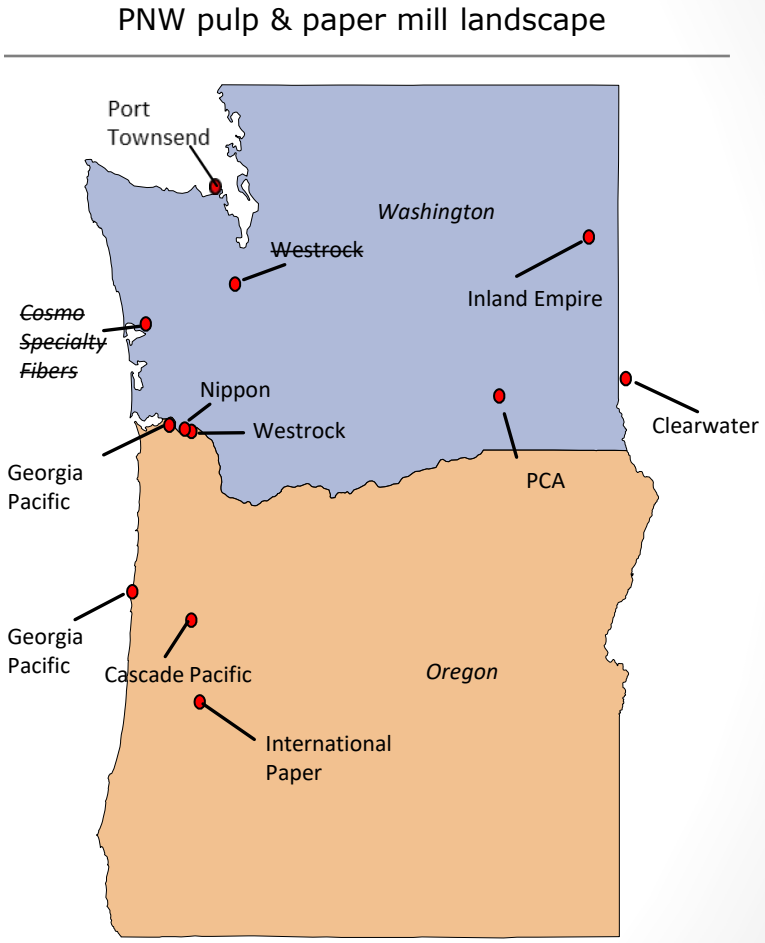
Wood Chip & Residuals Markets & Quality

Key Factors to Maximize Residuals Value

John Holte – Manager Chips & Coos Bay Shipping Terminal
Roseburg Forest Products

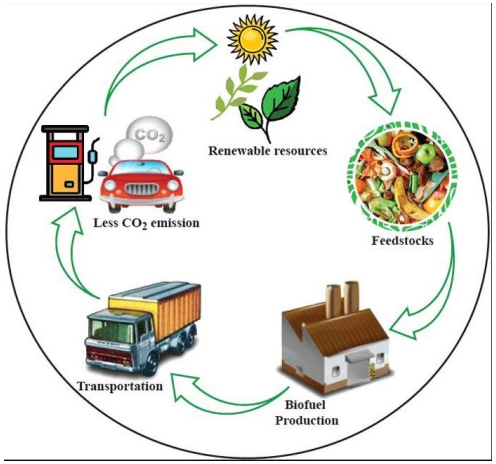
Pacific Northwest Pulp & Paper Mills

- 10 pulp mills are currently operating in the PNW
- Total virgin fiber consumption decreased by 44% in the last 15 years
- Downsizing and closure of mills has been driven by poor financial returns and limited reinvestment
- In recent years, labor, increased costs, fiber supply and COVID have also had a negative effect



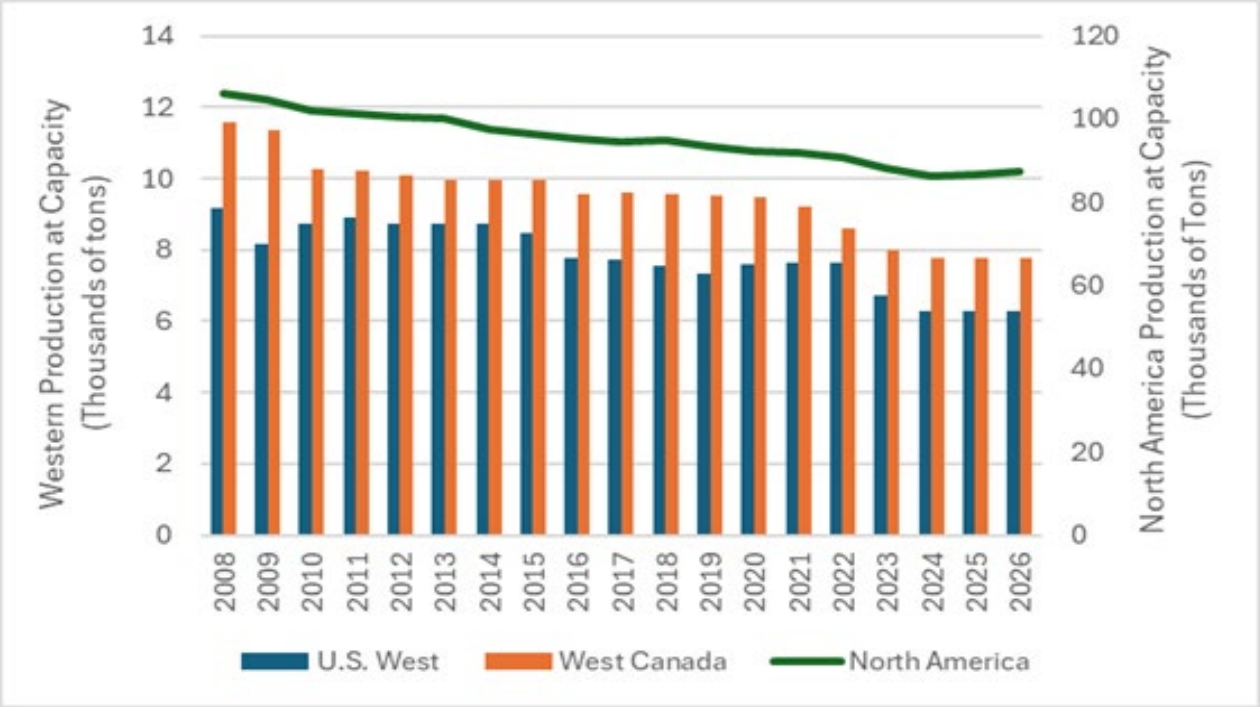
Residuals End Products

Residuals End Products



Significant Drop in Virgin Fiber Consumption in PNW

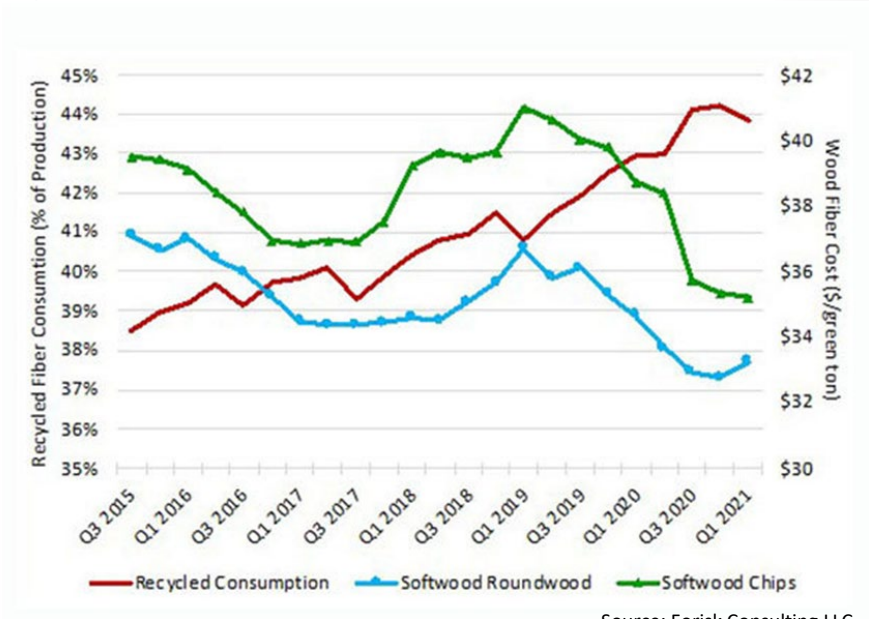
- In the last 20 years closures in the Pacific Northwest reduced fiber consumption by 5.4 million BDT's. This graph shows the downward trend since 2008
- During the same time lumber production dropped 9 BBF from 2005 to 2009, then has steadily climbed since, although much more slowly in the last two years, and is still 5 BBF below 2005 levels



Data Source: Forisk North American Mill Database

A Brief History of Chip Markets

- In 2020 there was an estimated 20% decline in the pulp and paper market. Closures of mills that make printer paper and newsprint reduced overall capacity. A shift to using more recycled fiber reduced virgin fiber consumption
- Residual chip supply grew as sawmills went into high gear to respond to record lumber markets. Chip exports to Japan & China dropped off as Covid surged. These factors combined to over-supply the domestic market, pushing prices down
- At the same time costs increased drastically in all areas of the industry

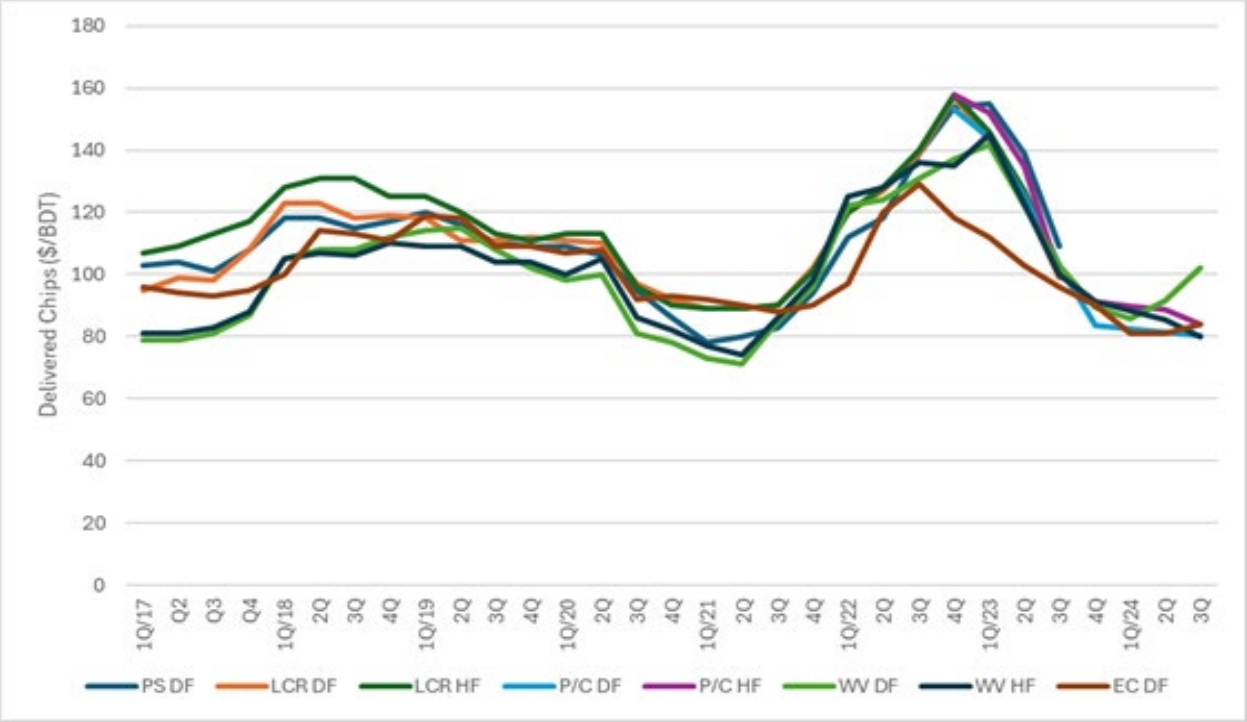


Source: Forisk Consulting LLC

Roseburg Forest Products – North Bend Chip Terminal

A Brief History of Chip Markets

- 2021 began a shift in demand and chip prices rose by 40% from 2020
- Export demand also increased in 2021 and initially residual chip volume was plentiful, that changed as domestic demand increased, and then changed again as lumber prices fell, & sawmill production fell reducing residual chips
- Whole log chip production increased to help meet demand
- Transportation was an issue throughout our industry especially for longer hauls
- Everything changed again in late 2022 into 2023 and chip demand dropped quickly



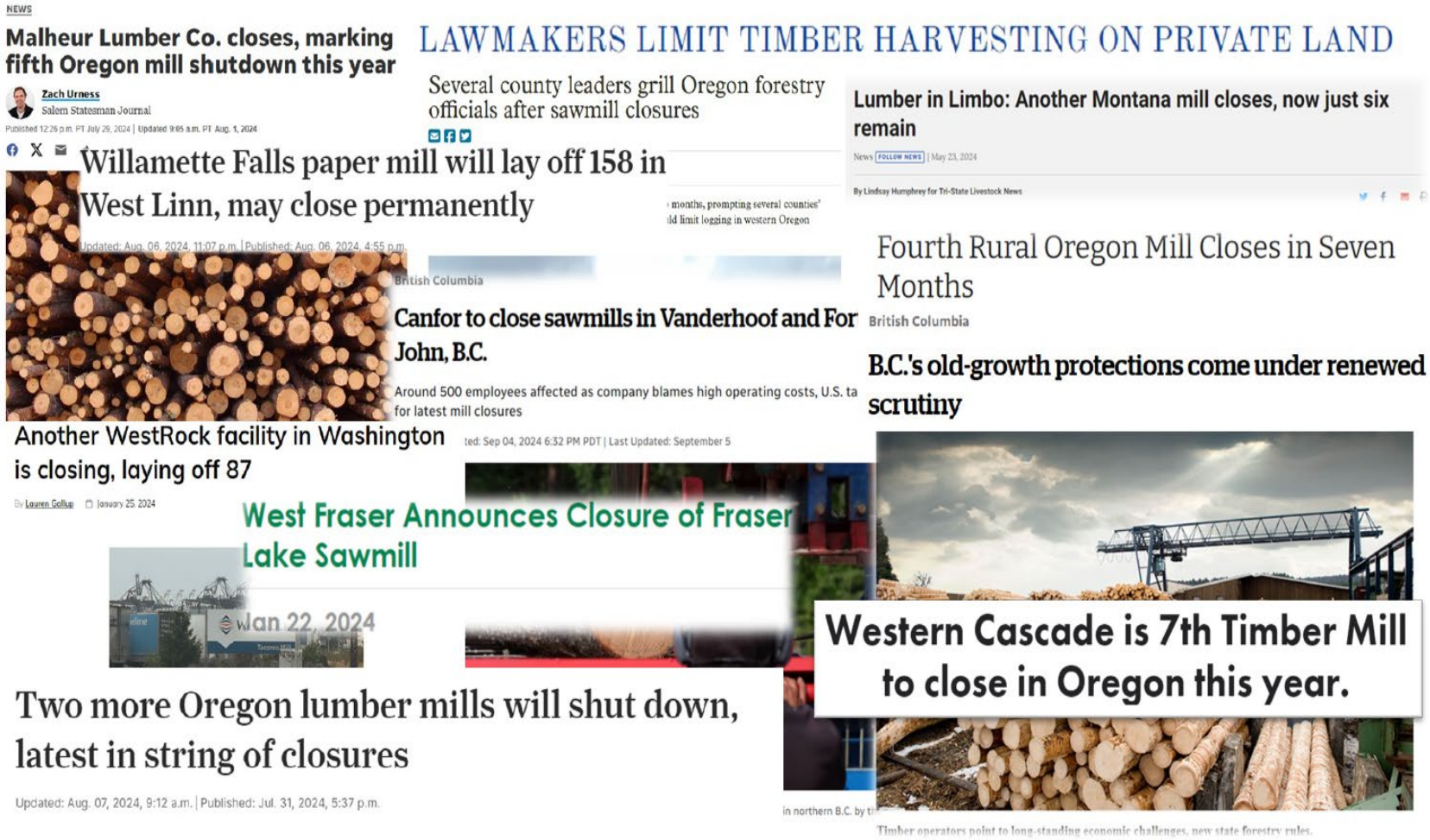
Data from FORISK

A Brief History of Chip Markets

- WestRock's Tacoma mill closed in September of 2023, which negatively impacted the whole-log chip market
- The oversupply of residual chips caused the production of whole-log chips to slow to little more than a standstill
- Producers found some help in markets exporting chips to Canada
- As sawmill closures and curtailments continued into Q1 2024, the market demand for whole-log chips started to rebound from the lows in 2023 *Data from FORISK*

Photo: Aaron Bender

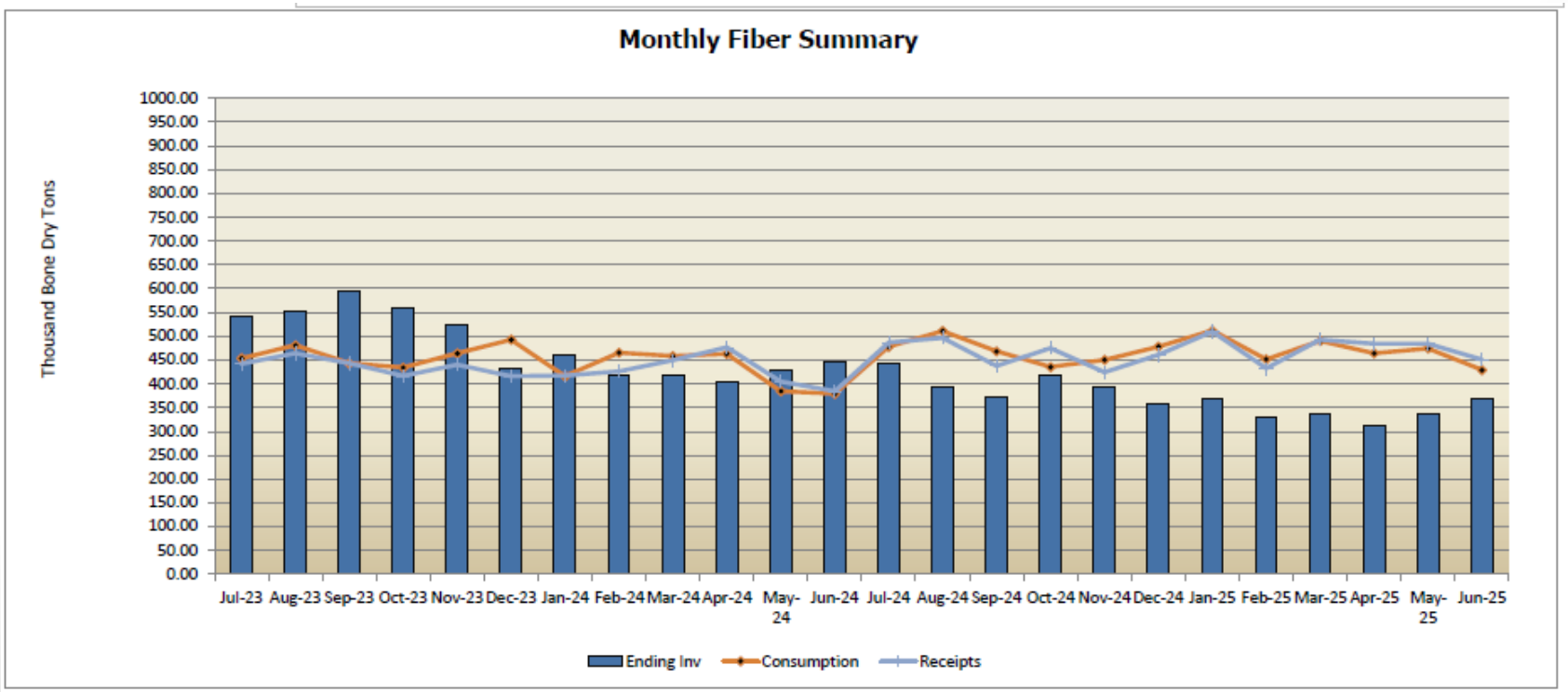
West Coast – A Year of News



Source: Colin Campbell, Green Diamond

Chip Consumption and Inventory

- 2024 and 2025 have showed a relatively flat chip market. Inventory increased in mid 2024, then came off for several months before bumping back up. Canadian exports have had an impact here with reduced residual chip production in Canada. Exports to Japan have been relatively stable, and demand to China is still not back
- If inventory drops with a stable demand, we could see upward price pressure in Q4, although it isn't expected to be a dramatic change

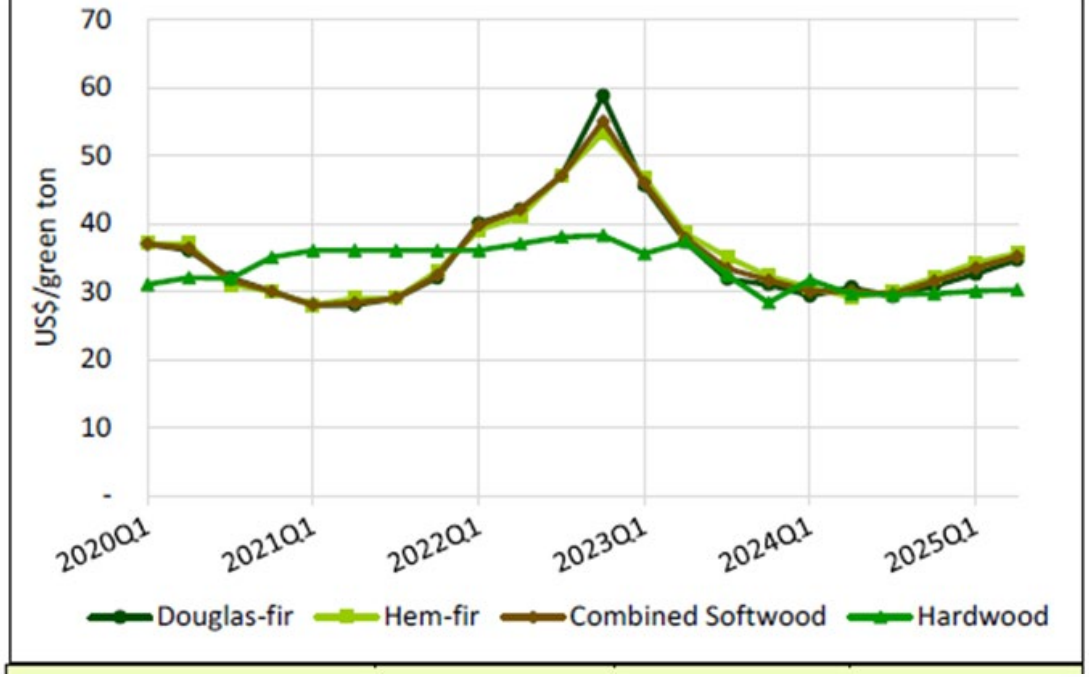


Data from FRA

Whole Log Chips

- Douglas-fir pulplog prices averaged $35/green ton across the region, up 7% from last quarter. Hemlock pulplog prices increased 3% to $35/green ton, making the weighted average for softwood pulplogs also $35, up $1 for the quarter.
- Average hardwood pulplog prices in the Northwest remained relatively flat for the quarter at $30/green ton.

Figure 5. U.S. Northwest Pulplog Prices and Q2 2025 Changes

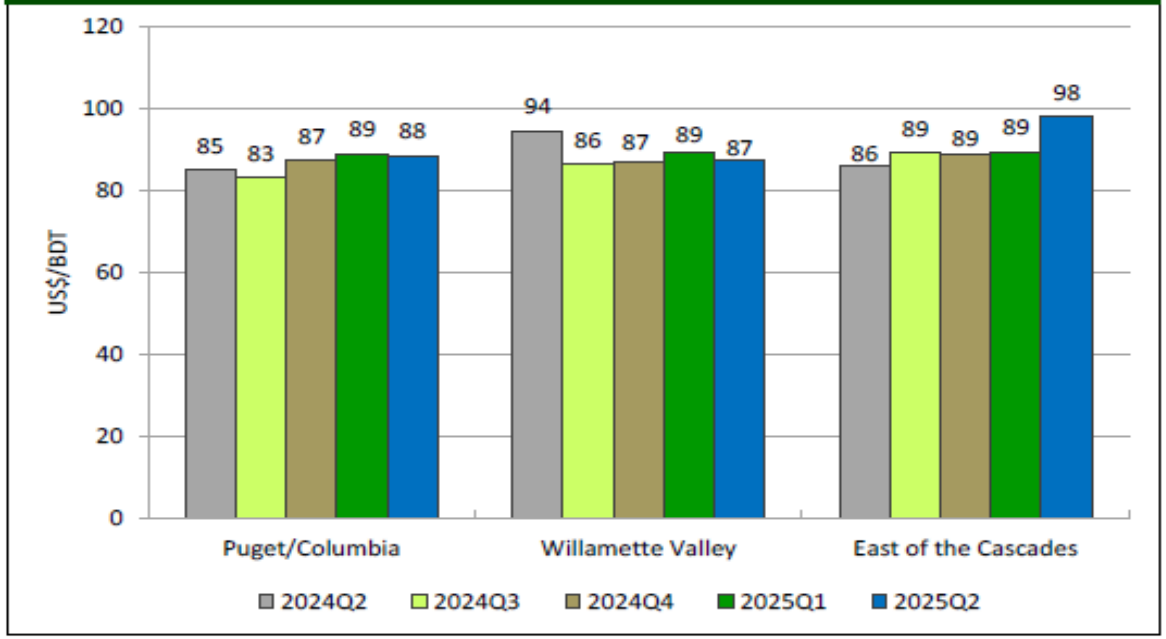


Data from FORISK

Market Trends by Region

- The weighted average price of all chips (residual and whole-log) changed slightly depending on region, some increased were driven by export demand coming from Canadian pulp mills looking for incremental fiber.
- Willamette Valley Douglas fir residual chip prices were flat to slightly down, while prices increased up to $8/BDT (10%) East of the Cascades.
- Hardwood chips have remained flat to slightly down so far in 2025

Figure 6. Softwood Chip Prices* in U.S. Northwest by Subregion



Data Source: Forisk Wood Fiber Review
*Prices are weighted average of residual and whole log chips

Data from FORISK

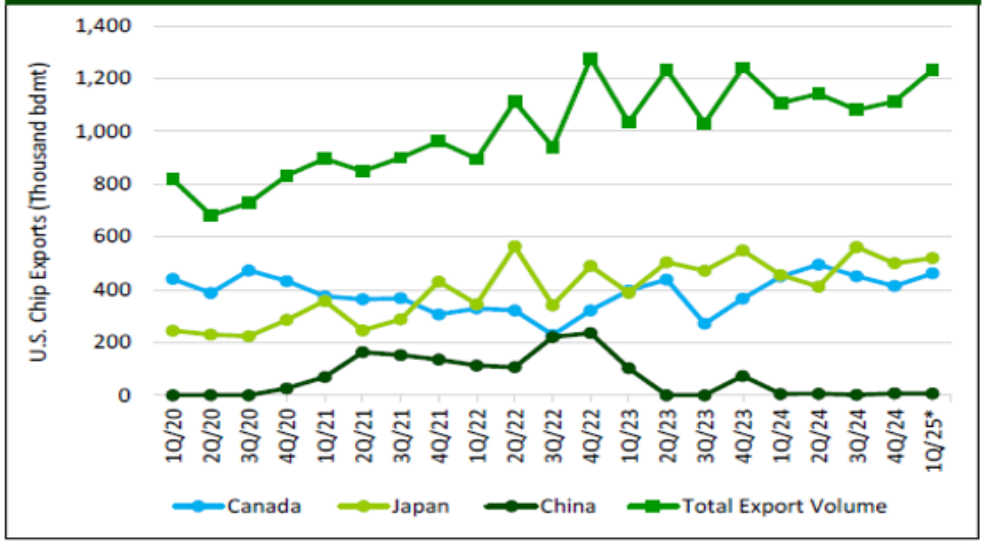
Chip Exports by Country

Canada has been a bigger player recently in the chip market, even replacing Japan as the largest importer of chips for a quarter

Chip exports to Japan came off in early 2024 but have come back and look to stabilize for conifer chips from the west.

Volume exported to China is expected to be minimal after the for the next 2-3 years

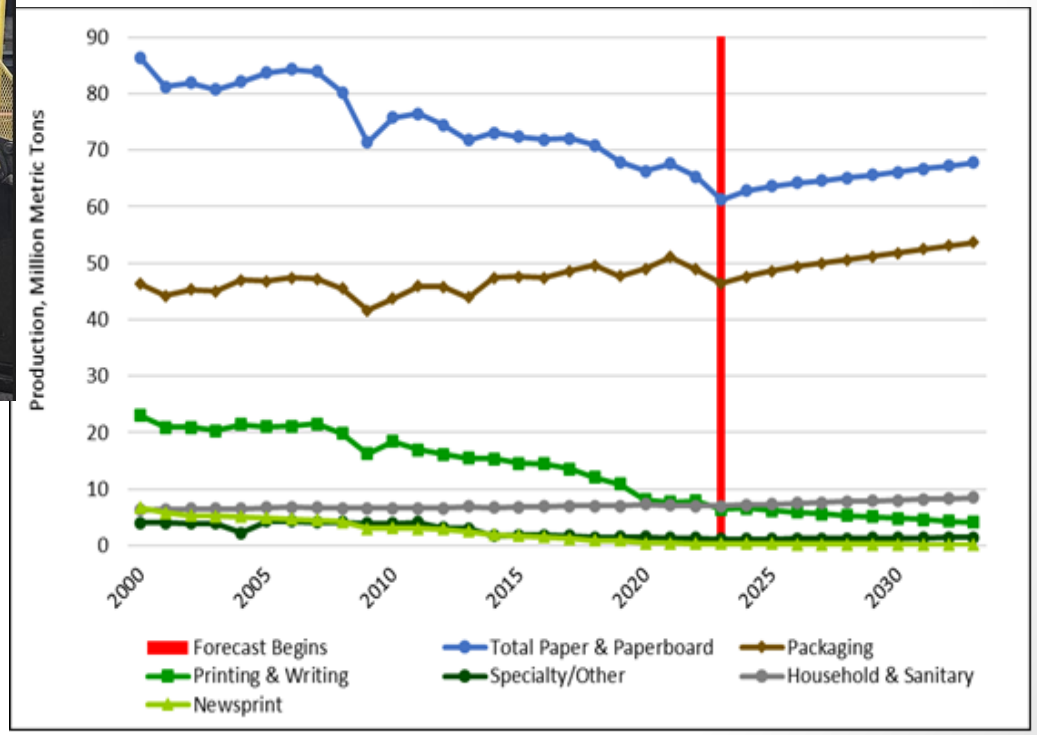
Figure 39. U.S. Chip Exports by Top 3 Destinations



Data Source: U.S. Census Bureau
*Projected full Q1 shipments
Data through February 2025

Pulp & Paper Markets

- This graph shows a breakdown of paper products, as most know we see a continued decline in printing and writing paper and newsprint
- Packaging has been flat to increasing, and is expected to grow in future years with more moves to paper product packaging



Data Source: FAO, ERA, Forisk Consulting FRQ

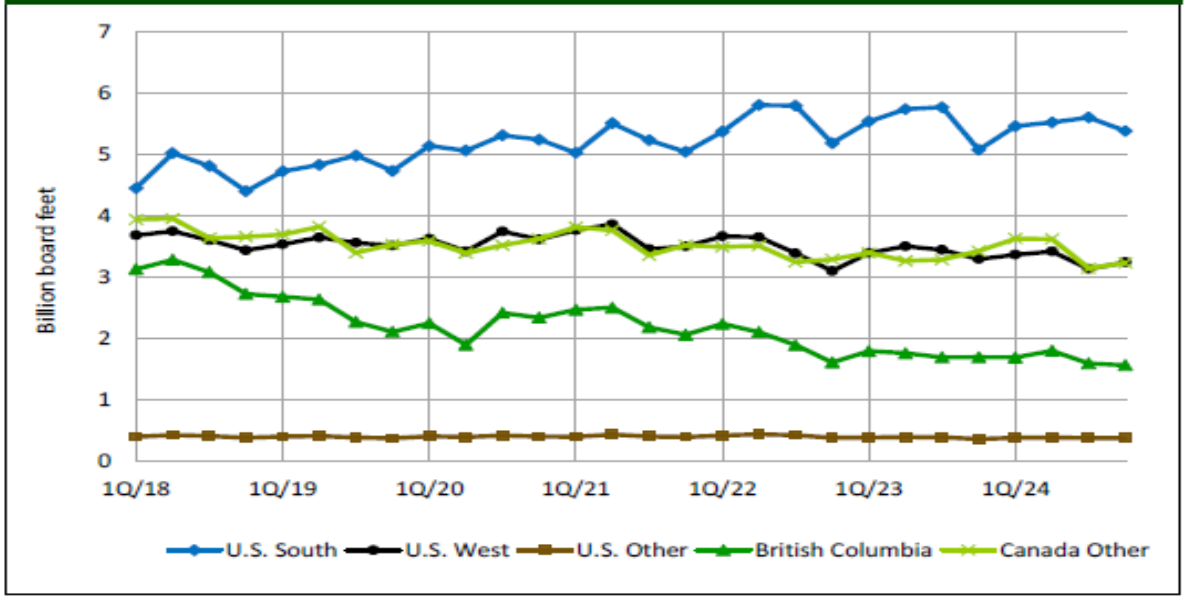
Market Trends and Influences

North American softwood lumber production was flat for both year-over-year and quarter-over-quarter in Q4 2024.

- The West gained over 3% while the South and North declined almost 4% and over 1%. In aggregate the US declined over 1% in Q4 2024.
- Quarter-over-quarter production declined in British Columbia almost 2% but the rest of Canada rose almost 3% to bring the Canadian total up over 1%.
- North American total production was down 3% over the last 5 years, with all North American regions flat or declining except the South rising 9%.

Data from FORISK

Figure 29. Regional Softwood Lumber Production in North America

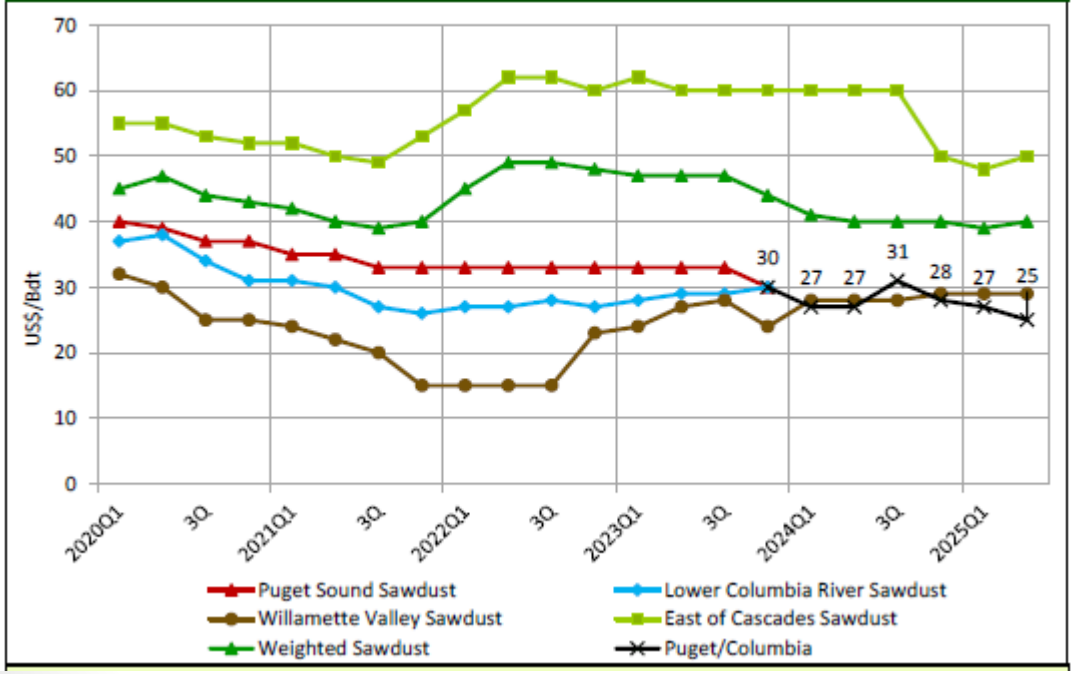


Data Source: WWPA

Sawdust & Shavings

Most all of us know the trouble sawdust has been in the last few years. Demand has fallen and piles are being built everywhere. Most are reporting the buying and selling sawdust for the cost of transportation. There is some relief in the near future with new pellet capacity coming on in Oregon, and longer-range plans have an MDF plan being built in Dillard that would also provide relief. The DRAX facility in Longview is still trying to get through the permitting process and its future is unclear.

Figure 9. U.S. Northwest Subregion Sawdust Prices



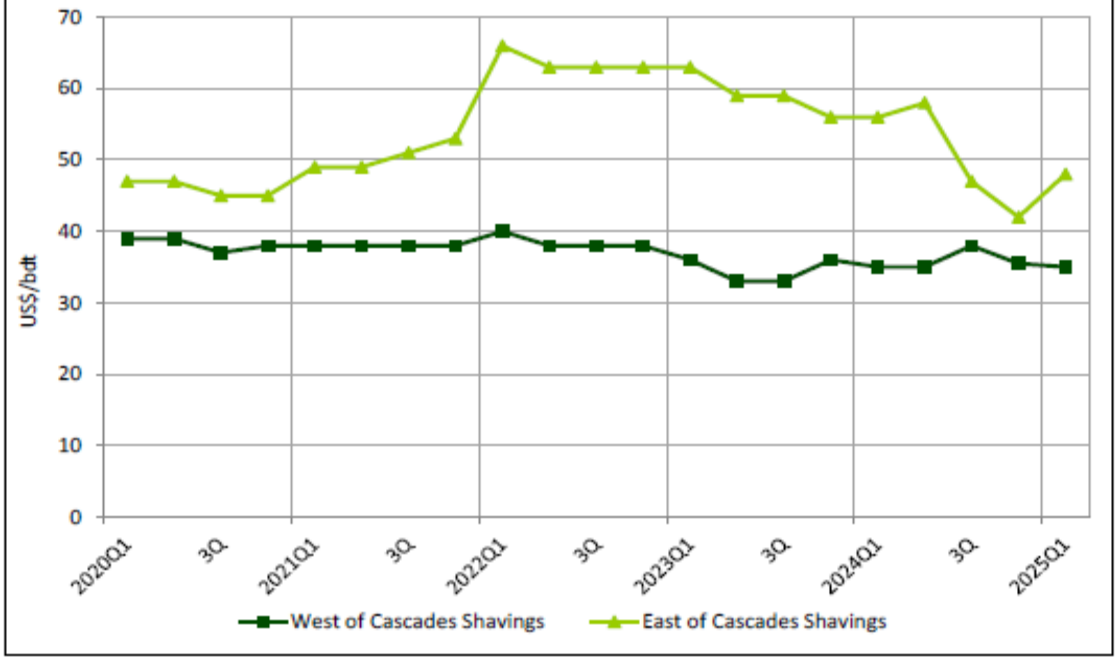
Data from FORISK

Sawdust & Shavings

Shavings tells a slightly better story than sawdust with more demand, especially for dry shavings – generally demand for dry shavings is higher in the winter months, higher demand for green in the summer

Future demand for sawdust and shavings could increase with planned pellet projects, and panel projects that will utilize more of what is produced

Figure 10. U.S. Northwest Subregion Shavings Prices

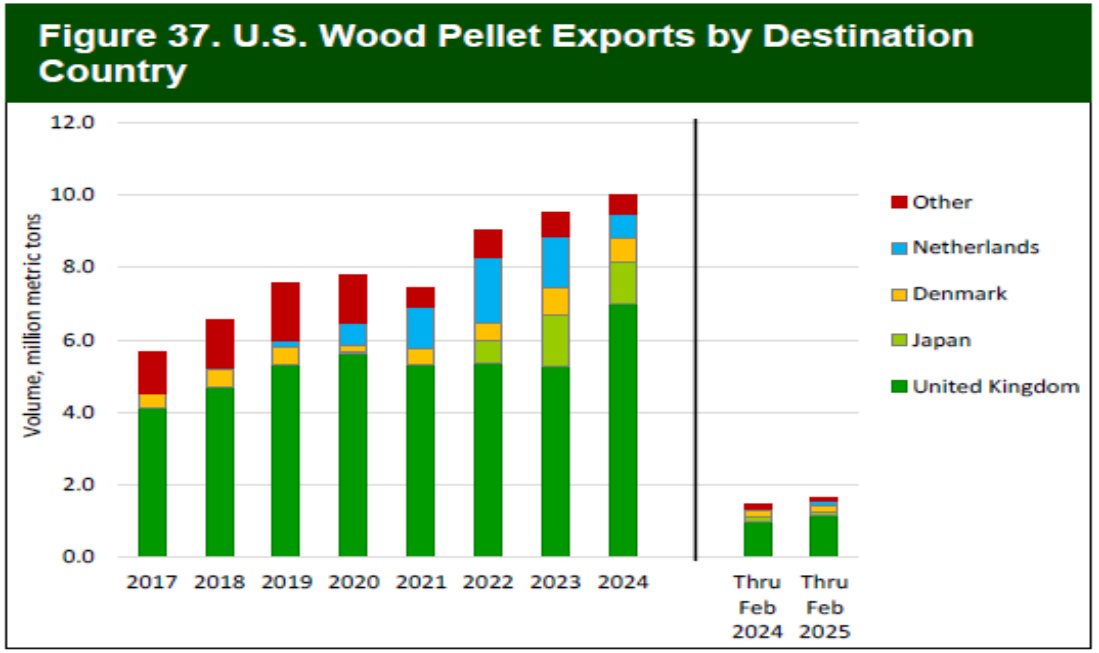


Data Source: *Forisk Wood Fiber Review*

Pellets – US Exports

Through February of 2025, U.S. wood pellet exports increased 13% with the majority going to the UK, which increased 18%.

- The Netherlands and Sweeden are also big importers.
- Japan had been increasing in the last few years but is down 45% so far this year through February



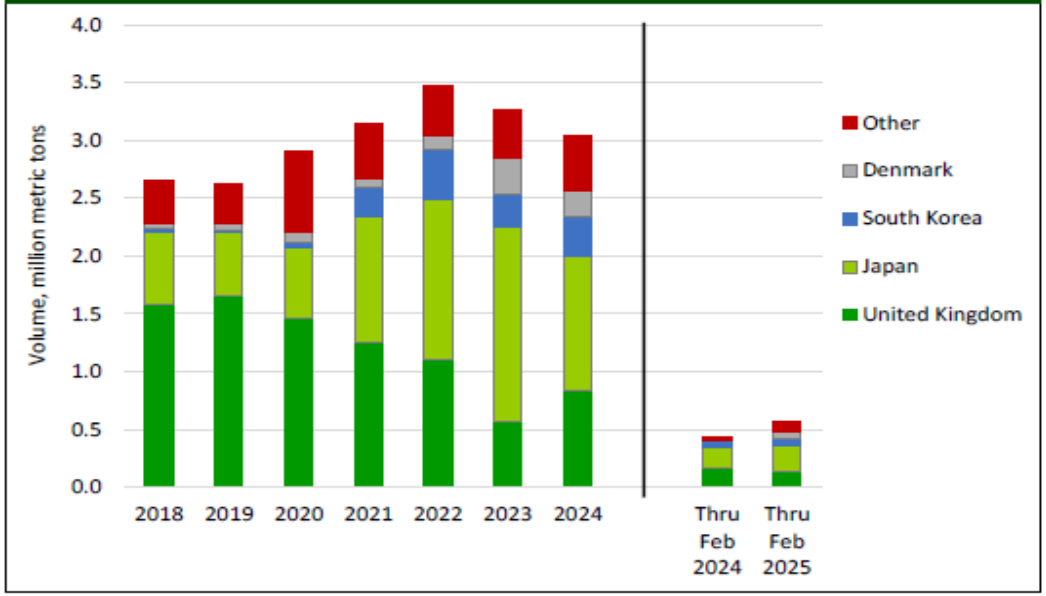
Data Source: U.S. Census

Pellets – Canadian Exports

Canadian wood pellet exports are up 34% YOY through February 2025

- Pellets exported from western Canada continue to shift to Japan and away from the UK
- Japan remains the top importer, taking 36% of Canadian pellets
- Exports to the UK are down 16% through February, taking 25% of production
- Denmark and South Korea also import pellets from Canada

Figure 36. Canadian Wood Pellet Exports by Destination Country



Data Source: Statistics Canada

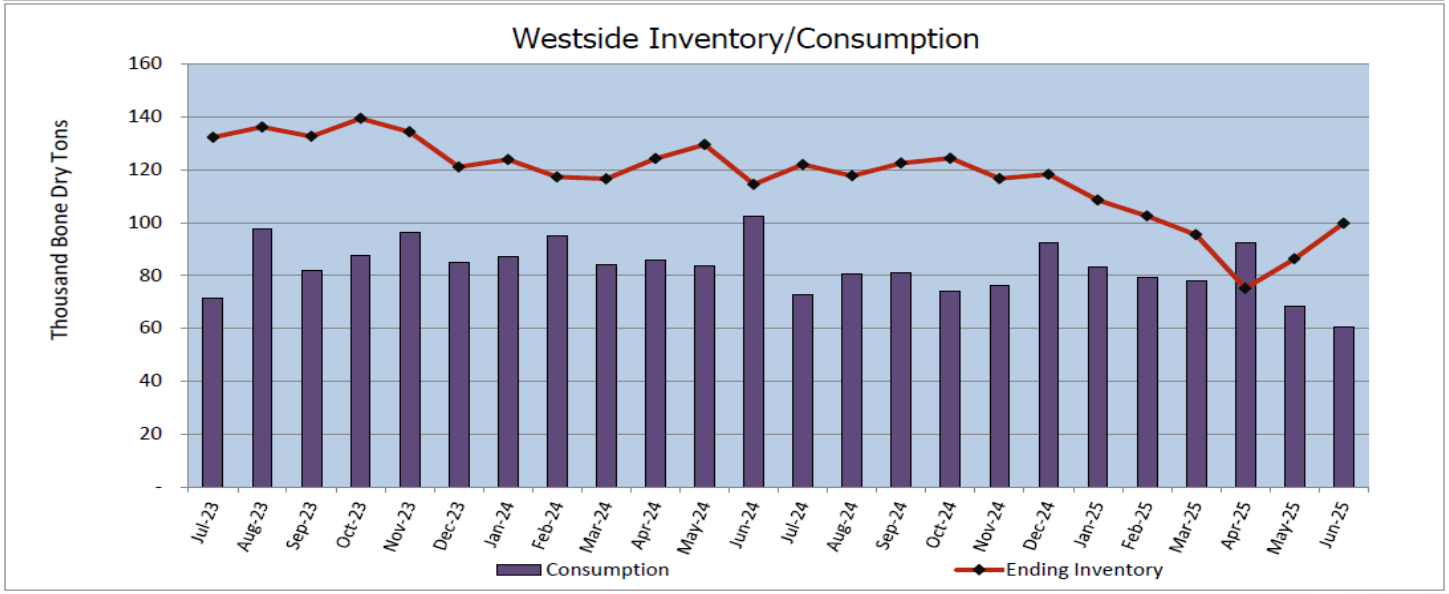
Hog Fuel

Inventory has been trending down in the western region, even with lower consumption. Seasonally this happens with the typical spring bark slippage and the pull from landscape companies. There is also a reduction in bark production with fewer mills operating and other mills burning as much as they can in their boilers.

Sellers are working hard to avoid the hogfuel market and maintain access to the higher-valued “beauty bark” outlets when available

Hogfuel - Selected Delivery/Usage/Inventory by Region

Data below is a subset of hogfuel, west of the Cascades in the Pacific Northwest bought or gathered from "open" sources - available for purchase from sawmills or other facilities, gathered from in-woods operations, or urban waste collection centers.



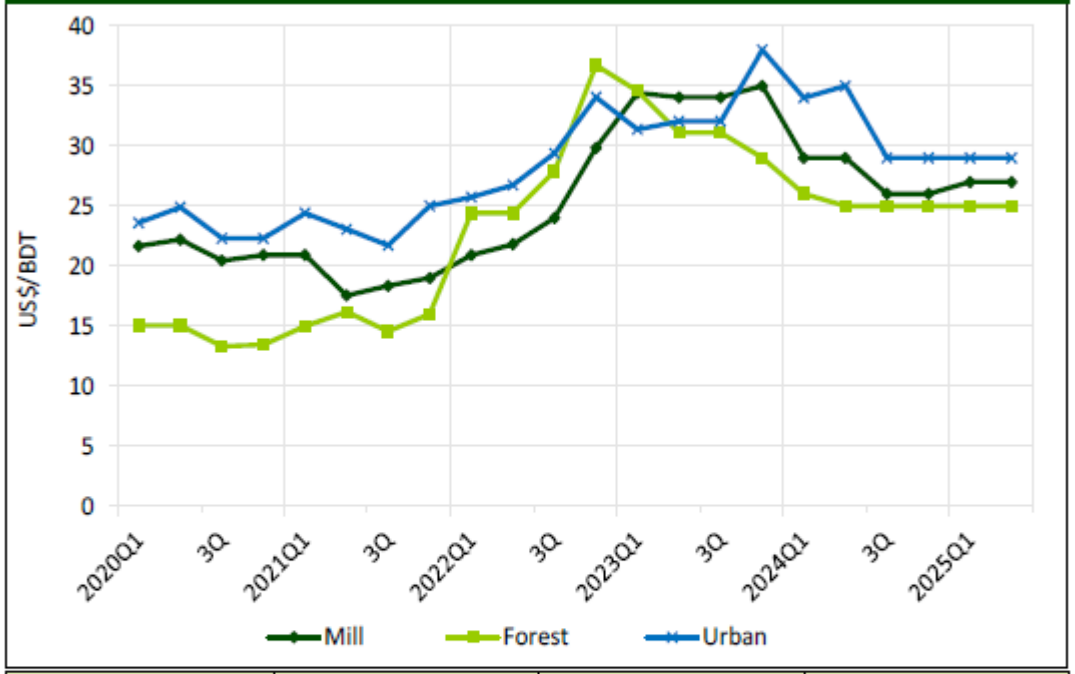
Data from FRA

Hog Fuel

Across the country, biomass prices were steady in Q225. This was the same for the PNW with mill, forest and urban biomass staying flat

The Southeast, South Central, Northeast, and Northern CA regions saw relatively small decreases in price

Figure 20. Western Washington & Northwest Oregon Woody Biomass Prices



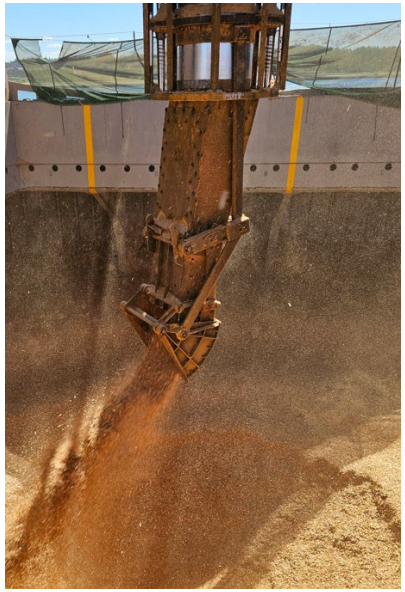
Product	Current Q	Q/Q	Y/Y
Mill	$27	0%	-7%
Forest	$25	0%	0%
Urban	$29	0%	-17%

Data Source: *Forisk Wood Fiber Review*
All prices are in US$/BDT(delivered).

Data from FORISK

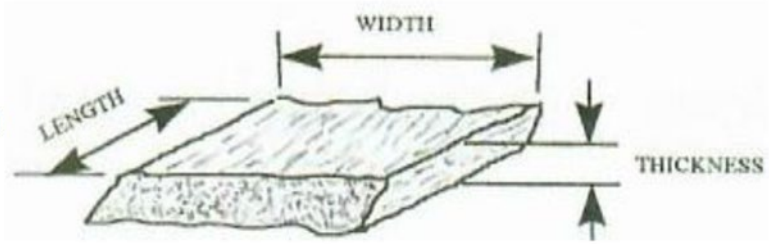
Wood Chip Quality

- Pulp mills require:
  - Uniform Chip Size and Thickness
  - Fresh, Green Wood
  - Minimal Bark
  - Absolutely NO Char or Non-Wood Material



Sizing and Thickness

- Target size may vary depending on the customer, but properly sized chips, or "Accepts," should be between 4-8 mm thick



Chip size is determined by measuring its length, width, and thickness.

FRA Chip Quality Manual – Sept 2020

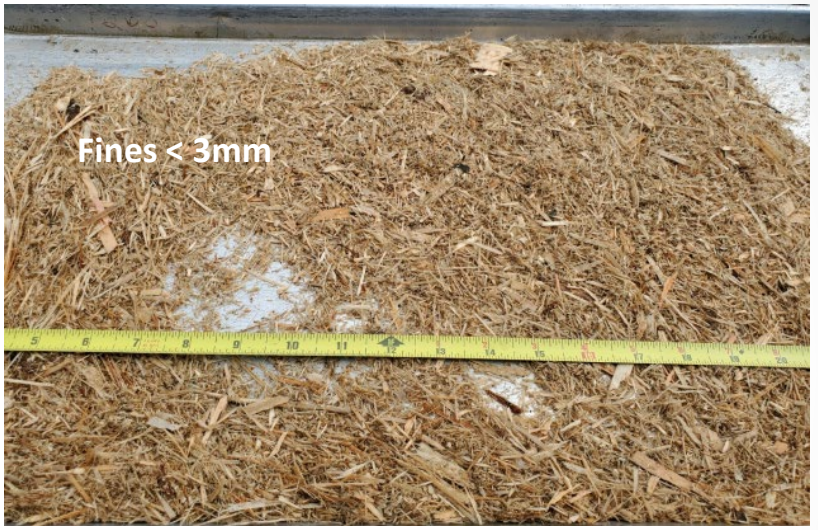
Sizing and Thickness

Pulping yield is directly affected by chip thickness

- **PIN CHIPS:** Pin chips are narrow, nearly full-length chips. They have 90% of the yield and strength of accept chips. Some continuous digesters have limited tolerance to high levels of pin chips
- **FINES:** Fines are composed of slivers, sawdust, bark, sand, and dirt. Fines have significantly lower yield, increased chemical use and cause dirt in the final pulp product. Fines decks in chip screens can plug due to over-capacity and high moisture content of the fines.
- **OVER-THICK CHIPS:** Chip thickness is the most important chip dimension in pulping. Ideally, chips should be 4-6mm thick, but due to non-uniformity in chipping, there is a distribution of chip thickness. Over-thick chips are usually defined as greater than 8mm thickness.
- **OVER-LENGTH CHIPS:** Over-length chips are actually chunks of wood broken or cut off in the chipping process. They range from 2" to more than 6". Thin over-length chips are called slivers. Most over-size are also over-thick. In addition to not pulping completely, over-length can cause screen and conveyor plugging.

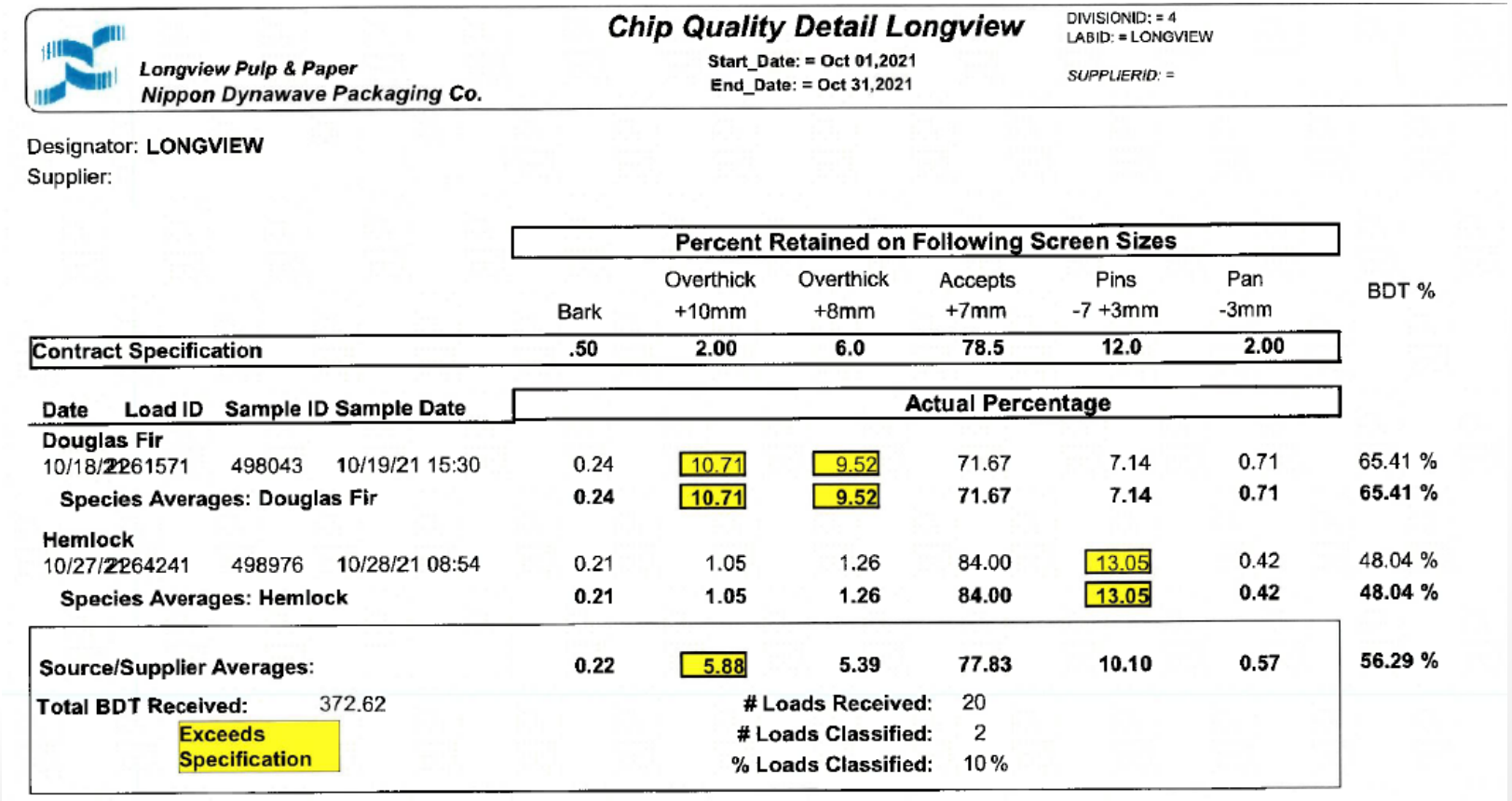
FRA Chip Quality Manual – Sept 2020

Sizing and Thickness



Quality Reports

- Samples will be taken to determine the % of Accepts, Fines, Pins, Overs and Bark



Longview Pulp & Paper
Nippon Dynawave Packaging Co.

Chip Quality Detail Longview
Start_Date: = Oct 01,2021
End_Date: = Oct 31,2021

DIVISIONID: = 4
LABID: = LONGVIEW
SUPPLIERID: =

Designator: **LONGVIEW**
Supplier:

Date	Load ID	Sample ID	Sample Date	Bark	Overthick +10mm	Overthick +8mm	Accepts +7mm	Pins -7 +3mm	Pan -3mm	BDT %
				Percent Retained on Following Screen Sizes						
Contract Specification				**.50**	**2.00**	**6.0**	**78.5**	**12.0**	**2.00**	
				Actual Percentage						
Douglas Fir										
10/18/2261571		498043	10/19/21 15:30	0.24	10.71	9.52	71.67	7.14	0.71	65.41 %
Species Averages: Douglas Fir				**0.24**	**10.71**	**9.52**	**71.67**	**7.14**	**0.71**	**65.41 %**
Hemlock										
10/27/2264241		498976	10/28/21 08:54	0.21	1.05	1.26	84.00	13.05	0.42	48.04 %
Species Averages: Hemlock				**0.21**	**1.05**	**1.26**	**84.00**	**13.05**	**0.42**	**48.04 %**
Source/Supplier Averages:				**0.22**	**5.88**	**5.39**	**77.83**	**10.10**	**0.57**	**56.29 %**

Total BDT Received: 372.62
Exceeds Specification

 # Loads Received: 20
 # Loads Classified: 2
% Loads Classified: 10 %

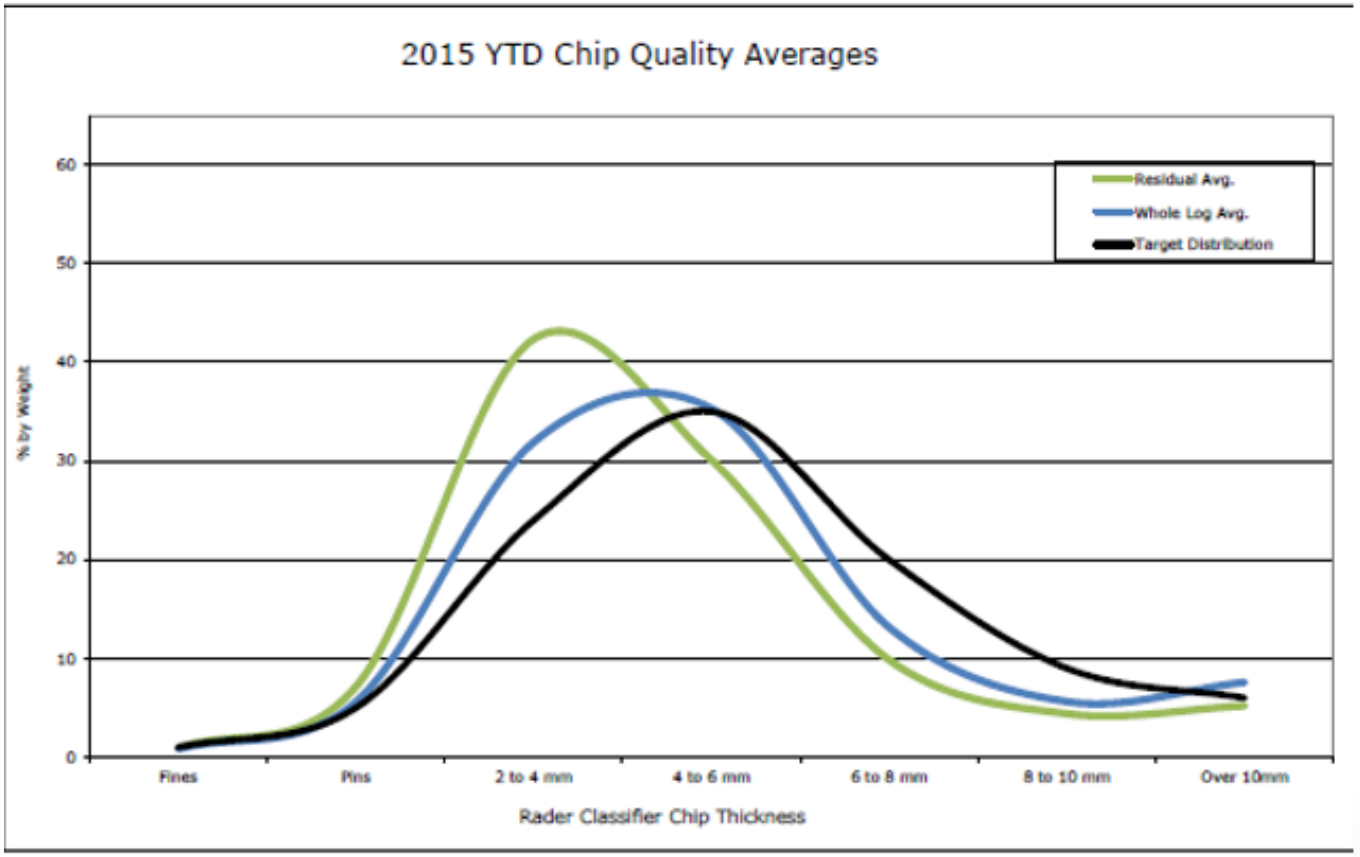
Whole Log vs. Residual Chips

KAPSTONE

Chip Quality Summary

Samples Collected and Analyzed by KapStone Kraft Paper Corporation

Chip Center: ***2015 YTD Chip Quality Averages***



Chippers

- Disc Chippers:
  - Precision machines, tuned to meet specifications
  - Maintain factory angles and clearances
  - Replace worn parts as needed. Worn disc face plates, spouts, anvils, knife pockets, and knives all affect chip quality
  - Keep knives sharp!

Chippers

- Chipping heads:
  - Chipper head RPM and log feed speed need to be compatible.
  - Variable frequency drives can help match these two key components.

RPMs vs. Feed Speed

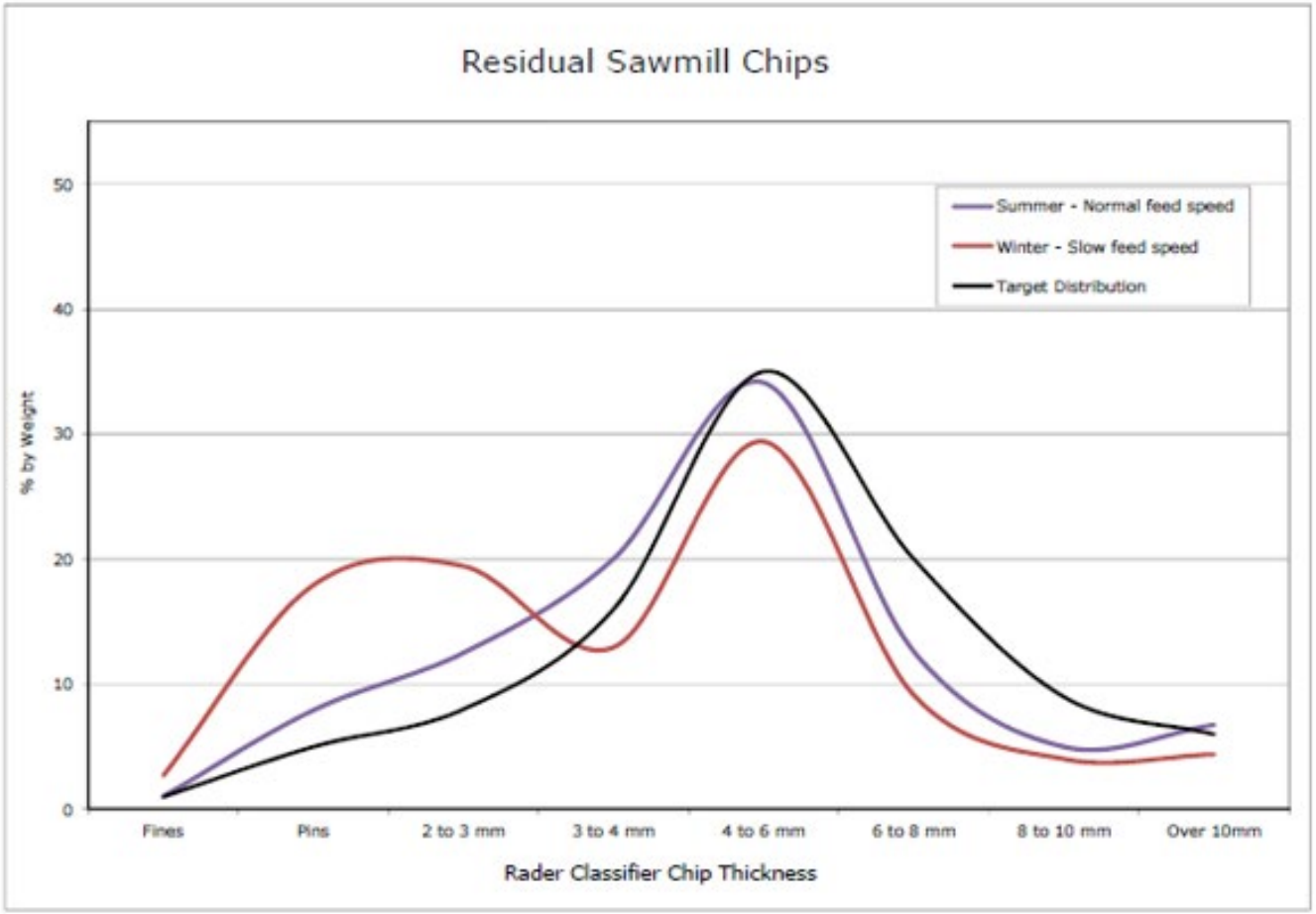
KAPSTONE

Chip Quality Summary

Slow Feed to Chipping Heads

Samples Collected and Analyzed by KapStone Kraft Paper Corporation

Chip Center: ***Residual Sawmill Chips***



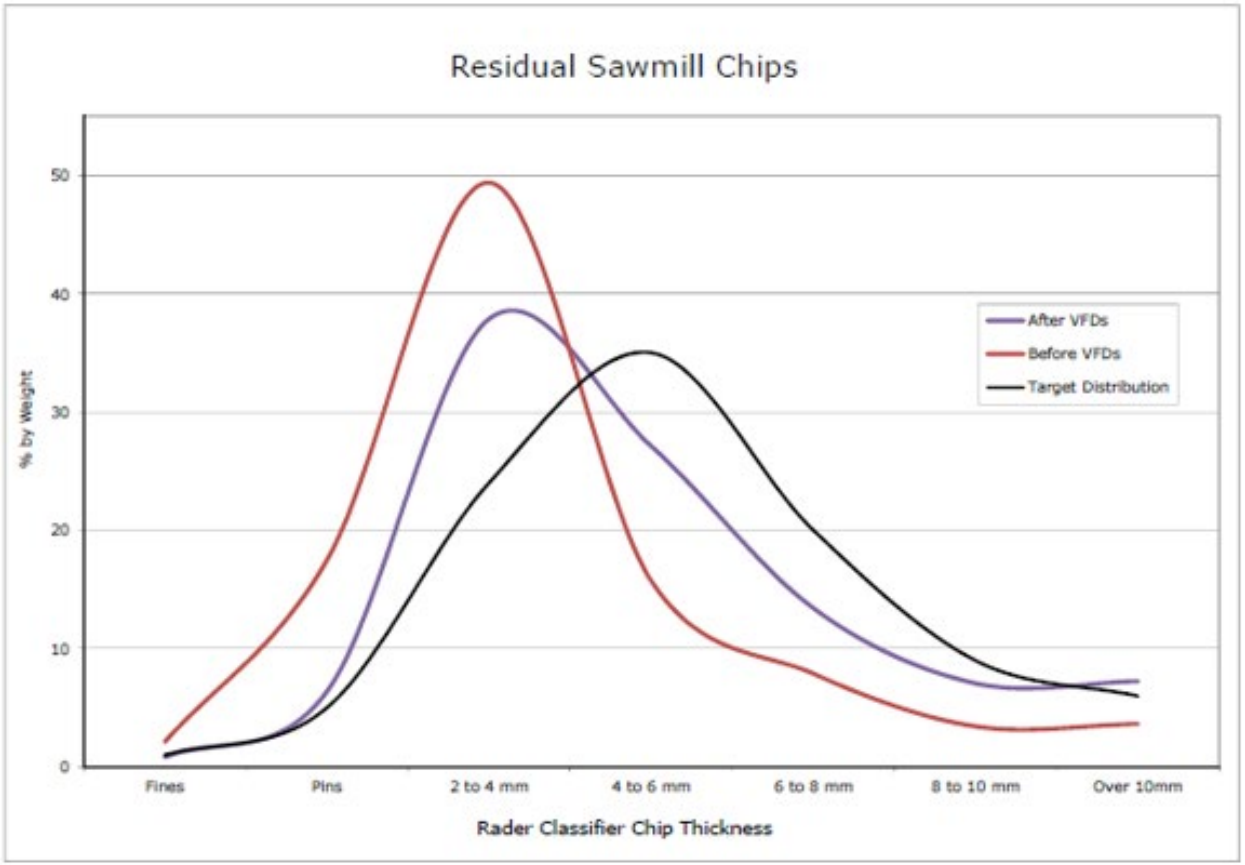
Variable Frequency Drives

KAPSTONE

Chip Quality Summary

Change to VFDs

Chip Center: ***Residual Sawmill Chips***



* Data collected combined 2-3mm and 3-4mm chip classification. Target distribution changed to reflect this.

Screening

- Screen capacities need to meet or exceed the maximum output of the mill
  - Be mindful of future production increases
- Select screen components based on your customer's specific requirements
- Schedule routine cleaning – Increase frequency as the weather or material dictates
- Evenly distribute material across the screen
  - Spreading devices or drop plates are effective, as well as proper balancing and leveling of screen
- Screen sawdust from the chipper feed

Screen Cleaning

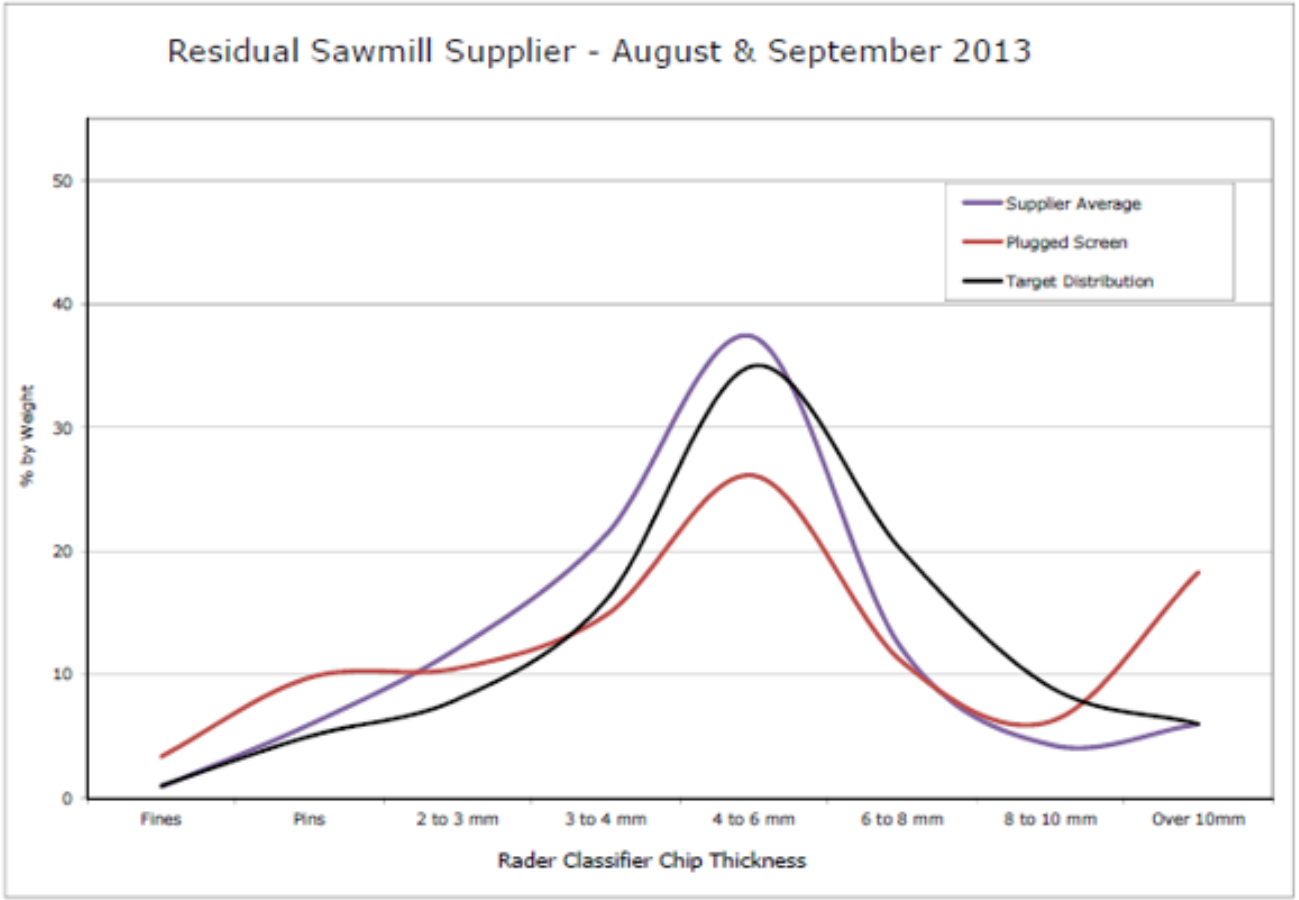
KAPSTONE

Chip Quality Summary

Screen Cleaning Issues

Samples Collected and Analyzed by KapStone Kraft Paper Corporation

Chip Center: ***Residual Sawmill Supplier - August & September 2013***



Contamination

- Bark:
  - Maintain tight tolerances on debarking equipment
    - Be proactive heading into the fall/winter
- Rock and Metal:
  - Test metal detector routinely to assure it is working properly, metal will not only contaminate chips but can cause serious damage to a chipper
  - Bin storage is best, but if ground storage is absolutely necessary, the area should be paved and care taken to eliminate contamination
- Plastic:
  - Monitor chip conveyors, shakers and screens for UHMW or other plastics that will bypass a metal detector
- Cleanup and yard debris:
  - Regular crew training - Cleanup material doesn't belong on a chip conveyor

Chip Handling

- Chip transfer points can cause deterioration and breakage
- High speed transfer points (discharging chipper head pockets, blow tubes, etc.) and abrupt chute angles can increase chance of plugging pipes, and cause chip quality to suffer
- Inspect for chute wear and maintain smooth transfers points with adequate room for chip deceleration

Chip Quality Manual

3rd Edition – September 2020

Quality Chips Make A Difference!

Forest Resources ASSOCIATION

Western Region
Kennewick, Washington
906.282.6752

https://forestresources.org/

Summary

- Maintaining good chip quality will benefit both the chip producer and the chip consumer, it will keep customers loyal and return the best value to the operation
- Frequent communication with your customer's fiber procurement staff will help you to quickly identify and remedy issues negatively affecting chip quality
- Tuning chippers and feed systems to produce quality chips will ensure maximum throughput with minimal downtime
- Scheduled maintenance, routine cleaning, and trained staff are key in maintaining high chip quality

Questions

https://www.rankred.com/how-is-paper-made/

https://www.wise-geek.com/what-are-paper-mills.htm

https://www.frdpapermachine.com/

https://www.valmet.com/insights/articles/pulp/record-upon-record-in-fluff-pulp-production/