North Olympic Peninsula Fiber and Residuals Report

Prepared For

Clallam Economic Development Council

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1. Project Overview

A. Objective

Port Angeles, Washington, has a diverse economy driven by industries such as forestry, maritime trade, tourism, and manufacturing. The Port of Port Angeles plays a crucial role in the region's economic vitality, serving as a hub for commercial shipping, boat building, and industrial activity. The port fosters economic prosperity by bringing together people, resources, and industries to create living-wage jobs.

The forest products industry is a major contributor to Clallam County's economy. The Port of Port Angeles Log Yard serves as a nexus for this industry, facilitating the movement of timber and other forest-related commodities. The sustainable harvest of timber and related value-added industries continues to shape the economic landscape of Clallam County.

Combined, the regional forest products industry, along with manufacturing and maritime transport sectors, have the potential for creating new economic activity in the local region, as opposed to merely redistributing existing economic activity. Recognizing this opportunity to promote prosperity, the Clallam Economic Development Council has targeted these areas for economic growth and diversification. The focus of this report is on wood fiber, an abundant natural resource with numerous opportunities for value-added primary and secondary manufacturing.

This report supports this regional effort to promote economic durability by expanding capacity in the wood fiber market, especially for low-value wood fiber that is currently unutilized or under-utilized. The following pages describe the low-value wood fiber opportunity in the context of the existing forest products sector in and around Port Angeles, as well as larger scale economic trends. This context of the broader forest products market is critical to understanding the low-value wood fiber resource because its economic availability is intertwined with the economics of the forest products sector at large. To the extent these raw materials or wood-derived finished products may be moved by maritime transport, they represent an opportunity in both target sectors, including expanding operations and boosting cargo at the Port of Port Angeles.

This report focuses on low-value wood fiber as a feedstock. Beyond general economic and logistical manufacturing considerations, it does not explore or identify any specific opportunity for value addition. Mentioned here to give the reader some perspective, these opportunities could include wood pellet manufacturing, wood fiber biorefining, or advanced chemical processing.

B. Wood Fiber

Wood fiber is a highly variable feedstock. While not an exhaustive list of variables, wood fiber properties vary depending on the part of the tree it comes from (i.e. trunk vs. limbs), species, size and shape (i.e. straightness), moisture content, and/or extent of processing. Another factor that contributes to the variability and characteristic of wood fiber is the point of origin along the forest products supply chain.

The entire tree (above and below ground) can be a source for wood fiber; however, much of today's wood fiber comes from above ground. Wood fiber found in the trunk (or bole) is referred to as stem wood; if this stem wood is the desired size, shape and species, it will likely be used as sawmill feedstock (i.e. logs). Wood fiber from the limbs and tops is referred to as topwood. When an entire tree is chipped or ground, the term

for this type of wood fiber is “whole tree chips,” or “dirty chips.” Bark is another category of wood fiber, generated when the bark is removed to produce “clean chips” used for paper pulp or as part of the sawmilling operation. “Residuals” is the category of wood fiber generally produced as a by-product (waste product) from the sawmilling process and may include the bark, the sawdust and any other wood fiber (slabs, end cuts, etc.) that is not part of the lumber produced in the milling process. Some wood fiber is referred to as “hog fuel,” a term that refers to a ground up wood fiber product typically used to fuel wood boilers.

Wood fiber that is used to make paper is chipped and must be free of contaminants such as bark, dirt, needles and/or leaves. Other end uses for wood fiber may have tolerances for contaminants, and fiber size and shape, especially when additional processing is included in the manufacturing process (for example if a hammer mill is used to further process wood fiber). On the smallest end of the scale, wood fiber can be sawdust sized particles or smaller.

The moisture content of wood fiber varies by the amount of processing and/or how much time has transpired since the tree was alive. A live standing tree, when felled, could have a moisture content of up to 60% depending on the species and the time of year (i.e. 60% of the weight of this tree is water). Chips produced from recently harvested live trees are called “green chips” The appropriate unit of measure for these chips is green tons. With time and processing, these green chips dry out; air drying alone can produce chips with a moisture content of 20% or slightly below within a time span of days to months depending on the chip size (chips with a high surface area to weight ratio—such as a microchip—can shed moisture more quickly). There are no commercial scale operations air drying chips, as the quality of the chip diminishes when left outside for an extended period of time. When wood fiber is a by-product of kiln dried wood or heated in ovens or driers, moisture content can fall to 10% or less. Wood fiber that has been oven dried can have moisture contents approaching 0%; the unit of measure that applies to wood fiber with a moisture content of zero is the “bone-dry ton.”

Table 1.1 – Types of Wood Fiber

Product	Description
Clean chips	Wood chips free of debris
Dirty chips	Wood chips not free of debris
Bark chips	Chipped bark
Pulp chip	Bark free, produced by chippers that produce uniform sized particles
Fuel Chip	Particles produced by chippers or grinders of varying sizes and shapes
Sawdust	Sawdust from sawmills
Shavings	Residuals from milling and planing

C. Wood Fiber and the Forest Products Industry

When considering wood fiber as a feedstock for value-added manufacturing or energy, it is also helpful to have some understanding of the forest products supply chain, and how or where along this chain the wood fiber originated. Another consideration is whether the wood fiber is the primary product (as in the case of a forest harvesting operation to produce only wood fiber) or a secondary product (byproduct and/or waste product generated in the production of lumber, for example). A very simplified version of the forest products supply chain is presented here.

The forest products supply chain starts at the stump when the tree is harvested. The costs of timber harvest and the price of wood products are such that sawlogs (logs with diameters inside the bark of generally at least six inches) drive the economics of timber harvest. Harvest of smaller diameter material, or of timber that is strictly for wood fiber production, is not currently economically viable due to the low price of the material. However, as a secondary product, material to produce wood fiber can be collected as part of the timber harvest, including tree tops, logs with defects which are unsuitable as sawlogs, and offcuts.

Wood fiber products are produced at mills as byproducts of lumber production. Wood fiber is produced at a sawmill when bark and/or slabs are removed and chipped, and from the green sawdust as part of the sawing, ripping, and/or edging operations. Further down the supply chain, wood fiber is produced at secondary processing facilities—the dry sawdust, shavings, and other material from the planing, milling, or other processing of kiln-dried lumber. Finally, wood fiber is produced as part of the manufacturing of end products, (i.e. end cuts, defective material, etc.). The value of wood fiber products can vary by product properties and market demand. For example, tree tops and small diameter logs in the forest require significant costs to recover including harvesting and transportation costs. The costs of harvest operations are such that harvest for wood fiber alone is not generally financially viable in the Pacific Northwest. However, recovery could be economically feasible as part of harvests that include production of sawlogs.

At the downstream end of the forest products supply chain, the wood fiber may have accrued significant value. Compared to the ton of wood fiber produced as part of a saw timber harvesting operation (i.e. green topwood), a ton of wood fiber produced as part of a millwork's operation (i.e. kiln-dried dust) has had significant value added (i.e. processing, removal of moisture, transportation, etc.). However, if no purchaser is available, wood fiber may have a negative price – producers must pay to have it disposed of.

In the Pacific Northwest, the production of wood fiber products is tied to the production of lumber. The amount of lumber produced in the region depends on a number of factors, but the overriding drivers of production are the rates of home construction, repair, and remodeling, as these are the primary uses of lumber from the region. When the demand for lumber decreases due to market downturns, logging activity slows, leading to reduced availability of wood fiber from both logging and sawmill operations. A decline in logging means fewer trees are harvested and processed, thereby tightening the supply of wood fiber. This constrained supply can raise costs for wood fiber and challenge the development of new markets for wood fiber-based products.

Conversely, if the pulp and paper sectors experience a downturn, it can lead to an overabundance of paper-grade wood chips, often sourced from sawmills or harvested specifically for pulping. This surplus would flood the market, making paper chips significantly cheaper and more accessible. Regional wood fiber markets could opt for the readily available paper chips instead of continuing to support these newly developed wood fiber sources. This dynamic can slow innovation and development in emerging wood fiber industries.

The interplay between these sectors highlights the complexity of wood fiber supply chains and the need for adaptability in market planning. Industries dependent on wood fiber must closely monitor shifts in lumber production and pulp and paper demand to anticipate changes in fiber availability. Strategic coordination between logging operations, sawmills, and secondary wood processors can mitigate supply disruptions and ensure stability for both traditional and emerging fiber markets. Understanding these relationships helps

industry stakeholders navigate economic fluctuations while fostering innovation in the low-value wood fiber market.

2. Infrastructure and Forest Resources

A. Sawmills

Log markets utilizing Olympic Peninsula timber include the Raymond, Aberdeen/Hoquiam, Amanda Park, and Port Angeles log markets. The market area is robust due to the significant acreage under commercial timber production from a variety of private ownerships including TIMOs, REITs, and regional forest product companies. U.S. Route 101, U.S. Route 12, Interstate-5, and State Routes 4, 6, 8, 105, 106, 107, 108, and 113 serve as the major transportation corridors, which allows wood to move relatively cheaply throughout the region.

Major domestic consumers in the Raymond and Aberdeen/Hoquiam markets include Sierra Pacific Industries and Weyerhaeuser. Export opportunities are also available at the Port of Grays Harbor. A number of exporters have operated out of the port through the years. Currently, Pacific Lumber and Shipping (PLS) is the only active exporter in the area.

In the Port Angeles log market, Interfor is the major domestic consumer. It is also the last conifer sawmill left in the northern portion of the Olympic Peninsula. Other mills located in the Puget Sound region occasionally buy logs into various satellite yards around Port Angeles. These logs are then barged to Shelton or Everett for further processing. The export market has historically been robust. Munro and China Forest Products are the two active exporters in the area.

Sawmills provide an important source of fiber for pulp and paper manufacturers in the Pacific Northwest. The majority of this material is transported via water passages such as the Puget Sound or the Columbia River. Due to the low value of chips and other sawmill residuals, these products cannot be economically trucked long distances at a large scale. For the purpose of this report, we analyzed the few mills that would be within 100 miles of the Port of Port Angeles and the Eclipse Industrial Park.

MB&G used the Service Area toolset in ArcGIS Pro to identify the area within 100 trucking miles from Port Angeles. Figure 2.1 shows the mills in this area along with other mills in the region outside of this zone.

Table 2.1 details these mills type, capacity and species purchased.

Table 2.1 – Mills Within 100 Road Miles of Port Angeles

Company	City	County	Mill Type	Species Purchased	Production Capacity	Unit
Conifer Sawmills						
Interfor	Port Angeles	Clallam	Lumber	75% HF, 25% DF	165	MMbf
Sierra Pacific Industries	Shelton	Mason	Lumber	75% DF, 25% HF	500	MMbf
Hardwood Sawmills						
Port Angeles Hardwood	Port Angeles	Clallam	Lumber	100% HWD	50	MMbf
Chips						
Hermann Brothers	Port Angeles	Clallam	Chips	All species	175	M Tons

Shear Brothers Chipping	Shelton	Mason	Chips	All species	150	M Tons

Interfor is the closest mill to the Port of Port Angeles. Located along Highway 101, the mill is approximately 5 road miles away from the port. Interfor is a softwood sawmill that consumes roughly 165 million board feet (MMbf) of sawlogs annually producing dimensional lumber. Interfor produces 100,000 green tons of chips annually. The majority of this is used on site, while some chips are sent via chip van to pulp destinations.

Sierra Pacific has a mill roughly 100 miles away from Port Angeles in Shelton. It is the largest mill by capacity in the State of Washinton. Opened in 2017, it is one of the most modern sawmills in the country. Sierra Pacific uses some residuals on site, but the majority are trucked to nearby pulp destinations. They are the largest producer of residuals in the region.

Port Angeles Hardwoods is located in the Eclipse Industrial Park. They are a hardwood lumber producer. All of their residuals that are not used on site are sent to pulp destinations.

Table 2.2 – Mill Distance to Port Angeles

Company	City	Distance to Port of Port Angeles (miles)	Distance to Eclipse Industrial Park (miles)
Conifer Sawmills			
Interfor	Port Angeles	4.7	1.7
Sierra Pacific Industries	Shelton	100	103
Hardwood Sawmills			
Port Angeles Hardwood	Port Angeles	3.1	0
Chips			
Hermann Brothers	Port Angeles	3.1	0
Shear Brothers Chipping	Shelton	100	103

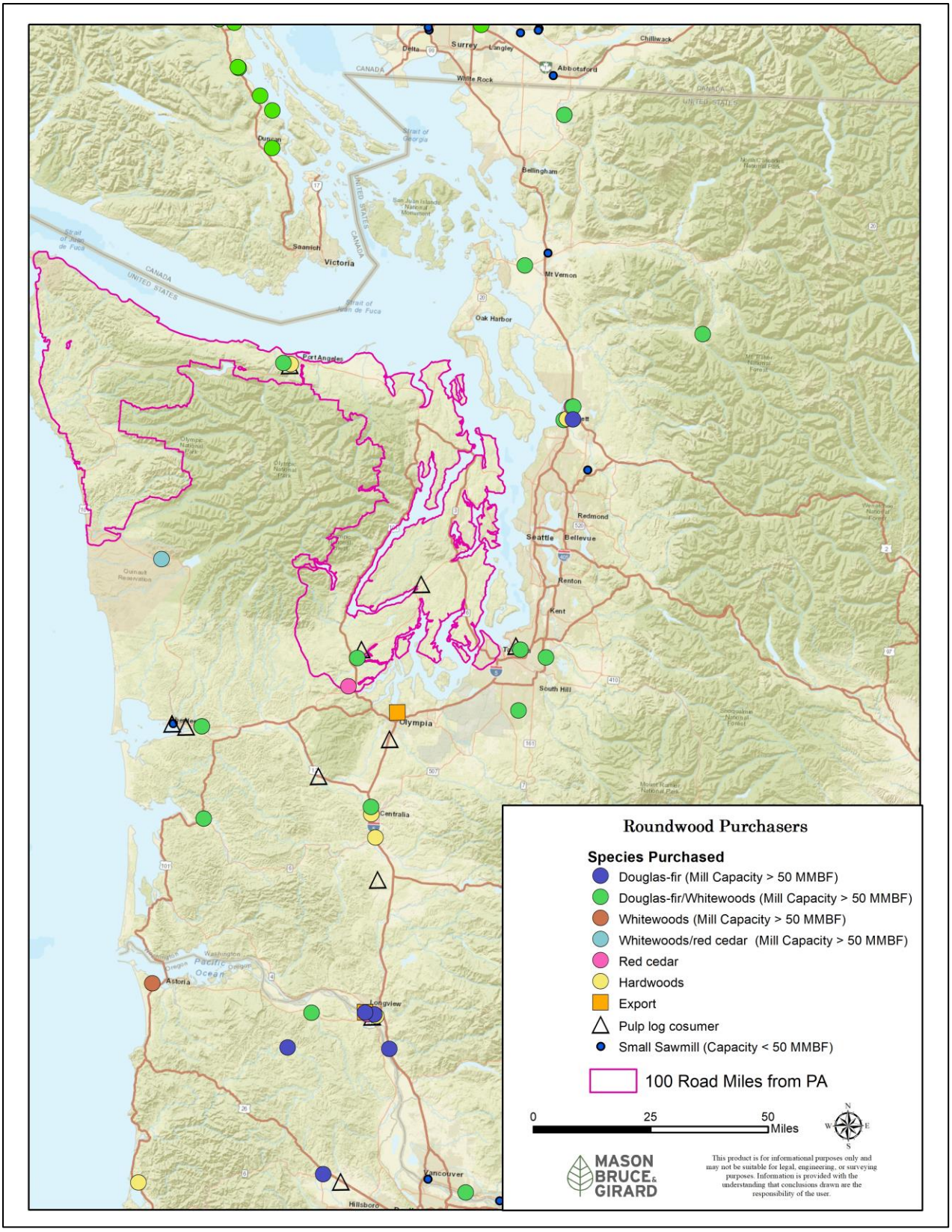

Figure 2.1 – Western Washington Sawmill Locations

B. Pulp mills

The pulp and paper industry has gone through significant shifts, influenced by global economic disruptions, policy changes, environmental pressures, and supply chain restructuring. Pulp and paper production in Washington has experienced contractions due to declining demand, mill curtailments, and an oversupply of residuals like chips and sawdust. The sector also saw a major drop in printing-writing paper shipments, with consistent double-digit percentage declines year-over-year from 2020 onward. Meanwhile, packaging paper – especially containerboard – showed more resilience due to the growth in e-commerce and demand for sustainable packaging. The region has seen several pulp mill closures over the last decade including mills in Tacoma and Cosmopolis.

Longview, Washington, has several pulp producers including Nippon, NORPAC, and WestRock. None of these mills buy pulp logs, rather they rely on sawmill residuals and chips for their fiber needs. This material is either sourced locally from sawmills in the area and trucked to the pulp mill or it is barged along the Columbia River. Residual material is moved from both up and downriver between Longview and the Lewiston/Clarkston area on the Washington-Idaho border.

Port Townsend Paper Company, located in Port Towsend, is the only operating pulp mill on the Olympic Peninsula. They produce mostly kraft pulp, kraft paper, and containerboard. They do not buy any pulp logs but rather rely on chips and residuals. Material is sourced from sawmills within trucking distance as well as sources withing barging distance.

Much like pulp and paper mills in the US, Canadian pulp mills are facing extreme challenges. Pulp and paper mills are major employers and economic anchors for many B.C. communities. Fiber supply has become a huge challenge for these mills. B.C. has seen numerous permanent sawmill closures over the past decade. Historically, Canadian pulp mills have been able to source fiber from Canadian sawmills, but with these closures, pulp mills in B.C. have been forced to source fiber from the states. Currently pulp mills in B.C. are barging materials from Washington and Oregon, sometimes as far as California. Chips are being exported out of Port Angeles to destinations in Canada.

C. Wood Product Barge Terminals and Tugboat Availability

Many of Washington's pulp and paper mills were built to take advantage of water transportation. Maritime transportation of mill residuals is far less costly than truck or rail and allows for residual materials to be moved much greater distances than by truck or rail. There is a robust existing network of barge loading and unloading facilities along Washington's rivers and marine routes (Figure 2.2). Most of these terminals are attached to sawmills, however there are a few whole log chippers located along waterways.

Paper mills located in Port Townsend and British Columbia rely on residuals and recycled materials transported along the Pacific Coast and the Puget Sound. Paper mills located in Longview and Clearwater, Idaho, rely on materials transported along the Columbia River. Ocean barging can be disrupted by seasonal weather conditions, while river transport is much more consistent with relatively few delays from rough waters. Currently, paper and pulp mills are the only destination for chips transported by barge. Drax announced a new pellet manufacturing facility in Longview that potentially could use chips transported along the Columbia River, however that project seems to be on hold at the time of this reporting.

There are many companies that run tugboats in the region. While these companies all transport forest products and mill residuals, they require back hauls of other products to ensure economic viability. Dunlap Towing Company, based out of LaConner, Washington, offers maritime towing and assisted services throughout the Puget Sound, along the Pacific Coast into Canada, and to Alaska. Dunlap hauls both mill residuals and recycled materials to both Port Townsend Paper Company and Paper Excellence in British Columbia. Tidewater, based out of Vancouver, Washington, currently only hauls mill residuals along the Columbia River. Tidewater can move material from Warrenton, Oregon, all the way to Clearwater, Idaho, via the Columbia and Snake Rivers. Island Tug and Barge Company, based in Seattle, specializes in barge transportation throughout the Puget Sound, Alaska, and British Columbia. Island moves material for both Port Townsend Paper as well as Paper Excellence. Sause Brothers, headquartered in Coos Bay, Oregon, runs both ocean-going barges in the Pacific as well as river going barges. The existing towboat capacity in the region is large enough to support a facility requiring chips in Port Angeles.

For the purposes of this study, we highlighted known barge facilities and their distance from the port and Port Angeles. These included terminals in coastal Oregon, coastal Washington, and British Columbia. We do not consider the Columbia River Region as a potential source of fiber. The existing demand for chips on the river combined with the differences between river- and ocean-going barges, make it unlikely a facility in Port Angeles would buy chips from facilities on the Columbia or Snake River. Table 2.3 has a list of barge terminals and their distance to the Port of Port Angeles.

Currently the Port of Port Angeles is exporting wood chips to pulp mills in Canada. The port does not have the existing infrastructure to offload barges with wood chips.

Table 2.3 – Barging Terminal Locations

Terminal City	State/Province	Distance to Port of Port Angeles (nautical miles)
Hoquiam	Washington	195
Junction City	Washington	203
Tacoma	Washington	107
Everett	Washington	75
Coos Bay	Oregon	440
Cowichan Bay	British Columbia	58
Ladysmith	British Columbia	81
Port Alberni	British Columbia	141
Alberni	British Columbia	130
Richmond	British Columbia	102
Vancouver	British Columbia	101
Delta	British Columbia	105
Surrey	British Columbia	112
Pitt Meadows	British Columbia	118
Barnston Island	British Columbia	119
S and R	British Columbia	121
Langley	British Columbia	132
Maple Ridge	British Columbia	135

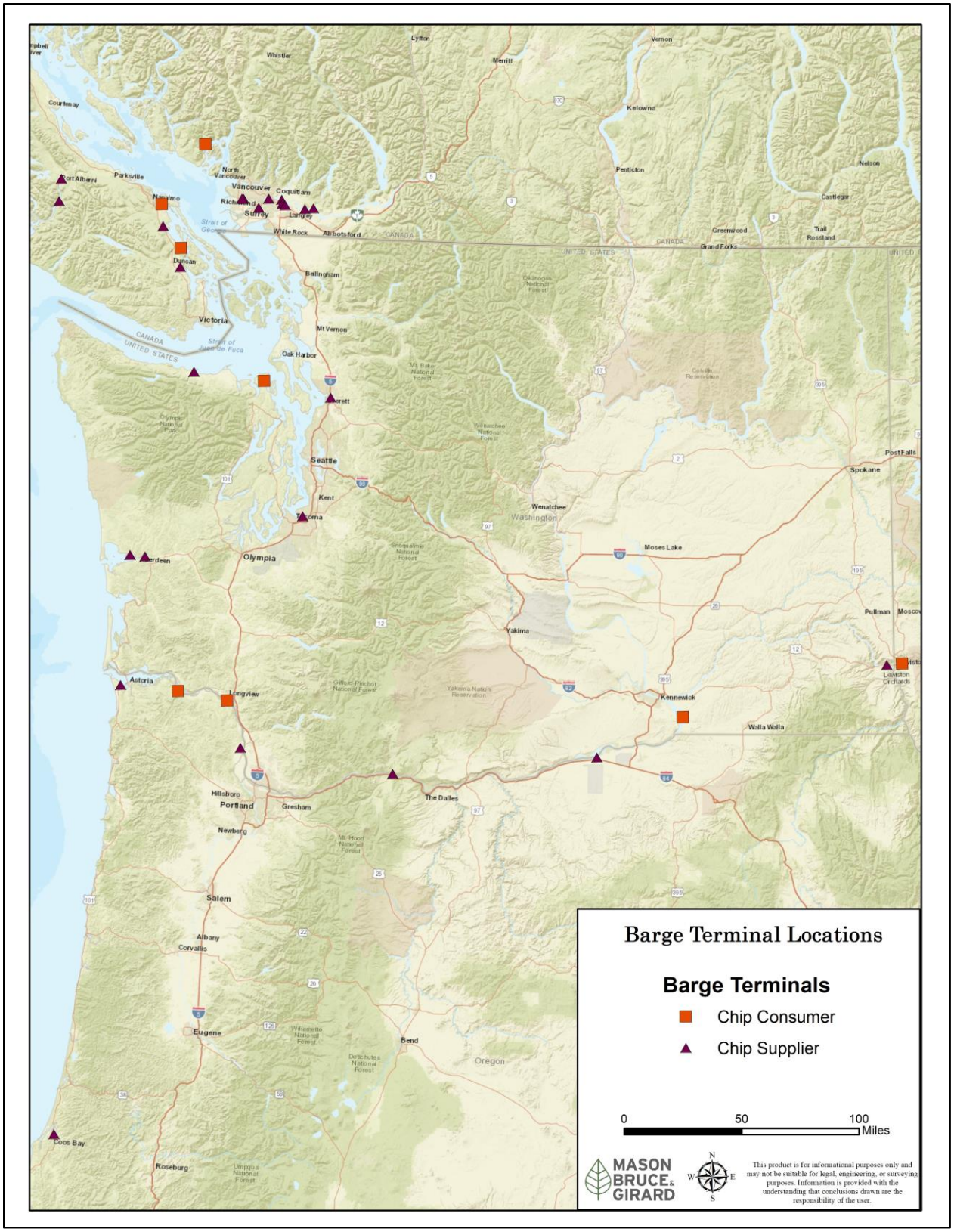

Figure 2.2 – Barge Terminal Locations

3. Long-Term Fiber Supply Outlook

A. Roundwood

Investment in manufacturing infrastructure is capital intensive. In the wood products industry, certainty of fiber supply is a key consideration. In this section we evaluate the potential supply of pulp logs over 20 years for properties within 100 miles of the Port of Port Angeles[1] and in coastal British Columbia (Figure 4.1).[2]

Due to differences in forest management policy, we approached this analysis differently for private lands compared to Washington DNR-managed lands, the Olympic National Forest, and provincial lands in B.C. Private land harvests are based on landowner objectives and market conditions. For these lands, we based our estimates on inventory data. Harvest levels on DNR lands, the Olympic National Forest, and B.C. lands are set by policy. We used policy trends to estimate future harvest.

For all landowners, volume was reported for saw logs. To estimate pulp log volumes, we used an internally developed factor. MB&G analysis has found that pulp volume adds 8% to the harvest volumes from Douglas-fir, and 12% to the harvest volumes from western hemlock and other conifers. Because the analysis area and coastal B.C. contain a mix of conifer species, we estimate pulp volume is 10% of the saw log volume. We converted the board foot volume to tons, based on conversion factors from the Washington Department of Revenue of 7.5 tons for Douglas-fir per thousand board feet (Mbf) and 8.25 tons for western hemlock per Mbf.

We estimated future private land harvest, based on growth rates calculated from Forest Inventory and Analysis (FIA) data and estimated available acres on industrial timber lands. FIA is the U.S. Forest Service nationwide forest inventory program. FIA plots are located on all landownership types (large private landowners, small private landowners, public lands).

Table 3.1 – Forested Acres by Owner Type Within 100 Miles of the Port of Port Angeles.

Owner Type	Acres*
Conservation	17,839
Federal Government	389,332
Forestry Department	524,757
NIPF**	192,738
Other	2,590
Real Estate	7,652
State and Local Government	442,170
Utility	333
Total	**1,577,410**

** Less Urban Growth Areas*

*** Limited to parcels where forested acres > 5*

[1] Excluding National Park and federally designated Wilderness areas.

[2] Oregon is not included as the prevalence of mills and the relative lack of coastal barging facilities makes shipping logs unlikely.

FIA data for private lands in the analysis area show an average growth rate of 0.82 Mbf per acre per year.[3] Based on a 2021 land ownership layer, Rogers (2021), there are about 525,000 acres of forest owned by large forestland owners. Using a conservative estimate that 20% of the land is available for harvest due to forest practices regulations and operability constraints, 420,000 acres are available for harvest. Based on FIA growth rates, these lands could produce about 345 MMbf per year. This is more than recent harvest levels, which averaged 255 MMbf between 2016 and 2023, based on data from the Department of Revenue for Clallam, Jefferson, Kitsap, and Mason counties, but less than 450 MMbf cut annually in the mid-2000s. It is likely that private forest stands are in a period of regrowth following relatively high harvest levels 20 years ago and it is equally likely that future harvest levels will increase from current levels. With a conservative assumption that harvest will remain approximately 255 MMbf per year, private lands will produce 200,800 tons of pulpwood annually. EFM, a timber investment management organization, recently purchased lands formerly owned by Rayonier. EFA announced that it established a carbon project on the property. The impact of the carbon project on harvest volumes over the next 20 years is unknown.

We estimated future DNR harvest based on projections from DNR's "sustainable harvest calculation," which estimates harvest levels for 100 years, though future harvest levels are subject to change.[4] We estimate B.C.'s harvest based on published "annual allowable cut" reports. Additionally, actual harvest from both DNR and B.C. is generally below the projected levels.[5] We subtracted the average percentage of under harvest from the published harvest levels of DNR and the Ministry of Foresty to estimate future supply from these lands.

DNR projects harvest levels by sustainable harvest unit. Most DNR lands in the analysis area are in four sustainable harvest units (Olympic Experimental State Forest (OESF), Clallam, Jefferson, and Kitsap).[6] Projections for 2025-2034 and 2035-2044 show harvest levels of 84.5 MMbf and 90.8 MMbf annually, respectively.[7] From 2015-2024, DNR realized about 85-95% of the planned harvest levels in the OESF, Clallam, and Jefferson units, and 142% of the planned harvest in the Kitsap unit. Assuming DNR will harvest 100% of projected volumes in the Kitsap unit and will harvest the other units at the same rate of planned volume as in the 2015-2024 period, DNR's expected annual harvest in 2025-2034 and 2035-2044 is 73.2 MMbf and 78.4 MMbf, respectively. Based on these values, the projected pulp wood volume is up to 57,700 and 61,800 tons annually. However, future constraints on harvest of older timber may reduce harvest levels.

[3] Based on a 20-year growth projection.

[4] https://www.dnr.wa.gov/publications/amp_sepa_nonpro_shc_feis_app_g.pdf?uzo06i

[5] https://www.dnr.wa.gov/publications/em_bc_bnr_soslcr1_02062024.pdf

[6] Additional lands are in a fifth sustainable harvest unit for Federally Granted and State Forest Purchase Lands. This unit pools lands across Western Washington. These lands make up a relatively small fraction of DNR lands within the analysis area.

[7] DNR is currently working on calculating a sustainable harvest level for the 2025-2034 period. This will likely result in different harvest levels than reported here.

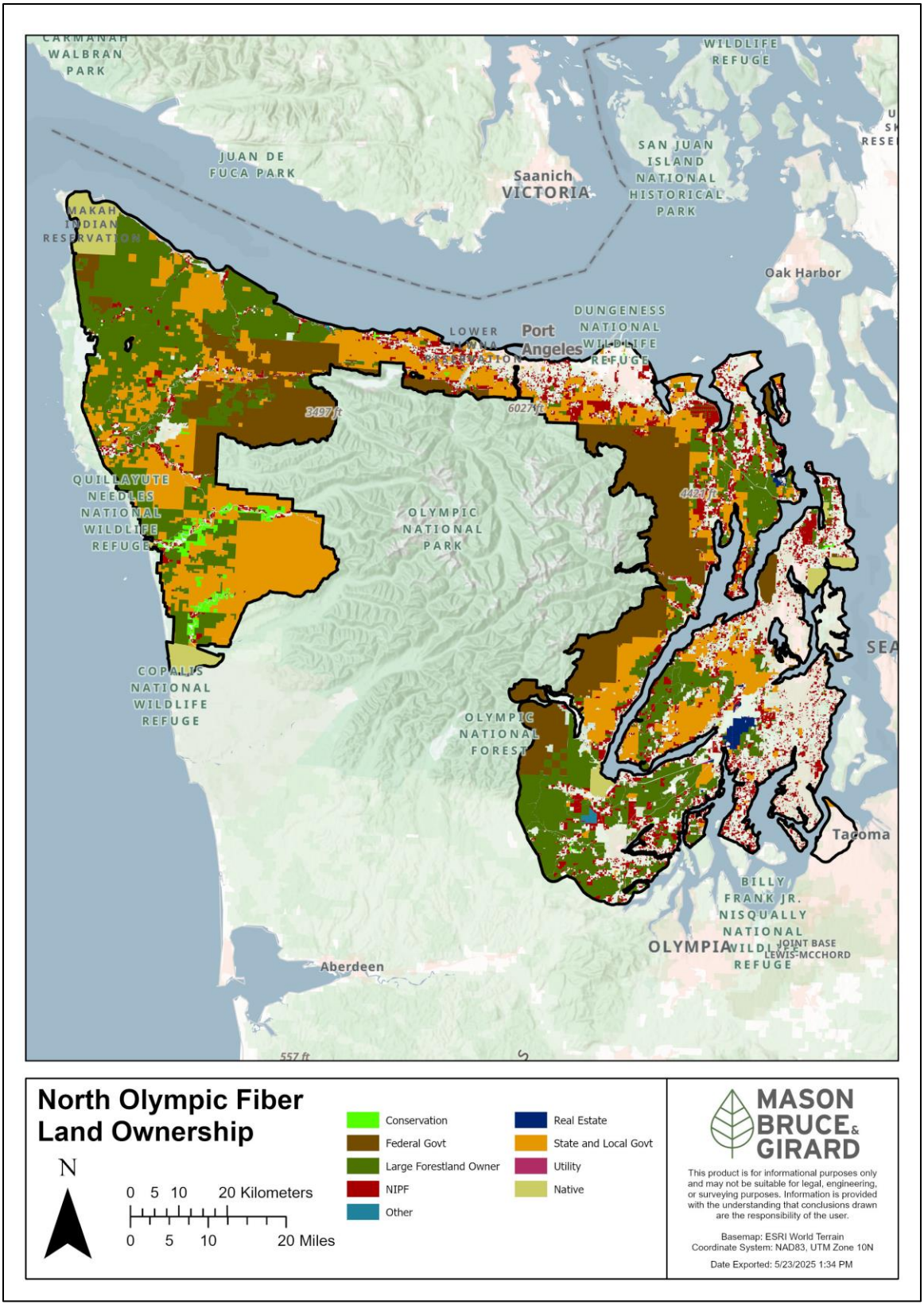

Figure 3.1 – North Olympic Land Ownership by Type within 100 miles of the Port of Port Angeles.

The annual allowable cut (AAC) for coastal B.C. is about 13.9 million cubic meters. Based on data from 2022, actual harvest was 97% of the AAC. This was before B.C. introduced a temporary deferral on old growth forest areas. A long-term old growth policy has yet to be released. Assuming a significant (20%) drop in the AAC results in an annual harvest of 11.1 million cubic meters. The potential pulpwood production based on this volume is up to 1,500,000 tons annually. B.C. mills have the capacity to process this material. Potential export volumes would depend on price.

The U.S. Forest Service sets annual targets for harvest on National Forests but does not provide long-term projections of harvest. For these lands we estimate harvest will continue at a rate equal to the 2022-2024 average. Currently, the Forest Service is considering changes to the Northwest Forest Plan, the guiding policy document for Pacific Northwest National Forests west of the Cascade Mountains. Changes to this policy should change harvest levels on the Olympic National Forest in the analysis area, but any change is likely to be small compared to the overall harvest in the analysis area. Additionally, the Trump Administration released an Executive Order to increase harvests from federal lands.[8] The Forest Service is aiming for a 25% increase in harvest. We do not include additional harvest in our projection based on this Executive Order because implementation is uncertain; the 25% target applies to the system of national forests and may not necessarily result in a 25% increase from the Olympic National Forest, and because future administrations may rescind the executive order.

From 2022-2024, the average annual harvest from the Olympic National Forest was 17.3 MMbf. Based on this, we estimate the future annual pulp log production will be up to 13,600 tons.

We estimate a total saw log harvest of 315 MMbf to 321 MMbf from the analysis area, with an additional 1,960 MMbf of log harvest projected in coastal B.C. (Table 3.2). Based on these harvest levels, between 272,100 tons and 276,200 tons of pulp logs could be produced in the analysis area through 2045 (Table 3.2). In poor market conditions, pulp logs may not be removed from the forest. As a result, actual production may not reach these levels. We estimate pulp log production in B.C. will be up to 1,500,000 tons.

Table 3.2 – Estimated annual saw and pulp log production through 2045

Region	Landowner	Annual saw log production (MMbf)	Annual pulp log production (Tons)
Within 100 miles of the Port of Port Angeles	**Large forestland owners**	225	200,800
	DNR	73.2-78.4	57,700-61,800
	Olympic National Forest	17.3	13,600
	Analysis area total	315.5-320.7	272,100-276,200
British Columbia	**Provincial lands**	1,960	1,500,000

**Removal of pulp logs from the forest depends on market conditions*

B. Mill Residuals

Mill residuals are any byproduct from forest products that are produced during the manufacturing process. This can be wood chips, bark, shavings, or sawdust. Historically, pulp and paper mills in the Pacific Northwest

[8] https://www.whitehouse.gov/presidential-actions/2025/03/immediate-expansion-of-american-timber-production/

would purchase roundwood to use in pulp production. As pulp mills began closing in the region and competition for material used in pulp production decreased, mills shifted to relying on mill residuals for pulp and paper production.

Another use for this material is hog fuel. The term hog fuel refers to when this material is used as feed material for wood fiber powered plants. Hog fuel is burned to produce heat and steam, which may be used for drying lumber, other industrial processes, or electricity generation. The most common use for hog fuel in the Pacific Northwest is to produce heat to dry lumber.

Almost all the pulp and paper mills still open in 2025 rely on marine transport as a source of fiber delivery. Papermills along the Snake and Columbia rivers obtain fiber from sawmills along the Columbia River that is transported by barge up and down the river. Port Townsend Paper in Washington obtains fiber via barge on the Puget Sound, as well as trucked in fiber from local sources. Pulp and paper mills in British Columbia import both mill residuals and pulp logs from various locations in B.C., Washington, and Oregon. Mills have been known to source fiber from as far south as Coos Bay for use in British Columbia. As of 2025, both pulp logs and chips are being exported from the Port of Port Angeles to destinations in British Columbia.

The Pacific Northwest has a robust sawmill infrastructure, as discussed earlier in this report. Table 3.3 shows available residual by type for different regions in the Pacific Northwest. These volumes represent numbers based on reported mill capacity and do not account for utilization. Mill utilization will vary by region, year, and type of mill.

Table 3.3 – PNW Sawmill Residual Production, 2025 – Units: Green Tons

Region	Softwood Chips	Softwood Sawdust/Shavings	Softwood Bark	Hardwood Chips	Hardwood Sawdust/Shavings	Hardwood Bark
Coastal Oregon	2,908,470	1,260,337	678,643	220,440	95,524	51,436
Puget Sound/Grays Harbor	2,028,480	879,008	473,312	105,000	45,500	24,500
Columbia River	3,218,820	1,394,822	751,058	378,000	163,800	88,200
Coastal British Columbia	1,664,697	721,369	388,429	-	-	-

**volumes are reported at mill capacity and do not account for mill utilization.*

**Source: FORISK Consulting*

Volumes for Coastal Oregon include mills in Coos, Douglas, Lincoln, Lane, and Tillamook counties. Most of the mill residuals in this region are being used as hog fuel on site. Southport lumber in Coos Bay has an onsite barge loading facility and ships chips as far north as British Columbia.

Volumes in the Puget Sound region include mills in Whatcom, Skagit, Snohomish, King, Pierce, Thurston, Mason, Grays Harbor, Kitsap, Jefferson, and Clallam counties. While some of this material is used for hog fuel, much of it is shipped to pulp and paper mills in Port Townsend and British Columbia. There are residual export facilities in Everrett, Tacoma, Port Angeles, Junction City, and Hoquiam.

Volumes for the Columbia River region include mills in Pacific, Wahkiakum, Lewis. Cowlitz, Clark, Skamania, and Klickitat counties in Washington and Clatsop, Columbia, Washington, Multnomah, Hood River, and Morrow counties in Oregon. The Columbia River has long been used to transport forest products. As of 2025, there are residual users in Wauna, Oregon, Longview, Washington, Wallula, Washington, and Lewiston, Idaho. Mills along the Columbia River load barges with residuals to be used up and downriver of them.

Volumes for the Coastal British Columbia region include mills along the Straits and Pacific Ocean. Residuals sold in this region are used mainly to feed domestic pulp and paper mills. The decrease in sawmill outputs in British Columbia have forced the pulp and paper mills in the region to begin to import needed fiber from the United States.

If a manufacturer were to build a facility in Port Angeles, there would be enough available mill residual fiber material to feed a small to medium-sized producer. Any manufacturer would require ample space to store residuals to account for fluctuations in mill utilization and weather restrictions for marine transportation.

C. Slash/Forest Residuals

The Washington Forest Protection Association reports that approximately 12% of a tree by volume is slash.[9] Slash includes limbs, topwood, and off cuts. Slash volumes are typically between 35 and 50 tons per acre on the Olympic Peninsula. The challenge to utilization of slash is recovery. Unlike logs, which can be quickly and compactly loaded on log trucks, slash loading can be time consuming due to the quantity that can be loaded per turn of a backhoe. Because slash piles are relatively low in density—the U.S. Forest Service estimates that about one-third of their volume is airspace—they result in inefficient use of truck space during transport.[10] Finally, slash contains a range of materials, including wood, bark, needles, and soil. Not all of these materials may be appropriate for end use. If not cleaned in the woods, this results in transport of material with no value, increasing costs per ton of material utilized.

An option for utilizing slash is in-woods chipping. This has not yet been shown to be cost effective in Washington. It is also operationally challenging since forest roads are not typically designed to support chip trucks. As a result, MB&G does not consider slash or similar forest residuals to be a viable source of material at this time.

D. Green Waste

Green waste is organic waste produced by households. Yard waste is the largest component of this, followed by construction and demolition debris. The volume of production is related to the size of the local population and productivity of yard plants. The U.S. Forest Service has estimated the wood waste component of green waste by county. Clallam and Jefferson counties are both estimated to generate between 1 and 5 dry tons of waste per square mile.

Recovery of green waste is a challenge. Households each generate relatively small quantities and are distributed across a large area. In rural areas, green waste may be composted or burned on site by landowners.

[9] https://www.wfpa.org/climate-change-solutions/forest-statistics/#/

[10] https://www.fs.usda.gov/pnw/pubs/pnw_gtr872.pdf

Household green waste can include material unsuitable for the desired product[11] or non-organic contaminates like plastic and metal. Household wood waste is likely best utilized in processes where contaminants pose relatively low risk to the quality of the final product, such as bioenergy production.

Due to the challenges of collecting and ensuring appropriate quality material, MB&G does not consider green waste a potential source of material for manufactured wood products.

4. Log and Chip Prices

Log prices are a key factor affecting lumber production in the Pacific Northwest. Since mill residuals are a key source of wood fiber in the region, dynamics in the log market affect wood fiber availability. This section provides important data on historical, current, and potential future log and chip prices.

A. Historical Saw Log Prices

Long-term real price trends for Douglas-fir #2 and western hemlock and fir (Hem-fir) #2 delivered sawlogs for the Puget Sound price region are illustrated in Figure 4.1. These prices are an average of subscription-based pricing services and prices made available by WDNR. Nominal prices have been converted to real 2025 dollars using the All-Commodities Producer Price Index.

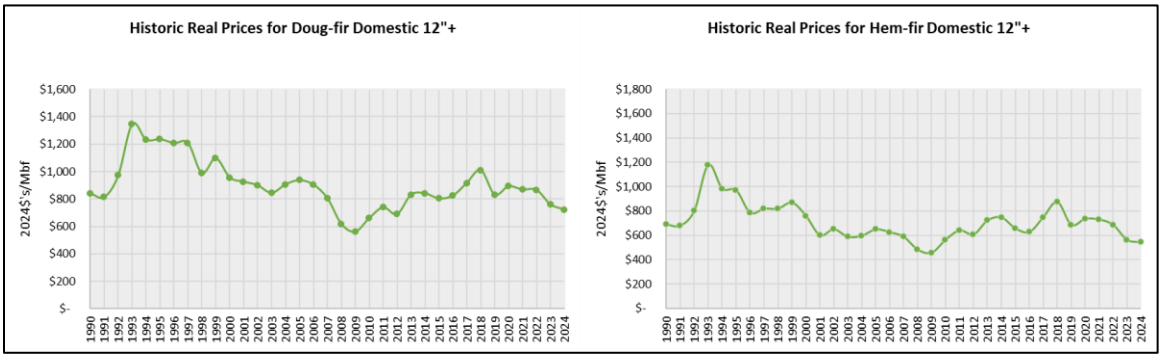

Figure 4.1 – Historical Real Price Trends for Douglas-fir and Hem-fir #2 Sawlogs.

The run-up in prices in the early 1990's was an effect of the curtailment of timber harvest on federal lands. By the end of the 1990s, regional timber markets had adjusted to the new realities of timber supply. Prices declined steadily until the housing boom began to put pressure on prices in the early 2000's. Log prices started to improve but then began falling as housing construction deteriorated, reaching a low point in March 2009 in the aftermath of the Global Financial Crisis.

Upon bottoming out in early 2009, log prices recovered in 2010, led at first by surging log exports to China, and followed by a gradual strengthening of the domestic economy.

Prices peaked in 2018 due to a combination of healthy domestic and offshore demand, tariffs on Canadian lumber, and a disruption to the log supply chain caused by a combination of bad weather and unusually severe fire seasons. On an inflation-adjusted basis, some of the highest log prices in over 20 years were experienced in 2018. Prices fell in 2019 due to an anemic lumber market and the escalating trade dispute with

[11] For example, grass clippings would be unsuitable for wood pellet production.

China that resulted in tariffs on Douglas-fir, hemlock, true fir, pine, and other species sawlogs from the Pacific Northwest.

In 2020, the COVID-19 pandemic hit, but log prices outperformed expectations and surpassed the 2019 price. A roller coaster of finished product prices in the wake of the pandemic supply chain disruptions followed in 2021 and 2022. Higher mortgage rates cooled the housing markets from mid-2022 and throughout 2023, softening log prices significantly. In 2024, further softening of log prices occurred as well as reduced log price volatility.

B. Current Saw Log Prices

Table 4.1 lists delivered prices for domestic and export Douglas-fir and Hem-fir logs, for the most recently available 12 months of data in the Coastal Washington log market. We focus on Douglas-fir and Hem-fir prices for #2 and #3 sawlog grades because these four products constitute most of the harvest volume in the market area. Average prices for various time periods are also shown at the bottom of Table 4.1 to illustrate how prices have changed over the past year. Table 4.1.

Washington DNR conducts a Delivered Log Price Survey each month, receiving price quotes from selected forest product producers and purchasers in Washington, Oregon, and Idaho. The prices are aggregated by species and log grades. Price summaries are published by marketing area within Washington. Reported log prices are for domestically processed logs and reflect what the purchaser is willing to pay for a log delivered at the mill.

Table 4.1 – WDNR Delivered Log Prices for the Coastal Washington Log Market.

Year-Month	Douglas-fir ($/Mbf)		Hem-fir ($/Mbf)	
	#2 Saw	#3/#4 Saw	#2 Saw	#3/#4 Saw
	12"+[†]	8-11"	12"+	8-11"
2024-05	$660	$800	$563	$563
2024-06	$734	$699	$575	$538
2024-07	$850	$699	$519	$524
2024-08	$856	$750	$575	$538
2024-09	$725	$704	$550	$533
2024-10	$853	$738	$570	$538
2024-11	$769	$658	$488	$489
2024-12	$753	$700	$575	$558
2025-01	$731	$720	$505	$472
2025-02	$748	$730	$515	$460
2025-03	$790	$695	$556	$526
2025-04	$760	$748	$500	$500
Avg – Past 12 Mos.	**$769**	**$720**	**$541**	**$520**
Avg – Past 6 Mos.	**$759**	**$709**	**$523**	**$501**
Avg – Past 3 Mos.	**$766**	**$724**	**$524**	**$495**
12 Mo. Change (%)	**15.15%**	**-6.50%**	**-11.19%**	**-11.19%**

[†] Log diameters are measured inside the bark on the small end of the log.

C. Future Saw Log Prices

Our discussion of future log prices is based on log price expectations provided by respondents to our Fall 2024 Timberland Market Survey. Every fall, MB&G conducts its annual timberland market survey, which queries major market participants for their views on log prices over the next decade. Respondents include most major TIMOs and REITs with acres under management in the Pacific Northwest. Other respondents are regional forest product companies, lenders, appraisers, and other investment advisors. Our most recent survey was conducted in September 2024.

Our survey focuses on Douglas-fir and hemlock since these two species comprise most of the regional timber volumes. In the survey, we asked respondents to provide expected delivered log prices in the western Oregon and Washington investment region for Douglas-fir and hemlock by sort and grade for 2025, 2029, and 2034. All prices are in real dollars, excluding inflation.

Figure 4.2 illustrates price trends from MB&G's Fall Market Survey forecast for domestic and export Douglas-fir and Hem-fir, respectively. Price forecasts have been indexed to 2025 (Index = 1.00) and projected forward. The resulting index for a given year is the projected price divided by the 2025 price.

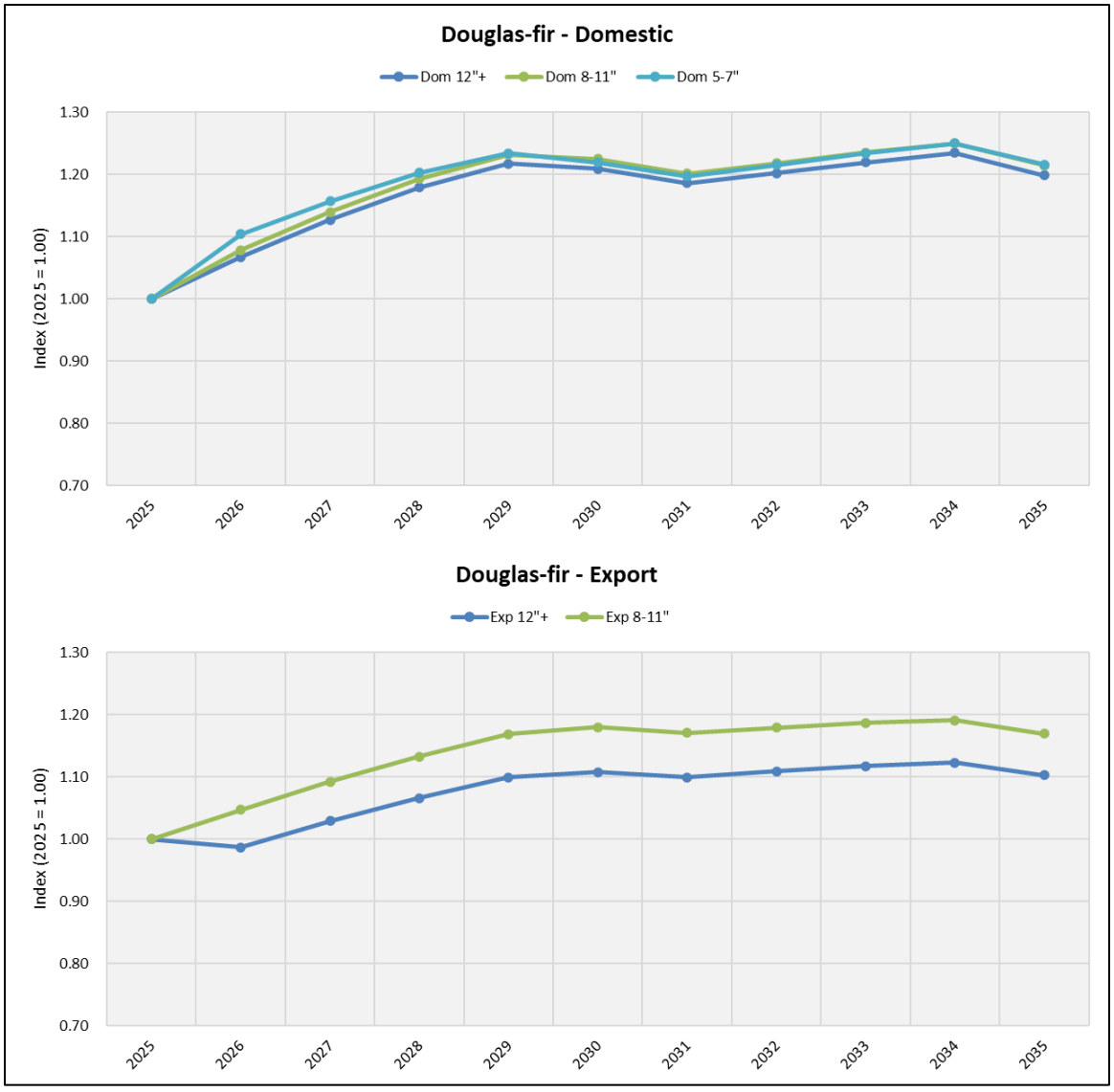

Figure 4.2 – Indexed Log Price Forecasts for Douglas-fir, Domestic and Export Sorts.

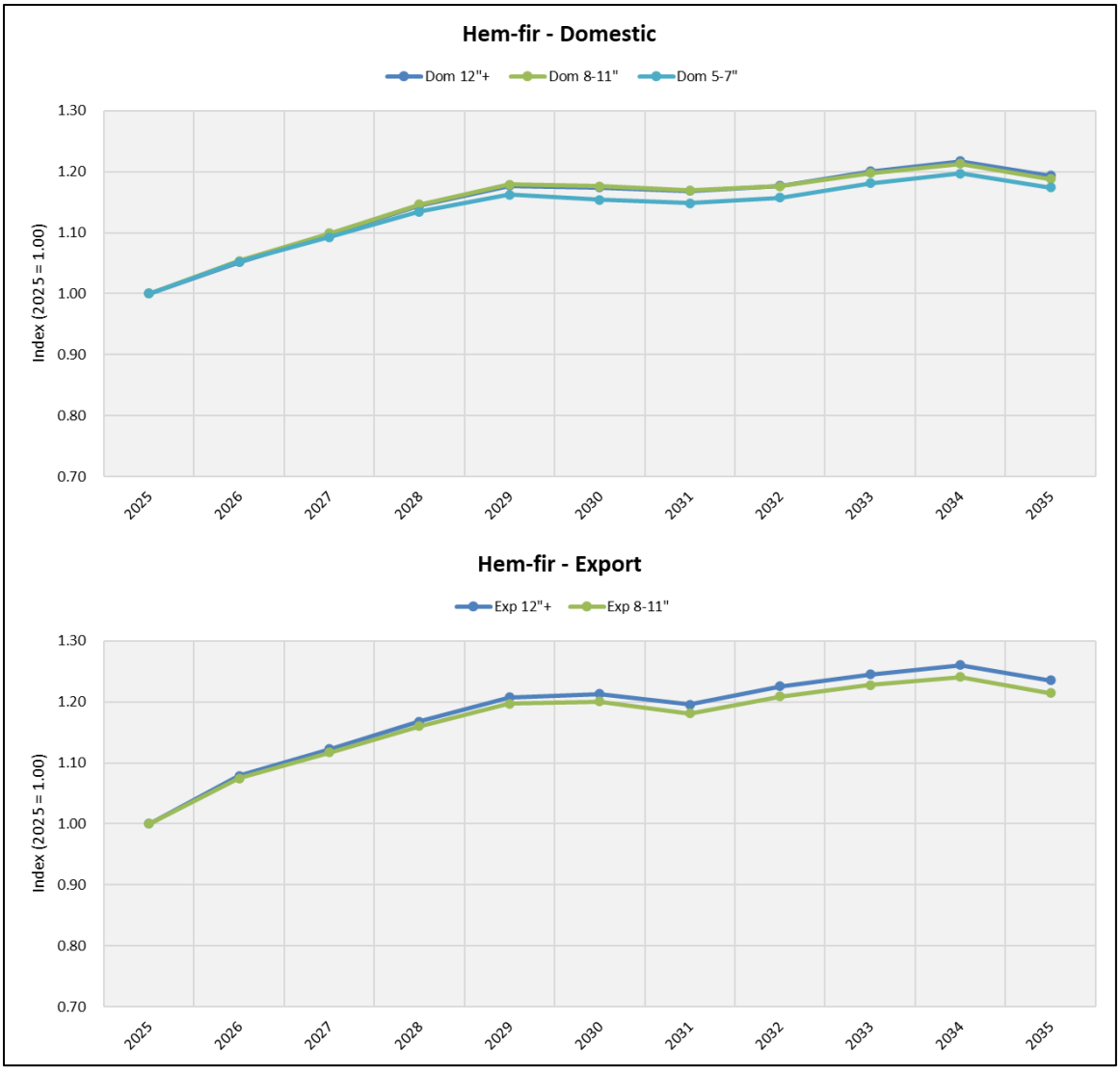

Figure 4.3 – Indexed Log Price Forecasts (MB&G and FEA) for Hem-fir, Domestic and Export Sorts, for Washington State Ports.

D. Historic Pulp Log and Chip Prices

From 2019 to 2023, the wood products and pulp industry underwent significant shifts influenced by global economic disruptions, policy changes, and supply chain restructuring. The COVID-19 pandemic, geopolitical tensions like the Russia-Ukraine conflict, and major changes in energy policy globally, all contributed to a highly volatile and dynamic environment for producers, exporters, and consumers.

Pulp and paper production experienced multiple contractions due to declining demand, mill curtailments, and an oversupply of residuals like chips and sawdust. The sector also saw a major drop in printing-writing paper shipments, with consistent double-digit percentage declines year-over-year from 2020 onward. Meanwhile, packaging paper, especially containerboard, showed more resilience due to the growth in e-commerce and demand for sustainable packaging.

The most consistent trend across these years was the steady decline in U.S. printing and writing paper shipments. The American Forest & Paper Association (AF&PA) reported shipment decreases between 20–35% in

most months compared to the prior year. For example, in 2023, shipments dropped by 25% in July and 21% in September compared to 2022. U.S. purchases of these grades were down even further—over 30% in some months.

Inventory adjustments followed, but mills were clearly scaling back operations, and several permanently shut down or curtailed output. The closure of the Catalyst Paper mill in Powell River, B.C. in 2023 highlighted a long-term trend of mill closures throughout the Pacific Northwest and Canada. In fact, Western Washington alone lost at least seven pulp mills since the 1960s, leaving just three current operational mills.

A chronic surplus of residual chips from sawmills and veneer mills developed after 2021. Mills had trouble absorbing the volume, particularly as more pulp mills went offline for maintenance or permanent closure. By late 2023, chip buyers reported it was the worst chip market in nearly five decades. This market imbalance led to pricing pressure, particularly on conifer chips, while alder and hardwood chips retained relatively more value. Even so, pulp log volumes were increasingly left in the brush as sellers couldn't find buyers at break-even prices.

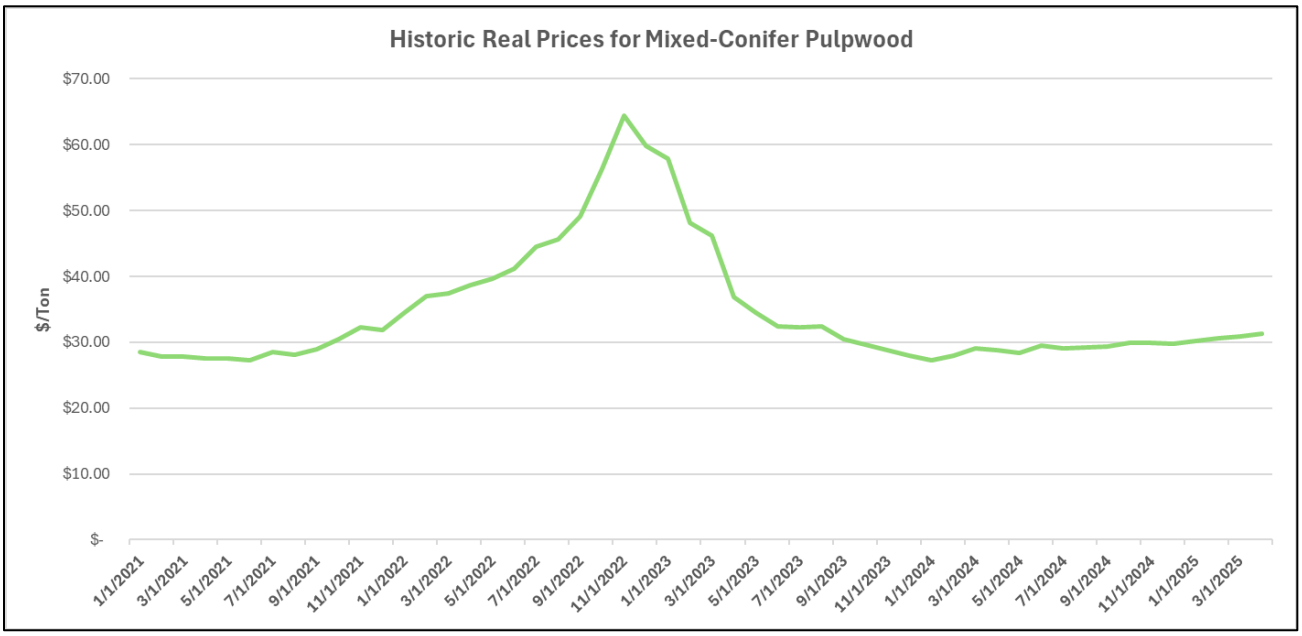

Figure 4.4 – Historic Real Price Trends for Mixed-Conifer Pulpwood

E. Current Pulp Log and Chip Prices

Consumers of wood fiber in the Puget Sound regions have shifted in recent years away from pulp logs to relying on chips and mill residuals. Current pulp log demand in the Puget Sound region is relegated to logging operations that are within a short haul distance to a whole log chipper. Whole log chippers are reporting inventories below their capacity but have been hesitant to raise log prices to expand their purchasing foot-print. Pulp mills in Western Washington are the whole log chippers' primary customer along with Canadian destinations. Canadians are presently buying from six different suppliers in the Puget Sound Region. All chips destined for Canada are being delivered from locations with access to a barge loading facility.

Low pulpwood prices have led to many landowners leaving pulp logs on the landings or bringing them back into the harvest units. Pulpwood prices have remained flat over the previous three years with little sign of improvement.

Sawmills in both the Puget Sound and Columbia River markets are struggling to find local buyers for sawdust and shavings. Instead, mill residuals are being shipped to Canadian mills from both the Puget Sound and Western Oregon markets. Similarly, sawmills struggle to find purchasers for bark, other than landscaping companies. We talked to one mill manager who said they struggle to "give away" their saw dust and bark. These residuals are also more difficult to transport compared to chips. Pulp chips are cleaner than residual chips and are uniform in size making them easier to utilize in pulp manufacturing.

Table 4.2 – Softwood Chip Delivered Prices by Region ($/BDT) – Source Forisk Wood Fiber Review

Year-Month	Puget Sound		Columbia River		Willamette Valley	
	Pulpwood Chips	Residual Chips	Pulpwood Chips	Residual Chips	Pulpwood Chips	Residual Chips
2024 Q1	$115	$85	$115	$85	$124	$86
2024 Q4	$105	$85	$105	$85	$132	$85
2025 Q1	$106	$87	$106	$87	$150	$88

Table 4.3 – Softwood Sawdust and Shaving Delivered Prices by Region ($/BDT) – Source Forisk Wood Fiber Review

Year-Month	Puget Sound		Columbia River		Willamette Valley	
	Sawdust	Shavings	Sawdust	Shavings	Sawdust	Shavings
2024 Q1	$26	$34	$26	$34	$27	$34
2024 Q4	$28	$36	$28	$36	$28	$36
2025 Q1	$27	$35	$27	$35	$29	$35

F. Future Pulp Log and Chip Prices

The future of pulp and chip markets in Washington are in flux and potentially at risk. Without new purchasers of pulp logs and chips, the market is very fragile. With very few buyers, and reliance on shipments to Canada, the loss of one or more of the current market participants could have a severe impact on the market. Investment in the pulp and paper sector in the Pacific Northwest has almost completely stopped. Drax announced a wood pellet manufacturing facility in Longview, however the project seems to be making little headway. Cosmo Specialty Fibers in Cosmopolis was on track to reopen the shuttered pulp facility but there is concern that inadequate investment will delay reopening. A new entrant in the market for pulp logs, chips, and residual would provide a much-needed destination for this material and help support the broader timber economy. A new entry to the market would initially drive prices up, as existing purchasers are forced to compete. However, long-term prices would stabilize, and if the increase in demand were there, it could potentially lead to investment in new whole log chippers in areas where there is little to no pulp log market.

5. Logging and Transportation Costs

A. Logging Costs

Logging costs on the Olympic Peninsula vary based on topography, type of harvest, and volume removed. For example, ground that is flat and can be logged using ground-based equipment will have lower logging costs than ground that is steep and requires cable equipment. MB&G has developed regression equations using a set of logging cost data from ground and cable-based logging operations. The equations calculate an on-board-truck (OBT) cost based on harvest volume per acre that includes falling, yarding, processing, and loading. The cost equations have been applied to calculate average logging cost by system and indexed by 5 Mbf per acre volume classes. A summary of these costs can be found in Table 5.1.

Table 5.1 – Logging Costs for Selected Harvest Volumes Per Acre ($/Mbf).

Net Mbf/Acre	On-Board Truck Shovel Logging	On-Board Truck Cable Logging
5.0 - 9.9	$216	$337
10.0 - 14.9	$189	$316
15.0 - 19.9	$172	$303
20.0 - 24.9	$159	$294
25.0 - 29.9	$149	$286
30.0 - 34.9	$140	$279
35.0 - 39.9	$133	$274
40.0 - 44.9	$127	$269
45.0+	$121	$265

B. Log Trucking Costs

Hauling costs have always been one of the largest costs associated with timber production. Similar to logging costs, trucking rates can vary depending on product hauled, distance to destination, logging road vs highway miles, and type of truck used. MB&G spoke to several log truck outfits as well as timberland owners who operate on the Olympic Peninsula to get a range of current trucking rates.

For the most part, trucking rates are set on an hourly basis. While in some instances rates are set as a flat fee per destination, for the purpose of planning and budgeting it is the industry standard to look at rates on an hourly basis. The range of trucking rates we are seeing in early 2025 on the Olympic Peninsula range from $115 per hour on the low end, up to $145 per hour on the high end. Haul times within the 100-mile analysis area from the Port of Port Angeles can reach up to 150 minutes or 2.5 hours, with most of the area being more than 1 hour from the port (Figure 6.2).

The trucking industry as a whole is experiencing a shortage of qualified drivers; this is especially true for logging trucks. The shortage can be attributed to several factors, including an aging workforce, challenging work hours, higher wage jobs outside the industry, and lack of qualified drivers.

The aging workforce is one of the largest near-term issues facing the log trucking industry. According to a study conducted by The Rural Technology Initiative at the University of Washington and The Transportation Research Group at Washington State University, 64 % of companies that own log trucks in Washington are single-truck companies. The average age of these company owners is 58. Many of these companies do not have a succession plan in place, meaning when the owner/operator dies, the company will cease to exist.

Log trucks also experience a high turnover rate of employees. This can be attributed to the unattractive nature of log trucking compared to other trucking opportunities. Log trucking requires very early morning activity compared to many other forms of trucking. Log trucking also requires a driver to navigate much more difficult terrain and roads, often requiring more on-road maintenance. With other trucking industries also experiencing a shortage of experienced workers, drivers have an increased opportunity to choose other trucking jobs.

Lack of qualified drivers can also be attributed to the financial barriers to entry into the industry. Obtaining a Commercial Driver's License (CDL) can be expensive, ranging from $4,000 to $10,000. There are also high costs associated with individuals who want to start their own trucking companies. Increased diesel and insurance costs over the last few decades have made owning a logging truck much more expensive.

Of the trucking companies we spoke to, the reoccurring long-term concerns were diesel prices (Figure 6.1) and the inability to attract and retain drivers.[12] While the timber industry has not yet seen a constraint of production due to lack of trucking, it is an issue that must be addressed in the near future.

[12] Additionally, a recent Executive Order from the Trump Administaton and subsequent order from the U.S. Department of Transportation to introduce new English proficiency for commercial motor vehicle drivers could reduce the trucking workforce nationally. The impact of the order will depend on the forthcoming implementation details.

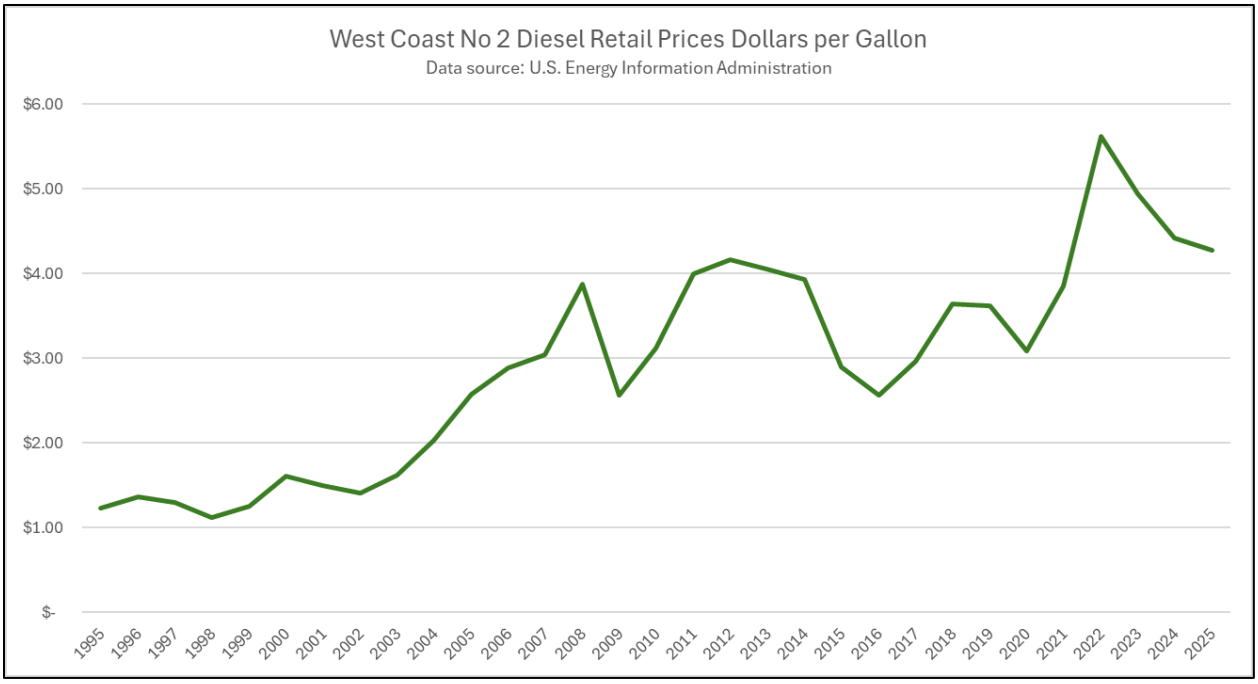

Figure 5.1 – Historic Diesel Prices

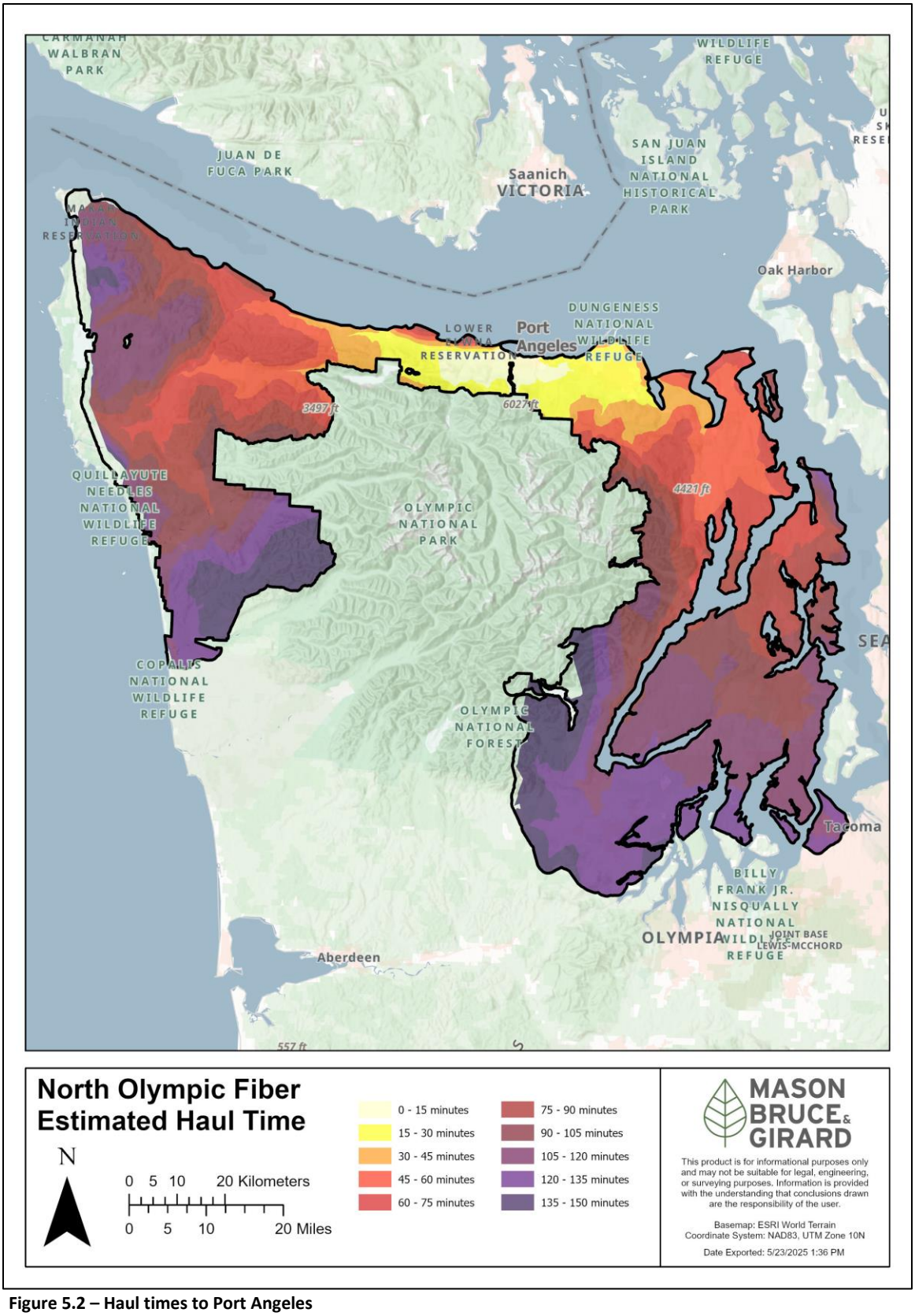

Figure 5.2 – Haul times to Port Angeles

C. Chip Trucking Costs

Similar to hauling logs, costs for hauling chips vary significantly. Unlike log trucks, the majority of chip trucks are not configured to be able to drive up the steep and winding logging roads found on the Olympic Peninsula. To account for this, pulp logs must often be hauled to an offsite chipper where the logs can be unloaded and chipped into a truck that can transport chips on the highway. These chip vans have a capacity of 34 tons of chips.

Hermann Brothers, located in Port Angeles, is the largest hauler of chips in the region. They have a chipper located in Port Angeles that can directly load vans. To address the issue of chip trucks not being able to navigate logging roads and thus limiting the option of in-woods chipping, Hermann Brother developed a specialized fleet of chip trucks that can reach some of the toughest logging operations. These trucks can haul 28 tons of chips directly out of the woods and to a final destination, thus eliminating the need for an offsite chipper and additional hauling of logs.

Trucking costs for chip trucks are higher than logging trucks and range from $160 to $180 an hour. Like the log truck industry, the chip truck industry also faces the same issues related to driver shortage and rising fuel costs.

Table 5.2 summarizes potential trucking costs of chips from locations located within 100 miles of Port Angeles. For this calculation we assumed $170 per hour for a trucking rate, one hour of time to load and unload the truck and a 34-ton truck capacity. All of these variables may change depending on real world factors.

Table 5.2 – Potential Trucking Costs

Company	City	Distance to Port of Port Angeles (miles)	Distance to Eclipse Industrial Park (miles)	Cost to Port of Port Angeles $/BDT*	Cost to Eclipse Industrial Park ($/BDT)*
Conifer Sawmills					
Interfor	Port Angeles	4.7	1.7	$ 6.67	$ 5.67
Sierra Pacific Industries	Shelton	100	103	$ 26.83	$ 27.83
Hardwood Sawmills					
Port Angeles Hardwood	Port Angeles	3.1	0	$ 6.33	$ 5.00
Chips					
Hermann Brothers	Port Angeles	3.1	0	$ 6.33	$ 5.00
Shear Brothers Chipping	Shelton	100	103	$ 26.83	$ 27.83

**Assuming round trip $170/hr truck rate and one hour load/unload time - 34 ton truck capacity*

D. Chip Barging Costs

Barge rates vary based on fuel prices, type of cargo, distance, and back haul availability. Like other transport costs, barge rates are calculated using multiple elements. Barge rates are typically calculated per mile, but barge rates can vary extensively depending on the base rate, distance, availability of barges and cargo, demand, weight and volume of cargo, freight class, and the type of cargo.

Distance is a factor when determining barge rates. Tugboats usually move at a speed of 6 to 7 knots. The longer the haul, the more time the tug is operational, but unlike trucking where rates can be directly tied to miles hauled, the principle of economies of scale often comes into play when looking at barging costs. As

marine distance increases, the cost per mile could decrease, making long-distance transportation more cost-effective per mile.

MB&G conducted several interviews with companies that operate barges in the Pacific, Puget Sound, and the Columbia River. All companies that we spoke with haul mill residuals. Table 5.3 summarizes the range in prices we found for ocean-going barges that would be able to service the Port of Port Angeles.

Table 5.3 – Cost Associated with Barge Operation

Item	Cost
Barge Cost per Day	$3,000-4,000
Tug Cost Per Day	$12,000-14,000
Loading and Unloading (Hrs)	8-12
Loading and Unloading ($/Hr) ILWU/PMA Rate	$56.55-62.65
Barge Capacity (BDT)	3,500-4,000
Tug Speed (NM/Hr)	6-7

The weight of cargo significantly affects barge rates. Heavier cargo requires more fuel to transport and load and unload. Mill residuals by nature are very light compared to most cargo hauled. Demand for cargo movement can fluctuate, altering the consistency of loads and consequently, barge rates. Cargo movement can also be seasonally influenced by weather and rough seas.

The Pacific Coast and Puget Sound regions have an ample supply of tug and barge operations that could accommodate a facility looking to source fiber and transport it via waterways. Like trucking, barge rates have been under pressure due to rising fuel costs, they remain a cost effective and efficient means to move bulk materials such as mill residuals.

Table 5.4 summarizes potential barging costs of chips from locations located within a reasonable barge distance of Port Angeles. The longest destination is Coos Bay, Oregon, at 440 miles away from Port Angeles. Currently there are longer barge hauls occurring (ex. Eureka, CA, to B.C.), but for the purpose of this study we have looked at more cost-effective hauls. As we discussed earlier in the report, we did not consider the Columbia River as a potential embarkment point due to the strong local market for residuals and differences in river and ocean-going barges.

The focus of this section is the cost of delivering fiber to the Port of Port Angeles. An additional consideration is whether barges are loaded leaving the port. If barges leave the port empty, a condition known as “deadheading,” costs will be higher as the cost return trip must be accounted for. Examples of products currently being exported from the Port of Port Angeles are pulp logs and chips destined for B.C. If a facility importing chips to Port Angeles were to exist, it is unlikely that chips would continue to be exported from the port. Maintaining and developing markets for material that can be exported from the Port of Port Angeles would reduce the need for deadheading and would improve the viability of the Port as a barge destination. However, regular traffic of barges to the port presents an opportunity to reduce deadheading costs that might currently exists for other products that have the potential to be shipped from Port Angeles but are not due to cost.

For this calculation we assumed $3,500 a day per barge and two barges per trip, based on information from industry participants. Barge capacity is assumed to be 3,500 BDT. Tugboat costs are assumed at $13,000 a day and at a speed of six nautical miles per hour. Load and unload time is assumed to be 20 hours total. ILWU workers would perform this work. To properly estimate this cost, we obtained the most current ILWU rates and assumed an average hourly rate of $58 per hour. MB&G spoke to ILWU Local 27 and reviewed current contracts at the Port of Port Angeles. We assume that a chip import operation would require eight union workers and a foreman.

Table 5.4 – Potential Barging Costs

Terminal City	State/Province	Distance to Port of Port Angeles (nautical miles)	Distance to Port of Port Angeles (hours)	Tug Cost ($/BDT)	Barge Cost ($/BDT)	Load and Unload ($/BDT)	Total
Hoquiam	Washington	195	32.5	$ 4.06	$ 2.19	$ 1.33	$ 7.58
Junction City	Washington	203	33.8	$ 4.17	$ 2.24	$ 1.33	$ 7.73
Tacoma	Washington	107	17.8	$ 2.93	$ 1.58	$ 1.33	$ 5.83
Everett	Washington	75	12.5	$ 2.51	$ 1.35	$ 1.33	$ 5.19
Coos Bay	Oregon	440	73.3	$ 7.22	$ 3.89	$ 1.33	$ 12.44
Cowichan Bay	British Columbia	58	9.7	$ 2.30	$ 1.24	$ 1.33	$ 4.86
Ladysmith	British Columbia	81	13.5	$ 2.59	$ 1.40	$ 1.33	$ 5.31
Port Alberni	British Columbia	141	23.5	$ 3.37	$ 1.81	$ 1.33	$ 6.50
Alberni	British Columbia	130	21.7	$ 3.22	$ 1.74	$ 1.33	$ 6.29
Richmond	British Columbia	102	17.0	$ 2.86	$ 1.54	$ 1.33	$ 5.73
Vancouver	British Columbia	101	16.8	$ 2.85	$ 1.53	$ 1.33	$ 5.71
Delta	British Columbia	105	17.5	$ 2.90	$ 1.56	$ 1.33	$ 5.79
Surrey	British Columbia	112	18.7	$ 2.99	$ 1.61	$ 1.33	$ 5.93
Pitt Meadows	British Columbia	118	19.7	$ 3.07	$ 1.65	$ 1.33	$ 6.05
Barnston Island	British Columbia	119	19.8	$ 3.08	$ 1.66	$ 1.33	$ 6.07
Port Kells	British Columbia	121	20.2	$ 3.11	$ 1.67	$ 1.33	$ 6.11
Langley	British Columbia	132	22.0	$ 3.25	$ 1.75	$ 1.33	$ 6.33
Maple Ridge	British Columbia	135	22.5	$ 3.29	$ 1.77	$ 1.33	$ 6.39

Barge Cost per Day	$ 3,500
Tug Cost Per Day	$ 13,000
Loading and Unloding (Hrs)	20
Loading and Unloading ($/Hr) ILWU/PMA Rate	$ 58.00
ILWU Workers needed	8
Barge Capacity (BDT)	3,500
Tug Speed (NM/Hr)	6
Barges per Tug	2

Table 5.5 – Current ILWU Rates Effective June 28, 2025

Worker	Rate $ Per Hour
Basic Longshore	$ 56.85
Skill I	$ 59.25
Skill II	$ 61.52
Skill LLL	$ 62.65
Journeyman Mechanic	$ 71.06
Leadman Mechanic	$ 76.75
Trainee Mechanic	$ 71.06
Basic Clerk	$ 56.85
Clerk Supervisor	$ 59.25
Kitchen/Tower/Computer Clerk	$ 61.52
Chief Supervisor & Supercargo	$ 62.65

6. Economic Environment

A. Macroeconomic Conditions

Gross Domestic Product

Over the past decade, U.S. GDP growth has averaged 2.5% with a high of 5.8% (2021) and a low of -2.2% (2020). Inflation, which had been gradually increasing since mid-2021, gained increased attention when it rose above 8% in March 2022 and became the overriding economic concern. In response, the Federal Reserve shifted monetary policy toward reining in inflation, increasing the target funds rate to between 5.25-5.50% by July of 2023. As intended, higher interest rates depressed demand, economic growth and inflation, so the Fed lowered the target funds rate gradually to between 4.25-4.50% by December of 2024.

The US economy was resilient in Q4 2024 as monetary policy designed to slow inflation appears to have been successful. Real GDP growth for 2023, the previous year, was revised upwards from 2.5% to 2.9%. The Bureau of Economic Analysis Second Estimate of Real GDP for the year 2024 was reported as 2.8%. Although inflation continues to be somewhat higher than desired by the Federal Reserve, interest rates may be reduced further in 2025. The economic impacts of trade and tax policy in the second Trump administration remain to be seen as neither has been solidified.

The latest forecasts, which came out before the Trump administration announced broad tariffs that sent financial markets spiraling[13], point toward slowing growth totals in 2025, before picking back up in 2026 and some moderate potential growth in 2027.

Table 6.1 summarizes forecasts for annualized, real GDP growth in the U.S. from the Federal Reserve Bank of Philadelphia (FRB), Forest Economic Advisors (FEA), and FastMarkets RISI (RISI).

Table 6.1 – Alternative Real U.S. GDP Growth Forecasts.

Year	FRB (Feb)	FEA (Mar)	RISI (Apr)
2025	2.4	2.7	2.3
2026	2.2	2.6	2.2
2027	1.8	3.0	2.1
2028	2.0	2.5	2.2
2029	N/A	1.7	1.2

The Federal Reserve Bank of Philadelphia released the First Quarter 2025 Survey of Professional Forecasters on February 14, 2025. The panel of 40 forecasters' outlook on the economy in the coming year improved from three months prior. The 2025 projection of GDP growth increased slightly from 2.2% to 2.4% and increased from 2.1% to 2.2% for 2026. Further out, the FRB decreased growth projections for 2027 downward from 2.1% to 1.8% and forecasts 2.0% GDP growth for 2028.[14] The FRB 2025 GDP forecast of 2.4% was more

[13]https://www.wsj.com/finance/investing/market-upheaval-from-trumps-tariffs-could-be-just-the-beginning-e70303f3

[14] https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/spf-q1-2025

conservative than FEA (2.7%) and more optimistic than RISI (2.3%). Projections for 2026 of 2.2% are also lower than FEA (2.6%) and more optimistic than RISI (2.2%).

The FRB Core CPI (Consumer Price Index, excluding food and energy) inflation projection for 2025 increased from 2.4% to 2.9% for the Q4/Q4 average because of inflation that rose unexpectedly in Q4 2024. Core CPI is forecast to lower to 2.7% by Q1 2026 and ease slightly to a Q4/Q4 average of 2.6% for 2026 by year end. Core PCE (Personal Consumption Expenditure, excluding food and energy) inflation annual average projections for 2025 increased from 2.2% to 2.4%. Projections for 2025 annual Headline PCE inflation increased from 2.2% to 2.4%, while Headline CPI projections increased from 2.4% to 2.8%.

FEA's Q1 2025 Timber Forecast Report, released on March 13, 2025, left GDP growth projections at 2.7% for 2025. FEA forecasted that quarterly growth in 2025 will continue to hold and a previously expected dip in Q1 would be avoided. FEA cited strong consumer spending, low unemployment, wage growth, and low household debt-service ratios. Productivity growth has also increased with investments in labor-saving equipment and technology, especially artificial intelligence. Fiscal policy has been stimulating growth at a deficit of 6.1% of GDP and is expected to continue in 2025. FEA's GDP projection of 2.7% is more optimistic than the FRB (2.4%) and RISI (2.3%) for 2025, and more optimistic than both RISI (2.2%) and the FRB (2.2%) for 2026 at 2.6%.

Projections for 2025-2029 show growth peaking in 2027 with 2.7% in 2025, 2.6% in 2026, 3.0% in 2027, falling off to 2.5% in 2028 and 1.7% in 2029. Consumer and government spending are more influential than residential construction in FEA's GDP growth projections in the near term. The forecast for residential construction was reduced for 2025. However, underlying demand remains strong, low competition from existing homes on the market and low probability of a recession are supporting single-family homebuilding projections.

FEA increased 30-year mortgage rate forecasts all the way out to 2029, with rates expected to average 6.8% in 2025, 6.2% in 2026, 6.2% in 2027, 6.1% in 2028 and 5.8% in 2029. As higher interest rates have persisted and homeowner's insurance rates have soared, affordability has continued to suffer. Homebuilders have shown reluctance to build more affordable units as inventories have sat at 8.4 months' supply in the past year. FEA revised longer term housing starts projections downward to account for the market conditions constraining single-family new home building. FEA's CPI inflation rate forecast increased to 2.8% for 2025. CPI inflation rates are projected to stabilize at around 2.6% from 2026-2029, which is elevated for a longer time than previous forecasts.

RISI's forecast was sourced from their February 2025 Monthly Economic Commentary, updated on April 2, 2025. Their 2025 GDP growth projection is 2.3%, which is more pessimistic than both the FRB (2.4%) and FEA (2.7%). RISI's 2026 projection is 2.2%, which is in line with the FRB and more pessimistic than FEA (2.6%). GDP growth is expected to be inhibited by interest rates and persistent inflation. The policies of the new presidential administration are expected to slow the global economy to some degree in 2025 as the US seeks to use tariffs and trade policy to strengthen its position. The resulting uncertainty is projected to keep investment low in the meantime. Headline CPI, although described as normalized, did rise in December-February, coming in at 2.9%, 3.0% and 2.8% year-over-year inflation each month.

Unemployment

Prior to the economic effects of the pandemic, the U.S. unemployment rate had been hovering around 4% since 2017 and was expected to reach 6% in 2022 before settling back down to 5% as GDP growth improved. In April 2020, pandemic related shutdowns caused the unemployment rate to spike up to 14.7% with the loss of 20.5 million jobs. The average annual rate of unemployment was 8.1% in 2020 according to the Bureau of Labor Statistics (BLS). In 2021, the average rate of unemployment decreased to 5.4% and in 2022 the average dropped further to 3.6% nationally.

The April 4, 2025, Employment Situation Summary report released by the Bureau of Labor Statistics stated that non-farm payroll increased by 228,000 in March of 2025. The unemployment rate increased slightly to 4.2% and the number of unemployed also increased slightly to 7.1 million people. The unemployment rate has risen to between 4.0-4.2% since May 2024. The number of people who were unemployed long-term, (27 weeks or more) has risen to 1.5 million. The labor force participation rate (seasonally adjusted) changed little at 62.5% and has remained in the same narrow range since December of 2023.

FEA's recent analysis reflects that unemployment is expected to rise moderately in the short term due to efforts to contain inflation, with national annual projections at 4.2% in 2025, 3.9% in 2026, 3.5% in 2027, 3.6% in 2028, and 3.9% in 2029.[15] (Figure 6.1B) shows historical unemployment rates and the forecast by FEA. Initial claims for unemployment are down 5% from 2019. Wage inflation for production workers has been receding, but slowly. The unemployment rate is forecast to peak in Q2 2025 at 4.3% before starting to improve again. Rate cuts by the Fed and tight labor markets throughout the rest of the decade support the forecast of continued strength in job markets going forward.[16]

[15] FEA Timber Forecast Q1 2025

[16] Ibid

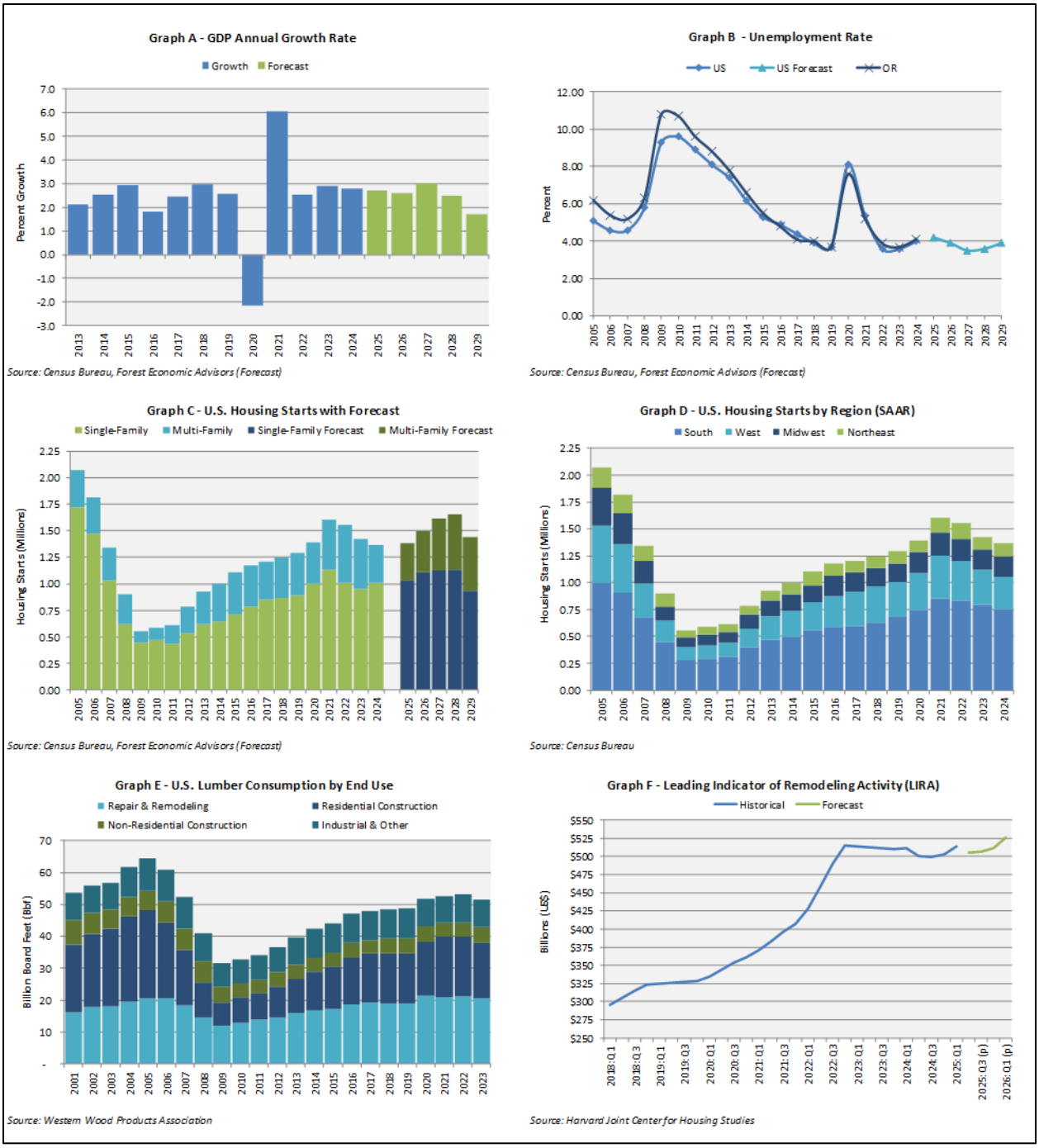

Figure 6.1 – Macroeconomic Indicators, Trends, and Forecasts.

B. Wood Product Demand Drivers

Housing

The U.S. housing market experienced more than a decade of growth, but in 2022, total starts decreased to 1.56 million units (-3%), largely due to a steep increase in mortgage interest rates and soaring prices.[17] Mortgage interest rates in the range of 5.8% - 6.8% forecast through 2029 are anticipated to dampen single-family housing starts further compared to recent forecasts.[18] Labor and other supply-side constraints, such as environmental compliance, permitting and zoning are expected to do the same. Drivers of demand have changed little, and indicators show that an economic recession is unlikely, except for risks related to China. FEA is concerned foremost with a war or blockade between China and Taiwan, and the potential for a rapid dissolution of China's economic relationship with the West.

The demographics of home buyers, wage growth, low household debt and little competition from existing homes for sale indicate strong underlying demand for single-family homes and resumed growth through a cyclical peak in 2028. However, total starts are not expected to meet or exceed 1.5 million units again until 2026 and projections are coming in a bit lower through 2028.[19] From 2016 to 2020 a growing percentage of housing starts, from 67% to 72%, were for single-family homes, which use more wood per unit for construction than the construction of multi-family homes. Between 2022 and 2024, that trend fell 5 percentage points back to 65%, but recovered to 74% in 2024. Single family starts are forecasted to increase to 75% of starts in 2025. However, by 2030, the percentage of single-family starts is expected to gradually drop by 10 points to 64% and stay within ±1-3 percentage points for the remainder of the forecast period, which is through 2040.[20]

FEA's forecast for 2025-2030, released in the Q1 2025 Timber Forecast, is shown in Table 6.2. Growth is expected to be weaker than the last forecast for 2025 due to worse affordability, but 2026-2028 starts are looking stronger. Also, growth is slower in multi-family starts due to modest oversupply in certain localities. However, rental vacancies have remained stable. FEA projects that housing starts will barely increase to 1.38 million in 2025, improve to 1.50 million in 2026, and rise to 1.66 million in 2028, hitting a cyclical peak. Starts are then expected to recede to 1.44 million in 2029.

Table 6.2 – Housing Start Forecasts.

Year	U.S. Housing Starts (MM Units)	
	FEA	RISI
2025	1.38	1.41
2026	1.50	1.53
2027	1.61	1.62
2028	1.66	1.69
2029	1.44	1.54
2030	1.39	N/A

[17] FEA Timber Forecast Q1 2023

[18] FEA Timber Forecast Q1 2025

[19] Ibid

[20] Ibid

This forecast does not incorporate and tariff announcements by the United States nor the subsequent financial market reactions. The latest RISI forecast, released in February 2025 and last updated on April 2nd, predicted housing starts will total 1.41 million in 2025. Housing starts are forecast to increase to 1.53 million in 2026, rising a bit higher at 1.62 million by 2027 then peaking at 1.69 million in 2028 and retreating to 1.54 million in 2029 (Figure 6.1C). RISI expects sales volume to increase once mortgage interest rates begin to ease, due to pent-up demand, high home equity levels, strong fundamentals in the US economy and consumer spending.

Repair & Remodeling

The repair & remodeling sector has made up a higher percentage of wood consumption than new residential construction over the past decade (Figure 6.1E). From 1971 to 2008, residential construction represented 33% of softwood lumber consumption versus 24% for the R&R sector. The relationship changed coming out of the Great Recession and has persisted. From 2009 to 2023, R&R comprised an estimated 38% of softwood lumber consumption versus 29% for residential construction. Thus, the R&R sector is an even more important driver of softwood demand.

The Joint Center for Housing Studies of Harvard University expects growth in remodeling expenditures to improve mildly in 2025 (Figure 6.1F), at a year-over-year total increase of 1.8%, far lower than the historical average of approximately 5.7%. Growth moved back into positive territory in Q1 2025 to 0.5% and is projected to increase to 1.4% by Q3 2025. Growth in the repair and remodeling sector was measured at an astonishing 26.6% (revised) in 2022, -1.0% (revised) in 2023, and -1.5% in 2024. The Joint Center's 2025 forecast was based on rising trends in retail sales of building materials and steady permitting for remodeling projects. While growth has slowed dramatically in the last year and a half, spending on improvements and remodeling has remained higher than at the outset of the pandemic home improvement boom by about $150 billion.

Log Exports

The ongoing trade dispute between China and the U.S. has continued to negatively impact the export market for Douglas-fir and hemlock sawlogs in 2024 and 2025 (Figure 6.2). In September 2018, China began applying tariffs on log imports in retaliation for tariffs imposed on a broad range of products by the U.S. The log import tariff puts U.S. exporters at a competitive disadvantage to their counterparts in Canada, New Zealand, Russia, Australia, and Europe. Increased phytosanitary restrictions created more barriers to U.S. log exports to China. Log export data from the Columbia-Snake Customs District, the source of most log exports from the Pacific Northwest, shows export volumes have been below 250 MMbf since 2023, less than 10% of the typical timber harvest volume in Washington.

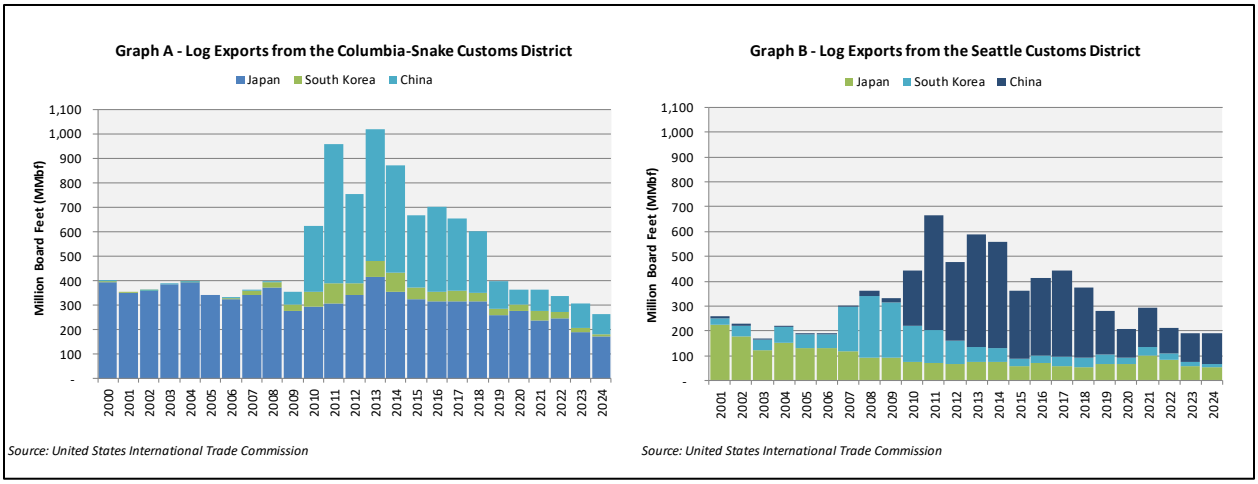

Figure 6.2 – Log Exports from Pacific Northwest Ports.

Exports to China from Seattle and Columbia-Snake ports combined were down 4.7% year-over-year in 2024 with a low volume of just 202 MMbf. Log exports to China from both ports have slowed by 75% from Seattle and 65% from Columbia-Snake ports YTD through February 2025. Once a driver of PNW log markets, China has become a less significant player, at least for now.

Export volumes to Japan surpassed those to China in 2024, making up 50% of volume from both ports. They have increased by 5% from Seattle and 16% from Columbia-Snake ports YTD through February 2025 and are on target to increase their overall share of total imports above 50% if trends hold. Japan slowed U.S. imports by nearly 10% in 2024 to 224 MMbf. Log volumes to Japan represented only a fraction of what they previously had been in the early or mid-2000's.

Many log export facilities that opened between 2010 and 2011 have shut down completely, including three of the four exporters that operated out of the Port of Coos Bay. Weyerhaeuser is the only exporter still operating there, and that volume is bound for Japanese markets. Currently, there are no exporters operating at the Port of Grays Harbor, the Port of Astoria, the Port of Tacoma, or the Port of Everett. Weyerhaeuser is the only remaining exporter at the Port of Olympia. The Port of Longview remains the hub of log exports in the region.

Aside from Chinese tariffs, higher U.S. domestic log prices and a weaker global economy are historically responsible for shrinking the export market to this point. The latest trade policy announcements and additional tariffs may affect the prices and volume of log exports to Asia. FEA already expected the trade relationship with China to continue to weaken and did not expect a significant improvement in export volumes going forward. It is reasonable to conclude that additional tariffs will weaken log exports to China. The real estate sector in China is still in persistent decline following a credit crisis, which is putting a significant drag on construction and demand for logs.

C. Market for Timberland

MB&G defines the commercial timberland market as consisting of properties at least 5,000 acres in size (although they are sometimes smaller) with the biological and economic potential to earn reasonable financial returns. Table 6.3 summarizes major transactions in western Oregon and Washington since 2022.

The demand for timberland in Washington in 2025 is very strong. It is an asset class that attracts a wide array of buyers. Traditionally this asset class was dominated by vertically integrated lumber companies but has since diversified. Investors include timber REITS, private family forest, private lumber manufacturers, timberland investment groups, and ecological investors.

Timberland provides the combination of both potential long-term land value appreciation and revenue from lumber sales. Timberland can provide investors with the potential for risk-adjusted returns, while also providing attractive environmental benefits, which has become important to many investors in recent years. Inflation protection is one of the most attractive characteristics of timberland. Timberland has proven long-term ability to preserve capital.

Over the last four years the timberland market has been bolstered by an influx of new capital. Foreign investors from Europe have viewed Washington timberland as a highly coveted investment. These investors have a much lower expectation of return compared to traditional timberland investors. These investors look at timberland as a method of wealth preservation rather than wealth generation.

New investors with management strategies less focused on timber production have also begun to enter the asset class with management strategies that could potentially differ from existing landowners. These investors are raising capital from both American and foreign organizations with stated "Environmental, Social, and Governance (ESG)" goals, including carbon net zero goals. For example, EFM recently purchased roughly 68,000 acres of timberland from Rayonier on the Olympic Peninsula. Since the purchase of these lands, EFM has partnered with Microsoft and Meta to structure a carbon project the ownership.[21] Details of this carbon project are unknown. This purchase is discussed further later in this section.

Family-owned, vertically integrated lumber companies have been very active in purchasing timberland to both firm-up the long-term timber supply near their mills and to keep competitors out of their wood basket. Hampton, SPI, and Stimpson have all purchased large scale timberland tracts over the last five years. They will likely continue to be active participants in the market.

Due to the productive quality of the lands, and strong market for wood products. We expect overall production of timber from western Washington and western Oregon will remain consistent with levels seen in the recent past.

[21] https://www.esgtoday.com/microsoft-signs-3-million-ton-nature-based-carbon-removal-deal-with-forest-investor-efm/ https://www.esgdive.com/news/meta-signs-10-year-forestry-based-carbon-offtake-deal-efm-climate-smart-management/744389/

Table 6.3 – Westside PNW Timberland Sales, 2022 – 2024.

Yr-Mo	Sale Name	Seller - Buyer	State / Sub-Region	Gross Acres	Sale Price (MM$)	$/Acre
22-Jan	Trask River	Manulife to Mid-Valley Resources (Hampton)	OR/Northwest	9,338	$55.0	$5,890
22-Feb	North River	Manulife to Weyerhae-user	WA/Southwest	4,243	$17.8	$4,195
22-Apr	Hood River	Weyerhaeuser to Twin Creeks Timber, LLC	OR/NW Cascades	28,356	$73.9	$2,606
22-May	Chinook	Campbell to Hampton	WA/Southwest	18,086	$107.0	$5,918
22-Dec	Project Olive	Rayonier to EFM	WA/Olympic Peninsula	10,981	$30.6	$2,787
22-Dec	Green Crow	Green Crow to Nuveen	WA/OR	47,751	$231.5	$4,848
23-Jun	NNC to CFP	Nuveen to Chinook FP	WA/OR	6,495	$34.2	$5,268
23-Aug	Trask River 2	Manulife to Hampton	OR/NW Oregon	15,099	125.0	$8,279
23-Dec	Menasha	Rayonier to Manulife	OR/SW Oregon Coast	55,036	242.2	$4,401
23-Dec	Sacajawea East Part 1	Manulife to WADNR	WA/SW Washington	9,115	$55.0	$6,034
23-Dec	Sacajawea East Part 2	Manulife to The Conservation Fund	WA/SW Washington	11,394	$66.0	$5,793
23-Dec	Sacajawea West	Manulife to Clair AG	WA/SW Washington	14,122	$81.0	$5,736
23-Dec	Lincoln Timberlands	Manulife to Hampton	OR/NW Oregon Coast	11,004	$56.0	$5,084
24-Jul	Project Discovery	Nuveen to Salm Schulenburg	WA/SW Washington	22,264	$155.0	$6,962
24-Oct	Project Skyline	Campbell Global to Tulalip Tribe	WA/Puget Sound	17,790	$104.0	$5,845
No Sale	Perpetua	BTG Pactual to No Sale	OR/SW Oregon	19,651	No Sale	No Sale
24-Nov	Project Emerald	Alco Holdings to Salm Schulenburg	WA/SW Washington	4,279	$29.0	$6,787
24-Nov	Project Teal: North Clallam	Rayonier to Campbel Global	WA/Olympic Peninsula	40,800	$138.0	$3,382
24-Nov	Project Teal: Jefferson	Rayonier to EFM	WA/Olympic Peninsula	31,344	$96.0	$3,063
24-Dec	Project Teal: South Clallam	Rayonier to EFM	WA/Olympic Peninsula	36,985	$117.0	$3,163
No Sale	Project Teal: Joyce	Rayonier to No Sale	WA/Olympic Peninsula	6,100	No Sale	No Sale
24-Dec	Project Bugle: Wllark	Manulife to Stimpson	NW Oregon	1,260	$12.3	$9,762
24-Dec	Project Bugle: Willamina	Manulife to Hampton	Oregon Coast	4,720	$29.5	$6,250
24-Dec	Project Bugle: Agness	Manulife to Fiera Comox	SW Oregon Coast	6,650	$43.0	$6,466

Sales in 2023

Seven westside sales closed in 2023 totaling approximately 122,230 acres:

- In June, investment clients of Nuveen sold 6,495-acres of the Green Crow acquisition described above to investment clients of Chinook Forest Partners for $34,218,800 or $5,268 per acre. The sale included scattered tracts in Whatcom, Skagit, King, Pierce, Lewis, Clark, Jefferson, and Clallam County Washington and additional scattered parcels in Washington, Clackamas, and Marion County, Oregon.

- In August, Hampton purchased 15,099 acres from investment clients of Manulife for $125,000,000 or $8,279 per acre. The sale is referred to as the Trask River 2 property. It is located in Polk and Lincoln County, Oregon. All tracts are proximal to one another, which provides operational efficiencies. The tracts are also located near Hampton's sawmill in Willamina.

- In December, Manulife purchased 55,036 acres from Rayonier. The property was once part of the old Menasha portfolio. The purchase price was $242,204,323 or $4,401 per acre. The sale was privately shopped around to a select group of buyers and was referred to as Project Douglas. It was not publicly marketed. We understand the opportunity attracted significant interest from several parties. The property is comprised of multiple scattered tracts. Most are concentrated in Coos County. A large contiguous block is located in Curry County. Additional scattered tracts are found in western Douglas County around the town of Reedsport.

- In August, LandVest began marketing the 65,646-acre Project Clover package on behalf of Manulife. The package included the 20,010-acre McCloud Timberlands property in Siskiyou and Shasta County, California; the 11,004-acre Lincoln Timberlands, which are primarily located in Lincoln County, Oregon; and the 34,632-acre Sacajawea Timberlands in Pacific and Wahkiakum County, Washington. The Sacajawea Timberlands were offered in two units: Sacajawea East (20,510 acres) and Sacajawea West (14,122 acres). The offering was available in whole or in any multi-package configuration via a single stage bid process. Bids were due on October 10, 2023 and all sales closed in December. Results are summarized below:

    - Sacajawea East – Part 1: The Washington State Department of Natural Resources acquired 9,115 acres of the Sacajawea East offering for a purchase price of $55.0 million or $6,034 per acre. According to a DNR press release, the property was purchased to offset a loss in productive acres that will be set aside for carbon sequestration. The property will be managed as a working forest. It was acquired with funds from the Real Property Replacement Account ($7.2 million) and Climate Commitment Act Funds ($47.8 million). The property is located in Wahkiakum County, WA and is adjacent to other DNR holdings.

    - Sacajawea East – Part 2: The Conservation Fund (TCF) acquired the remaining 11,394 acres of the Sacajawea East property for a purchase price of $66.0 million ($5,793 per acre). TCF partnered with the Washington DNR to purchase the Sacajawea East offering in its entirety and submitted a joint bid at auction. Both parties entered into an option agreement wherein

the DNR will purchase the TCF acquired lands in the future. TCF will manage the asset as a working forest in the interim. The property is primarily located in Wahkiakum County with two satellite parcels in Pacific County, WA.

- Sacajawea West: Clair AG, a Swiss single-family office, acquired the 14,112-acre Sacajawea West offering for a purchase price of $81.0 million or $5,736 per acre. The property is located mostly in Pacific County (WA). A large block sits southeast of Naselle, and another large block is located about 8-12 miles west of Nemah.

- Lincoln Timberlands: Hampton acquired the 11,004-acre Lincoln Timberlands property for $55,946,980 or $5,084 per acre. The property consists of several management blocks spread throughout Lincoln County. Most acres are located east and west of Hwy 229 from Lincoln City south to the town of Newport. The property is well positioned to supply Hampton's existing sawmills and is the latest in a series of acquisitions by Hampton over the past few years.

Sales in 2024

Nine westside sales closed in 2024 totaling approximately 166,100 acres:

- In July, Viessmann Generational Investments, a German Family office and investment client of Salm Schulenburg acquired 22,264 acres located in Wahkiakum, Pacific, and Lewis County, WA from investment clients of Nuveen Natural Capital. The sale was known as Project Discovery and the final sales price was $155,000,000 or $6,962 per acre.

- In October, investment clients of Campbell Global sold 17,790 acres located in King and Snohomish County, WA to the Tulalip Tribe for $103,982,358 or $5,845 per acre. The sale was referred to as Project Skyline. According to Tribe's press release, acquiring the property was "a historic step toward reclaiming our mountain homelands." The property will be managed as a working forest but will also be managed for cultural and ecosystem services. The press release highlights access to ancestral places and ensuring continuation of the tribe's cultural heritage. Given the motivation for purchase, we consider the buyer to be atypically motivated because it is clear they valued the property for reasons other than its ability to produce income and provide investment returns.

- In November, investment clients of Salm Schulenburg acquired 4,279-acres in Wahkiakum County, Washington from ALCO Holdings. ALCO is affiliated with the Agnew Company, which invests in a variety of real estate assets. The property was managed by Nuveen Natural Capital on behalf of ALCO Holdings. The sale was not publicly marketed but it was privately offered to three potential buyers. The property sold for $29,040,000 or $6,787 per acre.

- In April, LandVest began marketing 115,520 acres on behalf of Rayonier. The sale was referred to as Project Teal and the property was concentrated in western Clallam and Jefferson County, Washington on the Olympic Peninsula. The offering was split into three packages: the North Clallam Unit (40,800 acres), the South Clallam Unit (36,985 acres), and the Jefferson Unit (31,344 acres). A fourth unit, referred to as the Joyce Unit, included an additional 6,100 acres and was available for purchase

as an add-on to one of the larger packages. All three packages sold but none of the buyers exercised the option to purchase the Joyce Unit. Results by package are summarized below:

- North Clallam Unit (40,800 acres): This unit was sold to an investment client of Campbell Global for $138,000,000 or $3,382 per acre.

- South Clallam Unit (36,985 acres): This unit was sold to a consortium of investors led by EFM for $117,000,000 or $3,163 per acre.

- Jefferson Unit (31,344 acres): This unit was also sold to a consortium of investors led by EFM for $96,000,000 or $3,063 per acre.

Conversations with market participants indicated that the properties did not attract as much interest as was expected. One market participant opined that Rayonier's public announcement in late 2023 of their initiative to sell assets over the next 18 months to reduce the company's debt put them in an unfavorable negotiating position.

- In late August, LandVest released an advanced notice for Project Bugle, which included three packages located throughout western Oregon. The first package was the Wilark Unit, which is a 1,260-acre contiguous block located in Columbia County near Vernonia. The second package is the Willamina Unit. This unit includes 19 tracts spread throughout Yamhill, Polk, and Lincoln County. This unit is 4,720 acres in size. None of the tracts are contiguous. The third and final unit is the Agness Unit. This unit is mostly comprised of two separate blocks located in Coos County totaling 6,650 acres. The property was offered for sale in a single stage bid process. Prospective bidders were able to bid on the property in its entirety, by investment package, or by any multi-package configuration. All three properties sold and closed in December:

  - Wilark Unit (1,260 acres): This unit sold to Stimson Lumber Company for $12,300,000 or $9,762 per acre.

  - Willamina Unit (4,720 acres): This unit sold to Hampton Timber LLC for $29,500,000 or $6,250 per acre.

  - Agness Unit (6,650 acres): This unit sold to a Canadian investment client of Fiera Comox for $43,000,000 or $6,466 per acre.

Current Offerings

One commercial property is currently on offer within 100 miles of the Port of Port Angeles:

- In December, AFM began marketing the Hoko Falls property on behalf of investment clients of Campbell Global. The property includes 12,933 acres located in western Clallam County, WA. The property is a contiguous block with excellent infrastructure and good site productivity. The offering is part of the Olympic Tree Farm, which was put up for sale in its entirety last year but ultimately resulted in a no sale. The property also sits adjacent to the North Clallam Unit, which was part of the recent Project Teal sale. Bids were due February 2025. Results have not yet been made publicly available.

Figure 6.3 depicts more than one hundred and fifty transactions of investment-grade timberlands in westside Oregon and Washington since 1996. The size of each "bubble" is proportional to the gross sale acreage. The sale price per gross acre is expressed on the y-axis and the year and quarter of sale is shown along the x-axis.

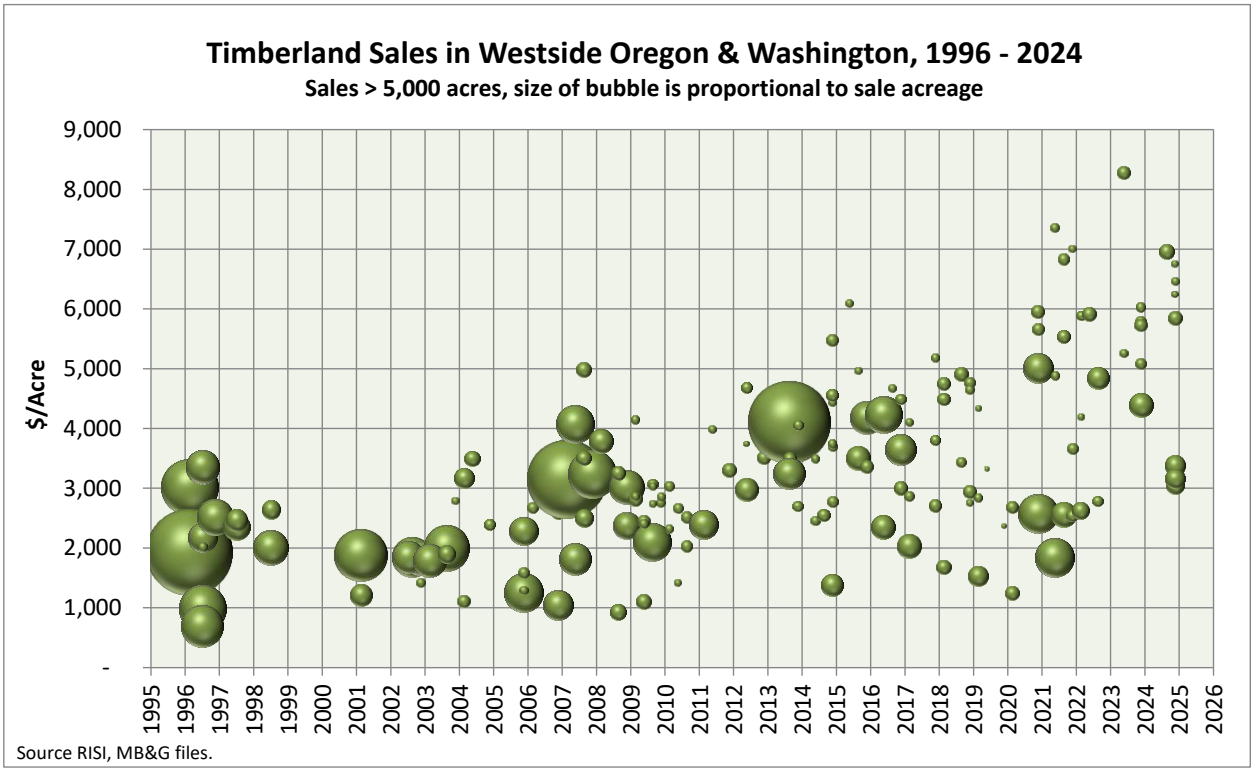

Figure 6.3 – Westside Timberland Sales, 1996 – 2024.

7. Other Economic Factors

A. Port of Port Angeles Foreign Trade Zone

The Port of Port Angeles is a Foreign Trade Zone. A Foreign Trade Zone (FTZ) is a designated area within the United States that is considered outside of U.S. Customs territory for the purposes of tariff laws and customs entry procedures. These zones are typically located near ports of entry, such as seaports, airports, or border crossings. Businesses operating within an FTZ can import, manufacture, and re-export goods without being subject to the usual customs duties and taxes until the goods enter U.S. commerce.

The core function of an FTZ is to facilitate international trade and enhance the global competitiveness of U.S.-based companies. Goods can be brought into an FTZ without formal customs entry or payment of duties. If the goods are later exported, no duties are paid at all. If they are imported into the U.S. market, duties are paid only at that time, and often at a lower rate, if the goods have been transformed into a different product with a lower tariff classification.

One of the primary benefits of operating in an FTZ is duty deferral and reduction. Companies can defer paying duties until goods leave the zone and enter the U.S. market. If the goods are re-exported, the duties are never paid. Additionally, if a company manufactures a product in the FTZ using imported components, it may be able to pay the duty rate on the finished product rather than on the individual components, which can result in significant savings.

In January 2025, the Port of Port Angeles, Washington, was officially designated as Foreign Trade Zone (FTZ) No. 303 by the Foreign-Trade Zones Board. This designation includes two “magnet sites”: the Port’s waterfront and the area surrounding the airport. For manufacturers in the wood fiber industry, FTZ 303 presents a strategic opportunity. For example, a company importing wood fiber (such as Canadian mill residuals) for processing into export commodities like pellets could benefit significantly. Within the FTZ, no import duties would apply, allowing the manufacturer to realize domestic economic gains from the production process while maintaining globally competitive pricing, free from the added cost of tariffs on both imported inputs and exported products.

B. International Longshoremen’s Association

The International Longshore and Warehouse Union (ILWU) is a labor union which primarily represents dock workers in the West Coast of the United States, Hawaii, and British Columbia, Canada. The ILWU has a single labor contract with the Pacific Maritime Association. The contract covers all West Coast U.S. seaports including the Port of Port Angeles.

ILWU 27 is the local longshoreman union for the Port of Port Angeles. They provide the labor for cargo operations on the marine terminals and aboard cargo vessels during cargo operations. ILWU 27A is the local union representing some of the employees of the Port of Port Angeles, primarily the Port’s employees performing facilities maintenance and log yard operations. These unions are related but operate under separate and different collective bargaining agreements. The union involved and the staffing requirements are very dependent upon the function and location of the labor being performed. Table 5.5 in section 5.D lists the current rates for the unions at the Port of Port Angeles.

8. Supply Potential and Conclusion

The Clallam County Economic Development Council (EDC) is dedicated to promoting the economic durability of the county by expanding capacity in the wood fiber market, especially for low-value wood fiber that is currently unutilized or under-utilized. The Olympic Peninsula and surrounding region have an extensive history of forest product-related manufacturing. The EDC is aiding in ensuring that this legacy extends into the future.

The Pacific Northwest currently has robust sawmill infrastructure and log markets that support strong cash flows associated with timberland ownership. These sawmills produce a large volume of residuals in the form of chips, shavings, and sawdust. These residual materials are shipped to pulp and paper mills located in Oregon, Washington, and British Columbia.

Even so, the residual market is fragile; with so few consumers of the material, the loss of one or more could have serious repercussions on the market. Pulp and paper mills in the region have struggled due to several factors, including decrease in demand for pulp and paper. Chip and residual prices have remained low and relatively flat since 2023. Without a new consumer of this material in the market, it is unlikely we will see any real increase in residual prices.

A manufacturer of valued-added wood products utilizing mill residuals and pulp logs operating in the Port Angeles region would strengthen the residual and pulp log markets. The increase in demand could be high enough to support one or more additional whole log chippers to the region. A manufacturer located in Port Angeles would be at a competitive advantage over the pulp mills in Canada, due to lower shipping costs from United States sources.

Access to barged material is critical. Total softwood chip volume within 100 miles trucking distance is 655,000, based on mill capacity and market information gathered by MB&G in interviews with market participants. MB&G interviewed market participants to get an estimate of utilization and residual production based on size and type of mills. The ability of the Port of Port Angeles to accept logs and mill residues is a significant strategic advantage for Port Angeles. The Port allows for a facility to access fiber in the Puget Sound, Gray Harbor, and coastal Oregon. Barging provides access to an additional 3.8 million tons of fiber, for a total of about 4.5 million tons (Table 8.1). In addition, the Port's Foreign Trade Zone could give unique opportunities to source fiber from Canada.

Type of Material	Annual Volume (BDT within 100 Trucking miles	Annual Volume (BDT) within Barging Distance	Total Annual Volume (BDT)	Estimated Price ($/BDT)
Softwood Chips	655,000	3,800,000	4,455,000	$85
Softwood Shavings	180,000	1,600,000	1,780,000	$35
Softwood Bark	140,000	900,000	1,040,000	$10
Hardwood Chips	83,000	105,000	188,000	$130
Hardwood Shavings	39,000	45,000	84,000	$45
Hardwood Bark	11,000	25,000	36,000	$10

Table 8.1 – Annual available production and typically price per BDT.

Pulp log delivered prices are typically around $30 per ton in 2025 dollars. Softwood chips cost about $85 per delivered ton. Delivered prices for shavings in the region are around $35 per ton.

For a manufacturing facility to succeed, challenges remain, though these can be overcome. Most importantly, a potential manufacturer must be engaged. An appropriate site for the facility, either at port, airport, or other location must be identified. Minor improvements to the port facilities may be needed, including new loading and off-loading equipment, refurbishment of dock facilities, and development of storage zones.

Once in place, a manufacturer can expect a sustained supply of wood fiber, if current trends continue.