in 2021 before slipping to 5 percent in 2022 and 2023. Food and Beverages maintained a steady presence over the 10 year period of 2 to 3 percent. Collectively, the top 25 commodities at the two-digit level represent between 83 and 87 percent of NWSA's total import tonnage each year.

Figure 18: NWSA Commodity Imports Market Share, Based on Top 25 2-Digit Groups

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Machinery and Vehicles/Vehicle Parts	25%	23%	22%	22%	22%	22%	20%	22%	26%	26%
Plastics, Rubber, and Chemicals	12%	12%	13%	12%	12%	13%	13%	13%	12%	14%
Metals and Articles	13%	13%	13%	13%	12%	12%	11%	12%	11%	11%
Furniture and Household Items	9%	10%	10%	11%	11%	9%	10%	10%	11%	9%
Wood and Paper	6%	7%	7%	7%	7%	7%	7%	6%	6%	6%
Apparel and Textiles	4%	5%	5%	5%	5%	6%	5%	5%	6%	5%
Toys, Games, and Sport Equipment	3%	4%	3%	3%	4%	4%	5%	6%	5%	5%
Food and Beverages	3%	3%	3%	3%	3%	4%	4%	3%	2%	3%
Other	10%	7%	7%	8%	8%	8%	7%	8%	7%	7%
Total Top 25	**85%**	**84%**	**84%**	**84%**	**84%**	**84%**	**83%**	**85%**	**87%**	**86%**

Note: sorted by 2023 share

Figure 19 illustrates the export market share trends for various product categories exported into the ports of Seattle and Tacoma between 2014 and 2023. Simplifying the categories into six groups, the largest class of commodities is Cereals, Milling Products, and Seeds, which recorded a significant upward trend that grew from 21 percent in 2014 to a peak of 34 percent in 2022 before slightly declining to 31 percent in 2023. Wood and Paper products exhibited a steady decline from 28 percent in 2014 to 19 percent in 2023. Fruit and Vegetables also experienced a downward trend, decreasing from 21 percent in 2014 to 17 percent in 2023. The market share of Meat, Fish, and Dairy remained relatively stable over the period, fluctuating between 6 percent and 9 percent. Metal and Metal Articles maintained a steady presence over the 10 year period of 3 to 4 percent. Collectively, the top 25 commodities at the two-digit level represent between 96 and 97 percent of NWSA's total export tonnage each year.

Figure 19: NWSA Commodity Exports Market Share, Top 25 2-Digit Groups

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cereals, Milling Products and Seeds	21%	24%	25%	27%	29%	29%	28%	30%	34%	31%
Wood and Paper	28%	27%	26%	27%	24%	23%	21%	21%	20%	19%
Fruit and Vegetables	21%	22%	19%	20%	17%	20%	20%	19%	17%	17%
Meat, Fish, and Dairy	9%	7%	7%	7%	7%	6%	7%	7%	7%	8%
Metal and Metal Articles	3%	3%	3%	3%	3%	3%	3%	4%	4%	3%
Plastics, Rubber, Stone, and Chemicals	4%	4%	4%	4%	3%	3%	3%	4%	3%	3%
Other Food Products	1%	1%	1%	1%	1%	2%	2%	2%	1%	2%
Other	9%	9%	11%	7%	12%	11%	12%	9%	8%	13%
Total Top 25	**96%**	**96%**	**97%**	**97%**	**96%**	**96%**	**96%**	**96%**	**96%**	**96%**

Note: sorted by 2023 share

Figure 20 illustrates the import market share trends for various trade partners at the ports of Seattle and Tacoma between 2014 and 2023. The decreased reliance on China following the implementation of tariffs on certain commodities and the lessons learned about supply chain resiliency following the global supply chain crisis are clear, with import tonnage sliding from about 61 percent of the total to just 43 percent in 2023. Several countries in Southeast Asia are the beneficiaries, with Vietnam in particular increasing its share of the total from 1.8 percent in 2014 to 9.8 percent in 2023. South Korea, Thailand, Indonesia, and Cambodia all experienced significant gains over the period. Japan and India also posted gains in their market shares.

Figure 20: NWSA Trade Partner Imports Market Share, Based on Top 20 Countries

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Market Share Change 2014-2023
China	60.60%	56.80%	55.00%	53.10%	55.30%	46.90%	43.20%	46.80%	44.80%	43.10%	-17.60%
Vietnam	1.80%	2.60%	2.90%	3.20%	3.50%	5.30%	8.20%	8.30%	10.00%	9.80%	8.00%
Japan	8.20%	8.10%	8.20%	8.50%	7.50%	9.00%	7.80%	7.90%	12.00%	9.80%	1.60%
South Korea	5.30%	4.90%	5.60%	4.70%	4.20%	4.20%	3.80%	4.50%	5.00%	6.10%	0.90%
Taiwan	5.00%	5.70%	5.40%	5.50%	5.00%	5.60%	5.80%	6.40%	5.80%	6.10%	1.10%
Thailand	2.30%	2.60%	2.70%	2.90%	2.60%	3.60%	4.00%	3.80%	4.30%	4.80%	2.40%
India	1.50%	2.10%	1.90%	2.20%	1.80%	2.70%	2.60%	2.10%	2.10%	2.90%	1.40%
Indonesia	1.80%	1.90%	1.90%	2.00%	2.30%	2.40%	2.30%	2.40%	2.60%	2.60%	0.80%
Malaysia	1.60%	1.80%	2.10%	1.80%	1.90%	2.00%	2.30%	2.00%	2.10%	1.70%	0.10%
Chile	1.10%	1.30%	1.30%	1.60%	1.50%	1.70%	2.20%	1.70%	1.40%	1.20%	0.10%
New Zealand	1.00%	1.00%	1.30%	1.20%	1.10%	1.10%	1.20%	0.80%	0.70%	1.20%	0.20%
Cambodia	0.10%	0.10%	0.20%	0.20%	0.30%	0.40%	0.70%	0.80%	1.00%	1.10%	1.10%
Italy	0.70%	0.90%	1.20%	1.20%	1.20%	1.30%	1.40%	1.30%	0.90%	1.10%	0.40%
Brazil	0.70%	0.90%	0.90%	1.10%	1.10%	1.30%	1.20%	1.10%	0.60%	0.90%	0.20%
Philippines	1.00%	0.70%	0.70%	0.70%	0.60%	0.80%	0.80%	0.70%	0.80%	0.90%	-0.10%
Australia	0.70%	0.60%	0.50%	0.50%	0.50%	0.70%	0.70%	0.60%	0.40%	0.60%	0.00%
Germany	0.40%	0.70%	0.70%	0.80%	0.90%	0.90%	1.00%	0.80%	0.40%	0.40%	0.00%
Peru	0.20%	0.30%	0.30%	0.30%	0.30%	0.40%	0.50%	0.40%	0.40%	0.40%	0.20%
France	0.10%	0.20%	0.30%	0.40%	0.40%	0.50%	0.40%	0.90%	0.30%	0.30%	0.20%
Netherlands	0.30%	0.50%	0.40%	0.30%	0.30%	0.30%	0.40%	0.30%	0.10%	0.30%	0.00%
Top 20	**94.30%**	**93.50%**	**93.60%**	**92.30%**	**92.30%**	**91.20%**	**90.60%**	**93.60%**	**95.70%**	**95.30%**	**1.00%**

Note: sorted by 2023 share

Figure 21 illustrates the export market share trends for various trade partners at the ports of Seattle and Tacoma between 2014 and 2023. As was the case with imports, the impact of changes in global trade patterns and the accompanying reduction in trade with China is evident. In 2014, China was the primary export market with 26 percent of the total tonnage, but by 2023 this had fallen to 18 percent and the country was ranked second behind Japan. A number of countries posted significant increases over the ten-year period, including South Korea, Vietnam, Japan, and Thailand.

Figure 21: NWSA Trade Partner Exports Market Share, Based on Top 20 Countries

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Market Share Change 2014-2023
Japan	21.50%	21.10%	19.50%	20.00%	19.70%	21.20%	21.80%	24.00%	26.80%	23.10%	**1.60%**
China	25.90%	25.50%	26.60%	26.20%	18.90%	13.90%	15.80%	18.20%	18.60%	18.20%	**-7.70%**
South Korea	11.90%	15.00%	13.80%	16.20%	17.40%	18.10%	16.50%	15.70%	16.60%	16.70%	**4.90%**
Taiwan	7.50%	7.10%	8.50%	7.50%	9.10%	9.00%	7.70%	7.60%	6.00%	8.20%	**0.80%**
Vietnam	2.40%	2.00%	3.20%	1.70%	2.90%	3.40%	3.60%	3.30%	3.60%	5.70%	**3.30%**
Malaysia	2.20%	1.70%	1.50%	1.90%	1.90%	2.40%	2.70%	3.60%	4.70%	4.10%	**1.90%**
Thailand	2.60%	2.60%	2.40%	2.30%	4.90%	3.50%	3.50%	3.90%	4.50%	4.00%	**1.50%**
Indonesia	3.10%	2.50%	3.60%	2.60%	3.90%	4.40%	4.80%	4.50%	4.30%	3.80%	**0.70%**
Philippines	3.00%	2.50%	2.30%	2.10%	2.70%	4.10%	4.00%	2.80%	3.20%	2.40%	**-0.60%**
Hong Kong	2.50%	2.80%	2.80%	2.80%	2.00%	1.90%	1.50%	1.40%	1.30%	1.50%	**-1.00%**
India	4.40%	4.50%	3.60%	3.00%	3.90%	3.20%	2.10%	1.80%	1.20%	1.40%	**-3.00%**
UAE	1.30%	1.30%	0.90%	1.20%	1.30%	1.30%	1.00%	0.70%	0.70%	1.30%	**0.00%**
Saudi Arabia	0.70%	1.00%	0.80%	0.80%	0.70%	0.90%	0.70%	0.60%	0.60%	1.10%	**0.40%**
Australia	1.10%	1.20%	1.10%	1.10%	1.00%	1.40%	1.30%	1.40%	0.90%	0.90%	**-0.20%**
Singapore	1.20%	0.90%	0.90%	0.80%	0.80%	1.00%	0.90%	1.00%	1.20%	0.70%	**-0.50%**
Spain	0.30%	0.50%	0.60%	0.60%	0.50%	0.70%	0.70%	0.50%	0.50%	0.60%	**0.40%**
Peru	0.30%	0.50%	0.50%	0.50%	0.40%	0.50%	0.70%	0.60%	0.40%	0.50%	**0.10%**
Colombia	0.50%	0.50%	0.50%	0.70%	0.30%	0.50%	0.70%	0.60%	0.30%	0.40%	**-0.10%**
Pakistan	0.40%	0.40%	0.70%	0.70%	0.50%	0.80%	1.20%	0.90%	0.40%	0.30%	**-0.20%**
Lithuania	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.30%	**0.20%**
Top 20	**93.00%**	**93.70%**	**93.70%**	**92.80%**	**93.00%**	**92.30%**	**91.40%**	**93.30%**	**96.00%**	**95.20%**	**2.30%**

Note: sorted by 2023 share

The import and export data from the NWSA tables suggest a number of target markets and potential commodity groups that are suitable for a potential container service calling at the Port of Portland.

Current Service Analysis

As of July 2024, the current container vessel orderbook stands at 5.95 million TEU.[vii] Of concern to the Port of Portland, with its depth constrained shipping channel, is the fact that 87 percent of that capacity is within vessels that have a capacity of 7,500 TEU and greater. While it is possible for larger vessels to call at Portland while light loaded and taking advantage of high tides (such as the visit by the 12,400 TEU MSC Katie in April 2023), over two thirds of the orderbook consists of vessels with a capacity of 12,500 TEU and greater. As a result, the new vessels will see a cascade of ever larger vessels assigned to services that call at the West Coast and the PNW.

[vii] Alphaliner Monthly Monitor July 2024

This trend in the container industry towards the use of larger vessels is accompanied by a move to call at fewer ports, with a prioritization on terminals affiliated with a carrier, which places a small port like Portland at a competitive disadvantage. As such, **container growth scenarios are based on the concept of establishing new, niche routes rather than attempting to lure cargo away from a neighboring port**.

The consultant team next examined existing ocean carrier services that call at the four PNW ports to identify which regions might be underserved at present based on the findings of the stakeholder interviews and data analysis. Figure 22 depicts the current international connectivity that exists at each of the PNW ports based on currently available schedules.[viii] Although the major markets of China and South Korea are well served by the region, there are relatively few services that call in the important growth region of Southeast Asia. Malaysia in particular is served by a single service, while just two calls connect the NWSA to Thailand. Given the increased cargo volumes that are expected to flow from Southeast Asia to North America as supply chains become more diverse and the accompanying growth that occurs in those economies, an opportunity might exist for a new additional service between the regions (the "Southeast Asia Gateway").

A single service connects the PNW to Central America and Europe (MSC's California Express), and a single service also provides the sole connection to Australia and New Zealand via the NWSA (ANL's PCX - Pacific Coast Express / Hapag Lloyd's WSN-PNW / Maersk's PANZ / MSC's OL1). Underserved routes offer an opportunity to establish a new niche service. Priority should be given to those routes that have larger markets that are also not served by a route that currently calls at the NWSA. Taking the two examples above, the California Express connects both the NWSA and Vancouver to Europe via Mexico and Central America, whereas the Pacific Coast Express connects NWSA to Australia, New Zealand, and French Polynesia. As such, the former route likely offers more opportunity for a new niche service, and as such forms the basis of a potential service in the forecast (the "AgriTrade Connection").

The lack of a direct connection between South America and the PNW also stands out as an opportunity (the "Pacific Produce Pathway"). Finally, Asia will continue to source timber and paper products from the PNW, and carriers like Swire operate multi-use vessels capable of transporting a small number of containers. Westwood (now Swire) previously called at the Port of Portland, and it is possible that they or a similar carrier might be convinced to return in the future (the "Timberwave Corridor").

[viii] Schedules are constantly changing with ports added and dropped (to avoid congestion, for example). As such, there may be service changes that have already impacted values on this table.

Figure 22: Container Service Connectivity at the PNW Ports

		Portland	NWSA	Vancouver	Prince Rupert
CHINA	Lianyugang		1	1	
	Ningbo	1	6	9	5
	Changshu			1	
	Qingdao	2	3	3	2
	Shanghai	2	8	1	7
	Tianjin				1
	Shekou		1		
	Xiamen		2	5	2
	Yantian	1	6	9	5
HONG KONG	Hong Kong		2	3	3
JAPAN	Hakata		2	1	
	Iyomishima		1	1	
	Kobe		2	2	
	Nagoya		5	4	
	Osaka		4	3	
	Shimizu		3	2	
	Tokyo		5	3	
	Yokohama		3	4	2
MALAYSIA	Port Kelang		1		
SINGAPORE	Singapore		1	1	
SOUTH KOREA	Busan	2	9	11	4
	Gwangyang	1	1	1	1
	Pyeongtaek		1	1	
TAIWAN	Kaohsiung		4	4	1
THAILAND	Laem Chabang		2	1	
VIETNAM	Cai Mep/Vung Tau		2	2	
	Hai Phong		2	1	1
	Ho Chi Minh City		1		
ANZ/PACIFIC	Auckland		1	1	
	Melbourne		1	1	
	Sydney		1	1	
	Papeete Tahiti		1	1	
	Tauranga		1	1	
CENTRAL/SOUTH AMERICA	Colon		1	1	
	Cristobal		1	1	
	Manzanillo (MX)		1	1	
	Rodman (PA)		1	1	
EUROPE	Barcelona		1	1	
	Civitavecchia		1	1	
	Fos-sur-Mer		1	1	
	Gioia Tauro		1	1	
	La Specia		1	1	
	Marsaxlokk		1	1	
	Sines		1	1	
	Valencia		1	1	
MIDDLE EAST	Dammam		1		
	Jebel Ali		1		
	Umm Qasr		1		

Existing Forecasts and Growth Trends

BST Forecast

As shown in Table 31 the BST forecast expected Portland container trade growth by 2030 of 143,000 TEU in a Low estimate, 177,000 TEU in a Reference (mid or base) estimate, and 414,000 TEU in a High estimate.

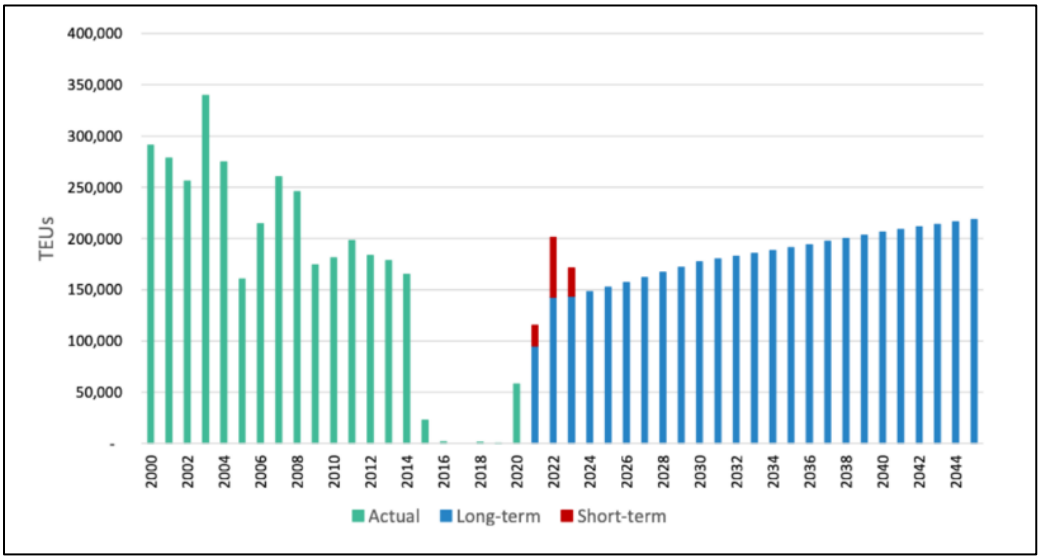
Table 31: Portland Container Trade by Vessel (000 TEU)

		History			Forecast			Compound Annual Growth Rate	
Direction	Case	2000	2010	2020	2021	2030	2045	2000-2021	2021-2045
Total	Low	-	-	-	111	143	-	-	0.0%
	Reference	290.9	181.1	58	115	177	219	-4.3%	2.7%
	High	-	-	-	122	214	314	-	4.0%

Source: BST Associates

The graph in Figure 23 shows the pattern, with the recent import surge yielding a short-term peak.

Figure 23: BST Associates Reference Case Forecast



Source: BST Associates

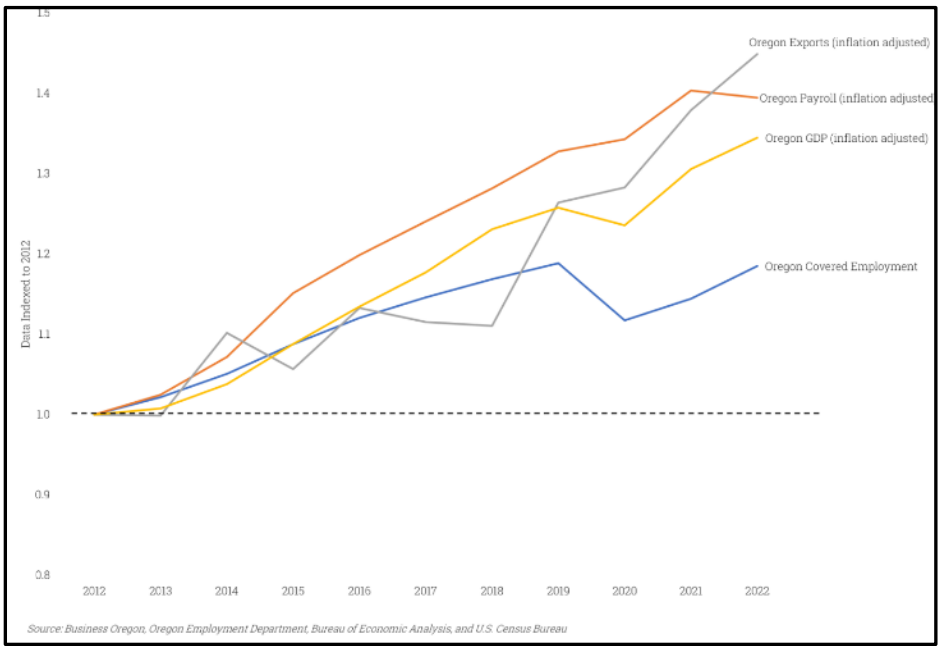
Growth Drivers

The main drivers of Oregon export growth are Oregon production and foreign demand for that production. Oregon imports are driven primarily by Oregon demand for consumer goods and inputs to Orgon production, which in turn are driven by Oregon population growth, economic activity, and prosperity. The consultant team located some indications of these trends.

Oregon Export Growth. A July 2023 article by Business Oregon titled *"Oregon Exports Continued Strong Growth in 2022"* observes some noteworthy trends. It states that Oregon exports have grown in recent years, account for a larger share of Oregon's economy than the national average (14.5% vs. 10.3% GDP), and have grown in percent of GDP as the national average has declined. It also states that China remains Oregon's largest export market, and that 1/3 of Oregon's exports are semiconductors or other electronic components. The article also states that "Other large export industries include industrial machinery ($3.5 billion in 2022 exports); motor vehicle

parts ($2 billion); engines, turbines, and power transmission equipment ($1.7 billion); and pesticides, fertilizers, and other agricultural chemicals ($1.5 billion)," and that motor vehicle parts were the fastest growing export industry.

Figure 24: Oregon Exports



Oregon Economic and Revenue Forecast

The June 2024 report from the Oregon Department of Administrative Services does not specifically concern exports or the Port of Portland, but includes some useful forecasts for the state's economic outlook. It begins by mentioning the overall US economic outlook, which remains in an "inflationary boom" with employment and income gains[ix]. It mentions that a larger population due to immigration is the major US forecast change, but states that:

> *"The Oregon population forecast remains essentially unchanged, and Oregon is not a major port of entry for international immigrants. As such, the local impact of the U.S. forecast changes is smaller. That said, a larger U.S. economy boosts non-wage Oregonian income, like investments and proprietors' income, as local firms sell more goods and services into that larger customer base elsewhere in the country."*

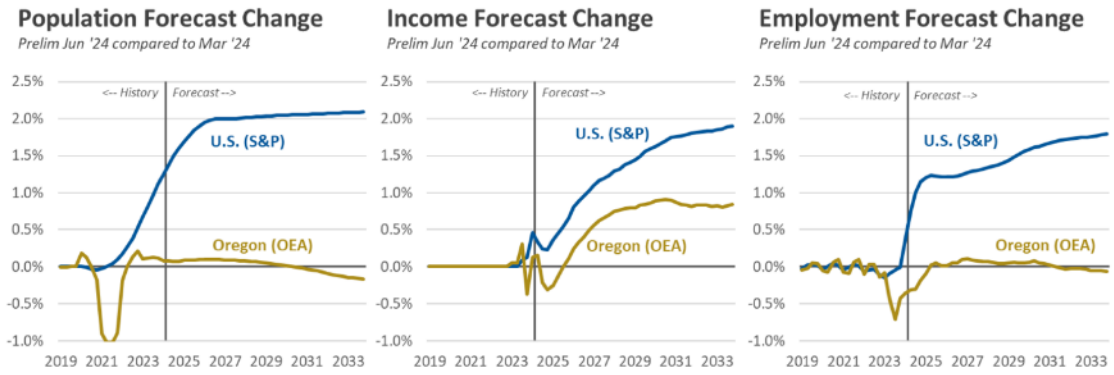
The executive summary also notes that:

> *"While still lower than the U.S., Oregon's per capita income and average wage are at their highest relative point compared to the nation in decades. A record share of working-age Oregonians have a job. And the state's labor force participation rate has risen the second most across all states."*

Population growth (even if not as rapid as in other states), rising wages, and increasing employment will all drive increased consumer demand for imports through 2029-30, as suggested in Figure 25.

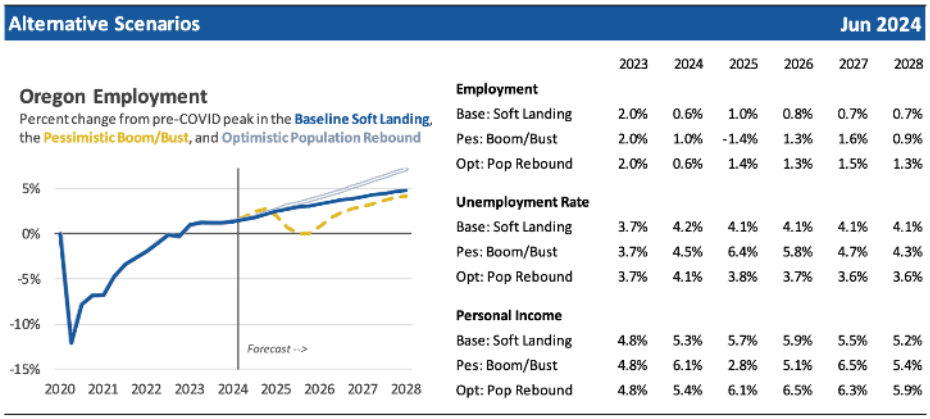
[ix] These gains have already driven a mid- 2024 US import surge.

Figure 25: Oregon Economic Forecasts



The report also includes the "alternative scenarios" chart in Figure 26. The most pessimistic scenario entails a near-term "bust" followed by a strong recovery.

Figure 26: Alternate Oregon Growth Scenarios



	2023	2024	2025	2026	2027	2028
Employment						
Base: Soft Landing	2.0%	0.6%	1.0%	0.8%	0.7%	0.7%
Pes: Boom/Bust	2.0%	1.0%	-1.4%	1.3%	1.6%	0.9%
Opt: Pop Rebound	2.0%	0.6%	1.4%	1.3%	1.5%	1.3%
Unemployment Rate						
Base: Soft Landing	3.7%	4.2%	4.1%	4.1%	4.1%	4.1%
Pes: Boom/Bust	3.7%	4.5%	6.4%	5.8%	4.7%	4.3%
Opt: Pop Rebound	3.7%	4.1%	3.8%	3.7%	3.6%	3.6%
Personal Income						
Base: Soft Landing	4.8%	5.3%	5.7%	5.9%	5.5%	5.2%
Pes: Boom/Bust	4.8%	6.1%	2.8%	5.1%	6.5%	5.4%
Opt: Pop Rebound	4.8%	5.4%	6.1%	6.5%	6.3%	5.9%

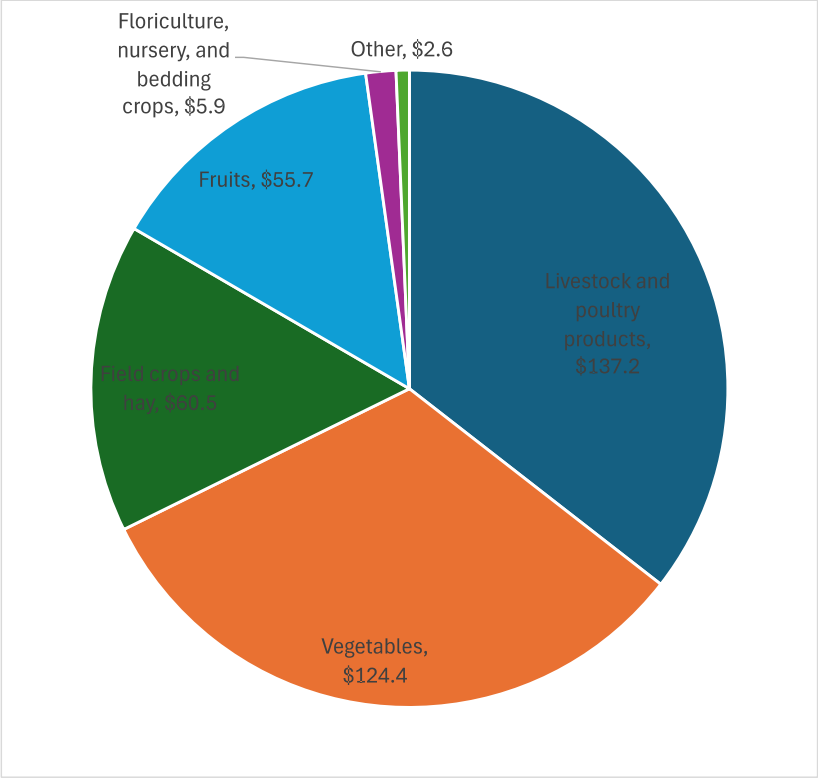
"So going forward, it looks like we're depending more on productivity and not job gains. And in recent history, that's been really good for Oregon.

Over this pandemic budget cycle, we're third across states, in terms of output-per-worker. So the productivity gained rather than more workers. And we're seeing it across every region of the state, with some of our rural counties being included as well. And so it looks like, going forward, this should continue because we're really in a healthy environment for business investment, seeing a lot of start-up activity, R&D and the like." - - State economist on Oregon's economic outlook, OPB Broadcast 1/13/24

Oregon Organic Agriculture

Ongoing direct service to T6 may have the potential to boost an Oregon growth industry. A 2022 report titled *"Market Assessment of Organic Agriculture & Food Products, Oregon",* by the National Agricultural Statistics Service, analyzes organic agriculture. Oregon is a leading state in organic production. Figure 27 shows the state's main organic agricultural products.

Figure 27: Value of Oregon Organic Products (in millions), 2021



Source: National Agricultural Statistics Service, 2022

The report mentions that growth in organic dairy production and organic livestock farming has led to increased organic alfalfa production, and that from 2011 to 2021:

> *"[Organic alfalfa] Acreage grew by more than half, quantity by about one-third, and sales value by 61%. Because demand for organic alfalfa is largely driven by the demand for feed from organic cattle, it is likely the growth in organic alfalfa was driven by the growth in organic cattle inventories (beef, dairy, and other cattle and calves, discussed above), which increased by 41% in Oregon from 2011 to 2021."*

The report states that

> *"there are companies exporting organic hay out of Oregon, due to access to ports and high demand from international areas"*

This suggests that, despite high demand within the state, many organic alfalfa farmers are finding it more economically viable to export their goods, and that easy access to export markets (i.e. through the Port of Portland) will increase export volume.

Additional Tioga research found that the leading consumers of organic products outside the U.S. are the Northern European and Scandinavian countries (Sweden, Denmark, Germany, Austria, Switzerland). The ability for Oregon producers to grow exports of organic products, especially organic feeds for organic livestock and dairy industries, will depend on good direct or transshipment ocean carrier services to those markets. Japan has a minor market for organic products to date, but Japan's recent government *Green Food System Strategy* and increased support

for organic dairies and livestock will likely expand that market in the near future. Here too, restoration of direct Japan service would give Oregon producers better access to a growing market.

Oregon Food and Beverage Sector

A Business Oregon article titled *"Oregon's Food and Beverage Sector Stabilizing After a Few Tumultuous Years"* from July 2023 concerns Oregon's food and beverage sector's return to normalcy following the COVID-19 pandemic. It notes that employment had not yet returned to 2019 levels, but had increased and was on an upward trend. This employment does not yet translate into exports, however, as the article states that Oregon exports a lower percentage of its food and beverage products than the national average (most are distributed in the US due to many of them being highly perishable and difficult to export). The article includes Figure 28 and Table 32 covering employment and exports in the sector, and how employment and exports in Oregon compare to the US average.

Figure 28: Oregon Food and Beverage Exports

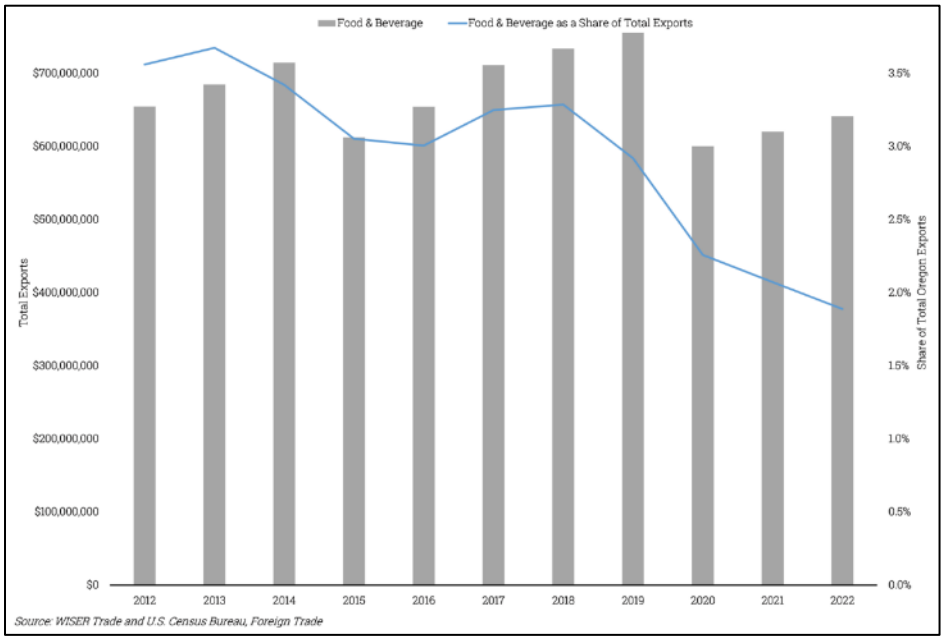


Table 32: Food and Beverage Manufacturing: Oregon versus US

	Oregon	US
Employment (Location Quotient)	1.38	1
Exports (Location Quotient)	0.41	1
5-Year Growth Rate (17-22)	0.1%	4.1%
Average Wage (22)	$51,511	$61,890

Container Cargo Growth Scenarios

Portland benefitted from an expansion of services in 2020 and beyond propelled in part by high freight rates and congestion at other ports caused by the pandemic import surge. High freight rates will not last much longer as existing orders for new vessels begin to deliver over the coming years (as previously discussed, almost six million TEU of new capacity is on order), and so the Port of Portland will need to focus on less-competitive or niche routes.

It is unlikely that Portland will be able to lure a carrier to shift a call away from the ports of Vancouver, Prince Rupert, or the NWSA for a variety of reasons, including terminal investments by carrier-affiliated companies and reduced calling costs brought about by the economies of scale associated with larger vessels unable to reach Portland. Instead the Port of Portland's future relies on either the addition of a call to an existing service that utilizes smaller vessels, or a new service that provides a connection to an underserved trade-region. These new services are modeled as "Growth Scenarios" intended to provide a sense of how import and export cargo volumes could grow as new regular container services arrive at the Port of Portland.

The Growth Scenarios differ from a traditional port forecast due to the degree that future cargo volumes at the Port of Portland are reliant upon new carrier services. Attracting new services to the Port will require a concerted effort from Port and State officials (and potentially coordination with staff from the NWSA and/or the Port of Vancouver) and will require months to achieve. As such, it is simply not possible to accurately project when a new service might be acquired, which trade partners it might serve, or how much cargo it will contribute to the Port of Portland's cargo flows. The Growth Scenarios present a way in which stakeholders can consider how cargo volumes might increase based on several key factors focused on each service, including call frequency, port-call order, and vessel size.

The Growth Scenario Model incorporates a number of assumptions, including limiting the rotation to two North American West Coast calls and fixed vessel sizes/call frequencies over the duration of the forecast period as it depends so highly on the primary assumption of when a new service might start. Likewise, long-term volume growth is based on the 2021 BST Associates forecast and does not incorporate scenarios that might result from short-term events including vessel draft restrictions at the Panama Canal, shifts in intermodal services, pricing, and connectivity within North America, or coastal diversions surrounding periods of labor negotiations.

BST Associates used the growth projections from the WPPA 2017 Marine Cargo Forecast for the Port of Portland's future import and export volumes, leading to an estimated average yearly growth rate of 2.7% for the reference case from 2021 to 2045. This growth rate was compared with forecast rates from recent studies conducted for the San Francisco Bay Conservation and Development Commission (BCDC) and the Vancouver Fraser Port Authority (VFPA) in British Columbia (Table 33).

Table 33: Comparison of Growth Rates for 2021 through 2045 in Recent PNW Forecasts

	Portland 2021	BCDC 2020	VFPA 2020
Slow/Low	-	1.6%	2.1%
Moderate/Base	2.7%	2.6%	2.7%
Strong/High	4.0%	3.5%	3.3%

Source: BST Associates

BST Associates notes that:

> *"2021 represents a low start-up year for Portland relative to future projections. As a result, 2.7% annual growth overstates the expected annual growth. Using the period 2025 to 2045, Portland's container volumes are expected to grow at 1.8% per year under the reference case."*

This report concurs with BST Associates' assessment, and the long-term growth rate for existing and new services is set at 1.8% per year. While this percentage can be modified in the Growth Scenario Model, forecasting a long-term growth rate for existing cargo volume at the Port of Portland (assuming continued container terminal operations) based on economic and population growth projections (among other variables) is beyond the scope of this report.

Target Markets

The consultant team reviewed 2014 shipment data, previous reports, and recent outreach findings to identify the most productive candidates for new or restored service. Those include:

- **Japan.** Japan was previously one of Oregon's best markets, notable for grass seed and hay. Recent exports to Japan may be hindered by the need to transship.
- **Central/South America.** With the loss of the previous Americas services Oregon's trade with Central America, South America, and the Caribbean has fallen off. Restoration of this trade would encourage Oregon exports and imports of fresh fruits and vegetables.
- **Mediterranean/Europe.** Oregon previously enjoyed good markets for lentils and other products in the Mediterranean and, via transshipment, in Europe. Restoration of Mediterranean service with access to a strong transshipment port such as Algeciras (?) would facilitate redevelopment of these markets.
- **Southeast Asia.** Oregon has not previously had good access to the growing export and import markets of Vietnam, Thailand, Malaysia, Indonesia, or Cambodia. As import sourcing is shifting in this direction from China these trading partners have become increasingly important, and their growing economies have also become better export markets. Calls at major transshipment ports such as Hong Kong and Singapore would link to the extensive intra-Asia service network.
- **India.** India has been cited by Oregon exporters as a major growth opportunity for exports such as hay and scrap metal. A direct service to India would be difficult to achieve from Portland, but transshipment through Singapore or Hong Kong would be a good second choice.

Service Scenarios

Four potential service scenarios follow.

Timberwave Corridor. The Timberwave Corridor sees a return of a timber-focused trade that connects Portland to Japan, Korea, and China, similar to that previously operated by Westwood. Although vessels are specialized in transporting forest products, containerized and oversized cargo would also be carried. The key feature of this service would be a revived direct call in Japan, which would be expected to recover some of the market previously enjoyed by Oregon exporters. Preliminary estimate: Based on the old Westwood (then Swire) monthly call. Annual cargo: 0 imports, 1,200 TEU exports.

Pacific Produce Pathway. The Pacific Produce Pathway would connect Oregon, Washington, and Idaho to the vibrant markets of Peru, Chile, and Ecuador. This route would carry commodities such as split peas and seeds to South America and return with fresh fruit and vegetables. A stop at a major transshipment port such as Manzanillo in Mexico (the country's largest port and a major hub) or Balboa in Panama, located on the Pacific-side of the Panama Canal, would also reopen other South Americans, Central American, and Caribbean markets for Oregon exports. Such a service might link to cold storage facilities previously considered for Portland. A stop in Mexico on the way back to Portland could leverage the growing trend of nearshoring manufacturing, helping to ensure route profitability. Preliminary estimate: 4,500 TEU vessel. A bi-weekly call calling at NWSA first (60:40 split in PDX favor for exports, reverse for imports). Annual cargo: 37,000 TEU imports and 56,000 TEU exports.

Southeast Asia Gateway. The Southeast Asia Gateway would link Portland to the dynamic markets of Vietnam, Thailand, and Cambodia. As these countries experience a surge in exports to the US due to diversifying supply chains, this route capitalizes on smaller underutilized ports within each country rather than the primary hubs like Cai Mep or Laem Chabang. A call at Singapore, Hong Kong, or another efficient transshipment hub would also

improve Oregon's access to the growing Indian market. Preliminary estimate: 5,400 TEU vessel. A monthly call, also calling first at NWSA (60:40 split in PDX favor for exports, reverse for imports): Annual cargo: 21,000 TEU imports and 31,000 TEU exports.

AgriTrade Connection. The AgriTrade Connection would offer connections between Portland and other PNW ports to Central America and Europe. With the transition to larger vessels globally, this service capitalizes on the availability of smaller ships and transshipment hubs to provide a reliable route for the region's agricultural exports, opening new markets and trade possibilities. Preliminary estimate: 4,500 TEU vessel. A monthly call, calling at Vancouver first (60:40 split in PDX favor for exports, reverse for imports): Annual cargo: 17,000 TEU imports and 43,000 TEU exports.

One key to unlocking T6's full potential is reactivation of Columbia River container barge service. Barge service has been by far the most economical way for upper Columbia River agricultural shippers to reach T6 and foreign markets, particularly in heavy agricultural products such as dried peas and lentils for Central/South American and Mediterranean markets. Contacts made in this study cite two existing barriers to renewed service:

- The need for larger year-round volume commitments than individual customers can make.
- The need for coordinated, efficient transfer at T6.

Intermodal rail service, such as that previously operated from T6 by SM Lines, will also expand the cargo potential by adding import and export access to inland markets.

Scenario Forecasts

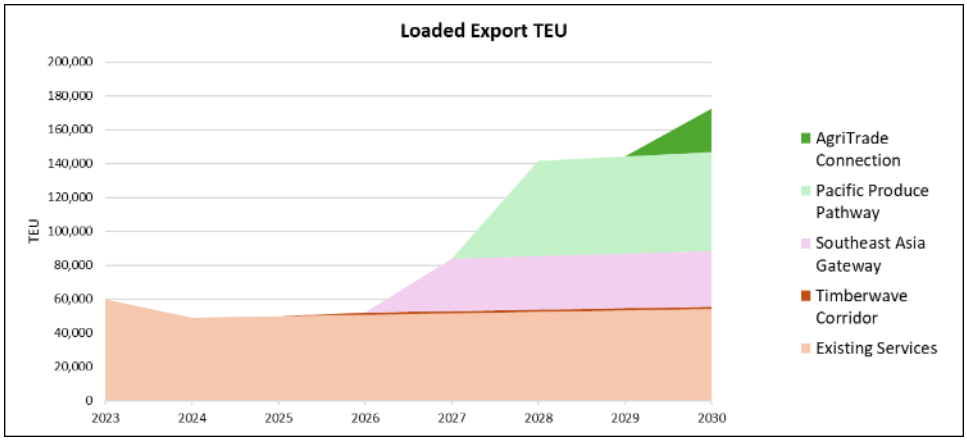
Assuming that SM and MSC remain at Portland at current levels (approximately 100k per year combined imports and exports), Table 34 shows the forecast scenarios extended to 2030.

Table 34: 2023-2030 Forecast Scenarios - Loaded TEU

IMPORTS	2023	2024	2025	2026	2027	2028	2029	2030
Existing Services	56,412	46,912	47,756	48,616	49,491	50,382	51,289	52,212
Timberwave Corridor		-	-	-	-	-	-	-
Southeast Asia Gateway		-	-	-	20,736	21,109	21,489	21,876
Pacific Produce Pathway		-	-	-	-	37,440	38,114	38,800
AgriTrade Connection		-	-	-	-	-	-	17,280
Total	**56,412**	**46,912**	**47,756**	**48,616**	**70,227**	**108,931**	**110,892**	**130,168**
EXPORTS	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Existing Services	59,651	48,796	49,674	50,568	51,479	52,405	53,349	54,309
Timberwave Corridor		-	-	1,200	1,222	1,244	1,266	1,289
Southeast Asia Gateway		-	-	-	31,104	31,664	32,234	32,814
Pacific Produce Pathway		-	-	-	-	56,160	57,171	58,200
AgriTrade Connection		-	-	-	-	-	-	25,920
Total	**59,651**	**48,796**	**49,674**	**51,768**	**83,804**	**141,473**	**144,019**	**172,532**
Total	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Existing Services	116,063	95,708	97,431	99,184	100,970	102,787	104,637	106,521
Timberwave Corridor	-	-	-	1,200	1,222	1,244	1,266	1,289
Southeast Asia Gateway	-	-	-	-	51,840	52,773	53,723	54,690
Pacific Produce Pathway	-	-	-	-	-	93,600	95,285	97,000
AgriTrade Connection	-	-	-	-	-	-	-	43,200
Total	**116,063**	**95,708**	**97,431**	**100,384**	**154,031**	**250,404**	**254,911**	**302,700**

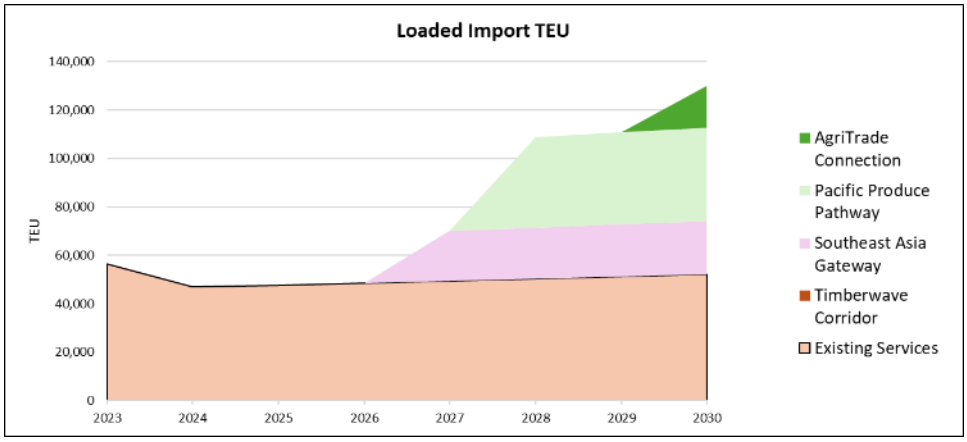
Figure 29 shows the buildup of export loads under these scenarios, with the largest expected boost from the Pacific Pathways service, modeled as beginning in 2028.

Figure 29: Loaded Export TEU Forecast Scenarios



Although the scenarios were chosen primarily to promote Oregon exports, imports would grow as well (Figure 30). Import growth is critical, because the greater revenue from import loads is what would attract carriers and Oregon exporters increasingly rely on empty import containers to supply container capacity for export loads.

Figure 30: Loaded Import TEU Forecast Scenarios



This is just one example of how the service scenarios could impact cargo volumes over the 2023-2045 period. Two additional growth scenarios follow, one with a lower growth outlook and one with a high growth outlook. Table 35 highlights the differences between the three growth scenarios, with changes to the year in which the three primary potential service scenarios are initiated, the assigned vessel sizes, the vessel utilization, and service call frequency.

Table 35: Comparison of Growth Scenarios

Service	Implementation Year			Vessel Size			Vessel Utilization			Call Frequency		
	Base	Low	High	Base	Low	High	Base	Low	High	Base	Low	High
Southeast Asia Gateway	2027	2028	2026	5,400	4,500	5,400	80%	75%	85%	Monthly	Monthly	Biweek
Pacific Produce Pathway	2028	2030	2027	4,500	4,500	5,400	80%	75%	85%	Biweekly	Monthly	Monthl
AgriTrade Connection	2030	2032	2028	4,500	4,500	5,400	80%	75%	85%	Monthly	Monthly	Biweek

Table 36 compares the import, export, and total loaded TEU volumes projected under the base, low, and high growth scenarios. By 2045 the High Growth Scenario would result in a 60% greater volume of loaded TEU than the Base Scenario, while the Low Growth Scenario would result in 24% fewer loaded TEU than the Base Scenario.

Table 36: Cargo Volume Comparison by Growth Scenario in TEU

TEU	2030			2045		
	Base	Low	High	Base	Low	High
Imports	130,168	85,200	203,309	170,107	131,770	265,689
Exports	172,532	105,080	282,244	225,468	167,964	368,842
Total	302,700	190,281	485,553	395,575	299,734	634,532

Table 37 converts TEU to containers and adds estimated empties and rehandles to the total to provide an estimate of corresponding vessel moves.

Table 37: Cargo Volume Comparison by Growth Scenario in Vessel Moves

Moves	2030			2045		
	Base	Low	High	Base	Low	High
Imports	71,130	46,558	111,098	92,954	72,006	145,185
Exports	94,280	57,421	154,231	123,207	91,784	201,553
Empties	38,274	24,291	61,017	50,017	38,096	79,738
Rehandles	2,945	1,854	4,718	3,848	2,919	6,166
Total	203,683	128,270	326,346	266,178	201,886	426,477

It should be noted that these projections differ substantially from those included within the BST Associates Forecast which applied a traditional forecasting approach to container volumes at the Port of Portland. For example, the BST Associates forecast correctly models a low growth scenario in which container service to/from Portland ends prior to 2045 due to "a combination of three factors: new vessels constructed for transpacific deployment trend larger than the capability of the Port to handle, the port does not maintain or upgrade existing equipment and infrastructure, and the Columbia River Navigation Channel is not deepened beyond its current authorized depth."[x] In contrast, the low growth outlook for 2045 in Table 36 has a total cargo volume that is only slightly lower than the High Case scenario in the BST Associates forecast. This difference is a result of the intended purpose of the Growth Scenario Model in this report, which is focused on highlighting the potential level of cargo activity that could be attracted to the Port of Portland through the arrival of four new services. Removing one or more of these services from the Growth Scenario Model dramatically reduces the 2045 cargo volume.

[x] Port of Portland Container Service Forecast and Economic Contribution Assessment page 7 (October 27, 2021), BST Associates,

Appendix: Methodology

Oregon Export and Import Shipping/Receiving Locations

In determine which locations imports were actually going to and where exports actually originated, in Oregon, the consultant team analyzed the list of importers to determine which companies on the list were handling shipping and receiving at their locations and which were instead freight forwarders or company offices without shipping and receiving. This has allowed the team to determine which parts of Oregon are receiving the most imports.

The team used Google Maps and Street View to search the locations and companies listed. Those that were visibly warehouses, or those that had an area dedicated to shipping and receiving, were marked as specific shipping/receiving locations, whereas those that were offices or locations without such an area were noted as such. The team determined the vast majority of locations on the list to be shipping/receiving locations.

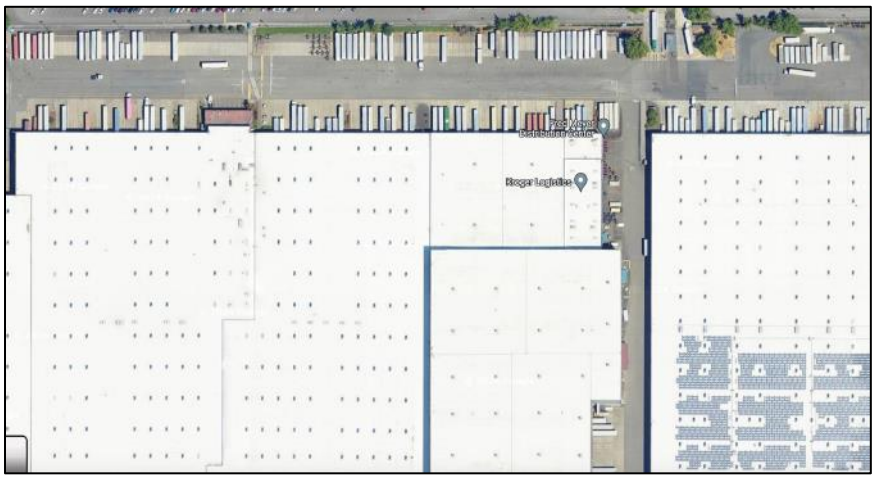
Some companies on the list included an address, which the team was able to search in Google Maps easily. Many did not, however, so the consultant team searched instead by company name in the city indicated. In most cases, this turned up a location, though there were a small number of companies that the team could not locate.

In many cases, it was obvious if a location handled shipping and receiving or not. One such example of this was Les Schwab, whose warehouse in Prineville was the largest importer listed. A Google Maps search of the provided address turned up the following street view, which clearly shows a warehouse with spaces to load and unload trucks. Therefore, the team could easily determine it to be a shipping/receiving location.

Figure 31: Les Schwab Warehouse Street View

Some other locations were also easy to determine despite no address given. For example, though Fred Meyer was listed in Portland without an address, a Google search turned up a Fred Meyer Distribution Center in Portland, which a satellite image clearly indicates as a shipping/receiving location.

Figure 32: Fred Meyer Distribution Center in Portland

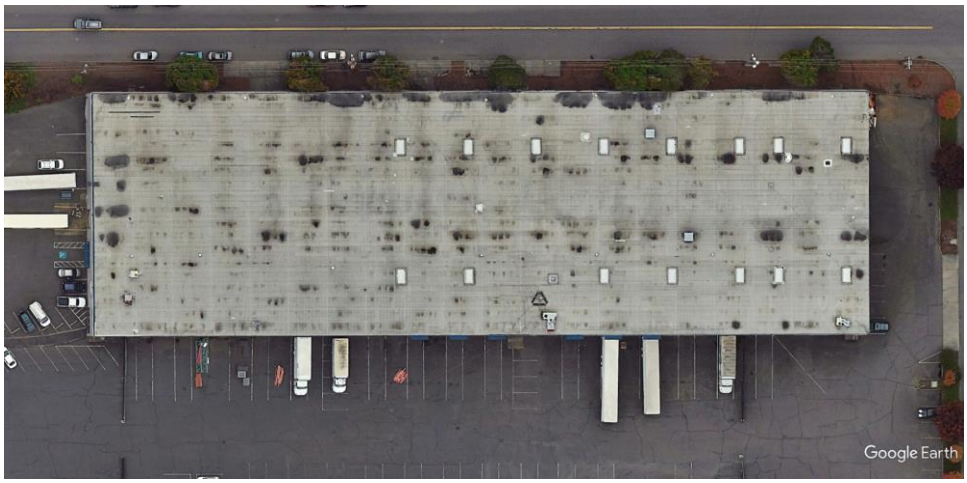


Other locations were easily determined not to be shipping/receiving locations. The team could sometimes determine this by the company's name as well. For example, Wood Brokerage in Lake Oswego (which gave an address) seemed to be a brokerage firm based on its name. A Google Street View search turned up images of an office park without shipping and receiving capability, which confirmed this.

Figure 33: Wood Brokerage in Lake Oswego

Though some other locations were less obvious, the team could typically still determine the actual location with this method. For example, a search for Furniture Connexion initially found furniture stores. Further research, however, located the Furniture Connexion Portland warehouse in Figure 34.

Figure 34: Furniture Connexion Warehouse



For locations that handled very few TEU that were not quickly found with an address search, the consultant team assumed them to be shipping/receiving locations for the purpose of sorting the data. Some companies were listed twice on the list (sometimes with slightly different spellings), but the team's categorizations accounted for this as well. This allowed the consultant team to sort where imports are actually going within Oregon by county.

This analysis allowed the consultant team to assign PIERS shipment records to one of

- Shipments originating or terminating at points in Oregon.
- Shipments without identifiable Origins or destinations, and which appeared to be booked by OTIs.
- Shipments with identifiable origins or destination in other states.

The first group was used to establish the pattern of Oregon origins and destinations by commodity. The second group was then allocated to Oregon counties based on this pattern. A small portion of records without analogous commodity origins or destinations in Oregon were then allocated based on the pattern of county totals.

Records with identifiable origins or destinations outside Oregon were excluded. These shipments generated Oregon employment and economic activity at T6, but not at origin or destination.

Figure 35 shows the listed states of origin for T6 exports in 2021-2023. The prominence of California, Texas, Illinois, and New York is due to the large number of shippers agents, freight forwarders, and other Ocean Transportation Intermediaries (OTIs) in those states.

Figure 36 shows the export origins in Oregon counties after the analysis and allocation process, and exclusion of Idaho and Washington trade.

Figure 37 and Figure 38 show the analogous distributions for import destinations.

Figure 35: Export Origin States from Raw PIERS Data

Figure 36: Allocated Export Origins in Oregon Counties

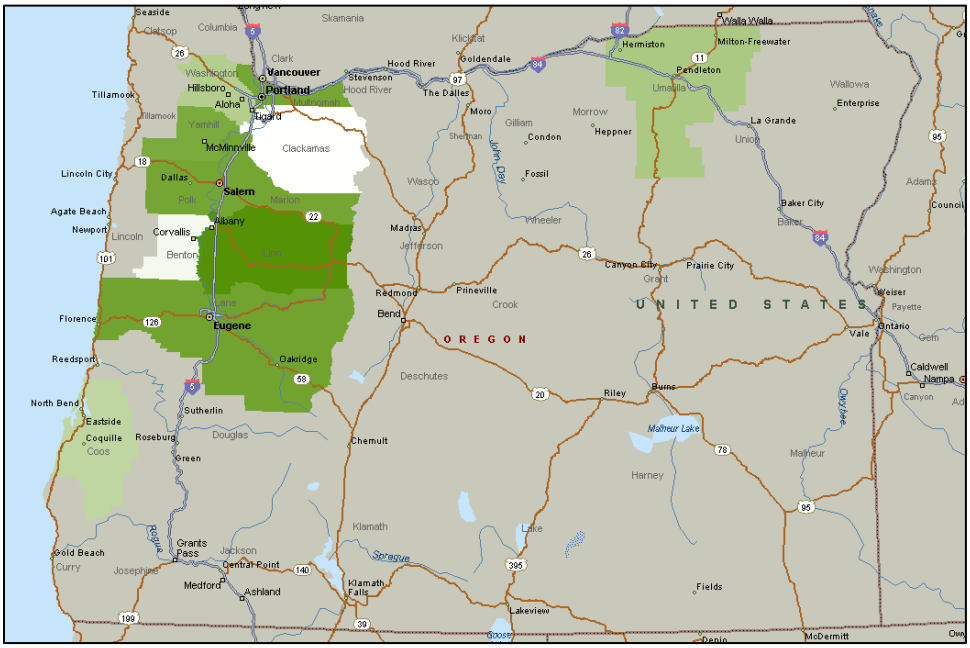
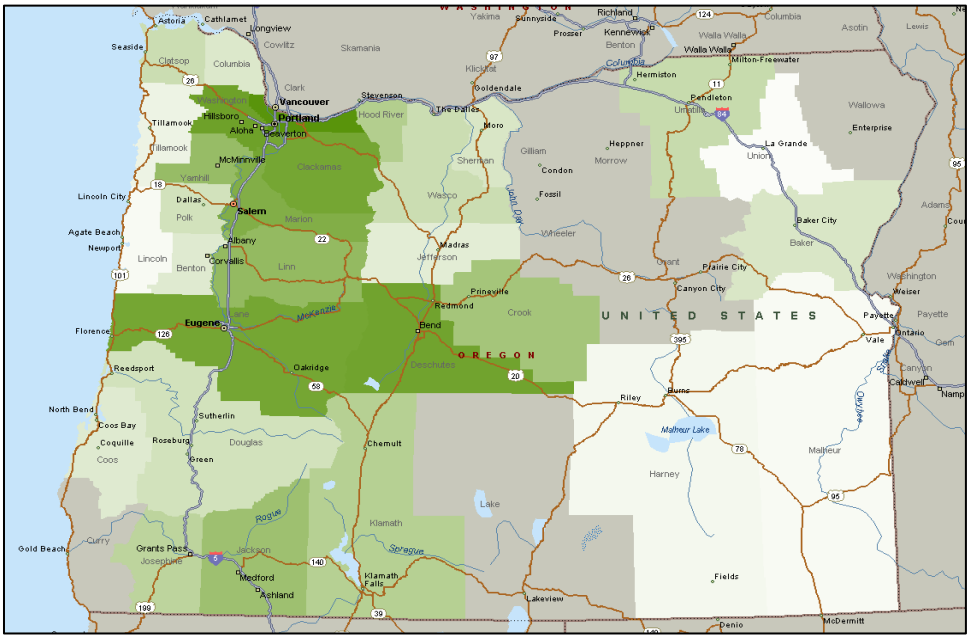


Figure 37: Import Destination States from Raw PIERS Data

Figure 38: Allocated Import Origins in Oregon Counties.



Growth Scenarios Methodology

The scenario forecast model is a simple model comprised of import and export volumes, each of which projects growth for the existing base volume and the four sample scenario services discussed above. The model is designed to allow for the adjustment of variables in the scenarios to assess how they might impact volumes over the coming 20 years at the Port of Portland, as depicted in Table 38.

Table 38: Model Variables for the Containerized Cargo Scenario Forecast

VARIABLES	Growth Rate	Implementation Year	Initial Import Call Volume	Initial Export Volume	Vessel Size (TEU)	Vessel Utilization	Direct Call	First Call	Last Call	Frequency
Existing Services	1.8%									
Timberwave Corridor	1.8%	2026	0	100						Monthly
Southeast Asia Gateway	1.8%	2027	1,728	2,592	5,400	80%	No	No	Yes	Monthly
Pacific Produce Pathway	1.8%	2028	1,440	2,160	4,500	80%	No	No	Yes	Biweekly
AgriTrade Connection	1.8%	2030	1,440	2,160	4,500	80%	No	No	Yes	Monthly

As the focus of the model is on the scenario services, only the average annual growth rate can be adjusted for the existing base cargo volume. The default for the base cargo forecast is based on the annual growth rate of 1.8% between 2025 to 2045 that is modeled in the 2021 BST Associates forecast.[xi]

The four scenario services feature a number of additional variables that can be adjusted:

- Growth Rate: The annual growth rate of the service following its implementation. The default is 1.8%.
- Implementation Year: The first year each service is implemented.
- Initial Import/Export Call Volume: With the exception of the Timberwave Corridor, this is a calculated volume that is based on the variables that follow. For the Timberwave Corridor the value is manually entered given the nature of the mixed-use vessels that the service envisions. Prior to their departure, Westwood was only exporting containerized cargo at a rate of approximately 100 TEU per month.
- Vessel Size: Any value can be entered, but the default vessel capacities used in the model are 4,500 TEU and 5,400 TEU.
- Vessel Utilization: This reflects that over the 20 year period the vessels will not achieve 100% utilization on every call. As the agricultural nature of the calls will also contribute to fluctuating vessel utilization the default is 80%, but this percentage can be freely adjusted.
- Direct Call: A yes/no variable. A direct call models that the Port of Portland is the sole West Coast call and as such will have all the vessel space allocated to the call for both imports and exports (although the Vessel Utilization variable will act as a limit unless it is set at 100%).
- First Call: A yes/no variable that is evaluated if the scenario service is not a direct call. If set as yes, imports are allocated 60% of the vessel utilization and exports are allocated 40% of the vessel utilization.
- Last Call: A yes/no variable that is evaluated if the scenario service is not a direct call or a first call, with imports are allocated 40% of the vessel utilization and exports are allocated 60% of the vessel utilization.
- Frequency: This can be set as monthly, bi-weekly, or weekly, and serves as a multiplier of the voyage utilization calculation. By default a monthly service has 12 calls per year, a bi-weekly service has 26 calls per year, and a weekly service has 52 calls per year, but this can also be adjusted.

Figure 39 through Figure 41 depict the forecast output based on the default variables described above. With these assumptions, the existing base cargo from SM Lines and MSC combined with the four scenario services result in approximately 170,000 import TEU and 225,000 export TEU in 2045.

[xi] Port of Portland Container Service Forecast and Economic Contribution Assessment (October 27, 2021), BST Associates

Figure 39: Port of Portland Containerized Import Scenario Forecast, 2023-2045

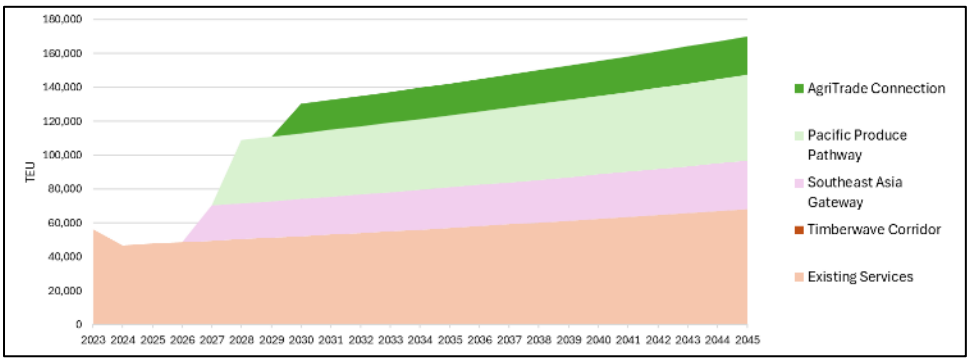


Figure 40: Port of Portland Containerized Export Scenario Forecast, 2023-2045

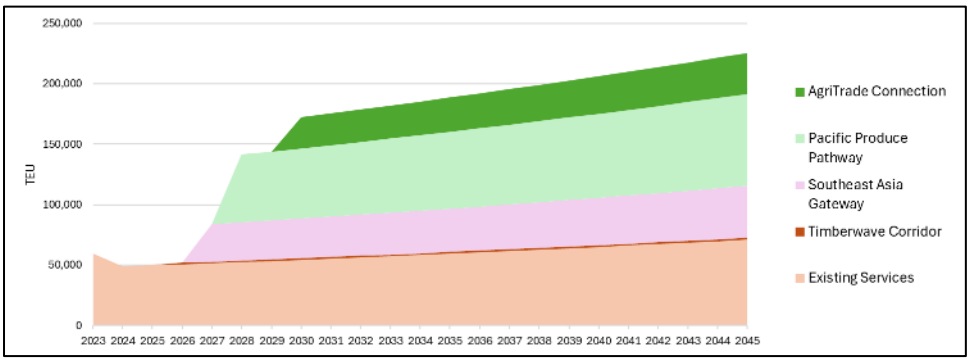


Figure 41: Port of Portland Total Laden Containerized Cargo Scenario Forecast, 2023-2045