

**Transportation Characteristics and Needs
of Forest Products Industries
Using Eastern Washington Highways
Part 5: Road Usage and Characteristics**

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EWITS Research Reports: Background and Purpose

This report is number twenty-two in a series of research reports prepared from the Eastern Washington Intermodal Transportation Study (EWITS). The reports prepared as a part of this study provide information on the multimodal network necessary for the efficient movement of both freight and people into the next century.

EWITS is a six-year study funded jointly by the Federal government and the Washington State Department of Transportation as a part of the Intermodal Surface Transportation Efficiency Act of 1991. Dr. Ken Casavant of Washington State University is Director of the study. A state-level Steering Committee provides overall direction pertaining to the design and implementation of the project. The Steering Committee includes Jerry Lenzi, Chair, Regional Administrator (WSDOT, Eastern Region); Richard Larson (WSDOT, South Central Region); Don Senn (WSDOT, North Central Region); Charles Howard (WSDOT, Planning Manager), and Eric Berger, Executive Director, County Road Administration Board. Pat Patterson represents the Washington State Transportation Commission on the Steering Committee. An Advisory Committee with representation from a broad range of transportation interest groups also provides guidance to the study. The following are key goals and objectives for the Eastern Washington Intermodal Transportation Study:

- *Facilitate existing regional and statewide transportation planning efforts.*
- *Forecast future freight and passenger transportation service needs for eastern Washington.*
- *Identify gaps in eastern Washington's current transportation infrastructure.*
- *Pinpoint transportation system improvement options critical to economic competitiveness and mobility within eastern Washington.*

For additional information about the Eastern Washington Intermodal Transportation Study or this Research Report, please contact Ken Casavant at the following address:

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EWITS PREVIOUS REPORTS NOW AVAILABLE

1. Gillis, William R. and Kenneth L. Casavant. "Linking Transportation System Improvements to New Business Development in Eastern Washington." EWITS Research Report Number 1. February 1994.
2. Gillis, William R. and Kenneth L. Casavant. "Lessons from Eastern Washington: State Route Mainstreets, Bypass Routes and Economic Development in Small Towns." EWITS Research Report Number 2. February 1994.
3. Gillis, William R. and Kenneth L. Casavant. "Washington State Freight Truck Origin and Destination Study: Methods, Procedures, and Data Dictionary." EWITS Research Report Number 3. December 1994.
4. Gillis, William R. and Kenneth L. Casavant. "Major Generators of Traffic on U.S. 395 North of Spokane: Including Freight Trucks and Passenger Vehicles Crossing the International Border." EWITS Research Report Number 4. January 1995.
5. Newkirk, Jonathan, Ken Eriksen, and Kenneth L. Casavant. "Transportation Characteristics of Wheat and Barley Shipments on Haul Roads To and From Elevators in Eastern Washington." EWITS Research Report Number 5. March 1995.
6. Jessup, Eric and Kenneth L. Casavant. "A Quantitative Estimate of Eastern Washington Annual Haul Road Needs for Wheat and Barley Movement." EWITS Research Report Number 6. March 1995.
7. Gillis, William R., Emily Gruss Gillis, and Kenneth L. Casavant. "Transportation Needs of Eastern Washington Fruit, Vegetable and Hay Industries." EWITS Research Report Number 7. March 1995.
8. Casavant, Kenneth L. and William R. Gillis. "Importance of U.S. 395 Corridor For Local and Regional Commerce in South Central Washington." EWITS Research Report Number 8. April 1995.

9. Gillis, William R., Eric L. Jessup, and Kenneth L. Casavant. "Movement of Freight on Washington's Highways: A Statewide Origin and Destination Study." EWITS Report Number 9, November 1995.
10. Chase, Robert A. and Kenneth L. Casavant. "Eastern Washington Transport-Oriented Input-Output Study: Technical Report." EWITS Research Report Number 10. March 1996.
11. Chase, Robert A. Kenneth L. Casavant. "The Economic Contribution of Transport Industries to Eastern Washington." EWITS Report Number 11. April 1996.
12. Lee, Nancy S. and Kenneth L. Casavant. "Waterborne Commerce On the Columbia-Snake System." EWITS Report Number 12. October 1996.
13. Alderson, Lynn C., Eric Jessup, and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 1: Economic Structure of the Industry." EWITS Research Report #13. November 1996.
14. Eriksen, Ken and Kenneth L. Casavant. "Impact of North American Free Trade Agreement (NAFTA) on Washington Highways - Part 1: Commodity and Corridor Projections" EWITS Research Report Number 14. January 1997.
15. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Highways: Part 2 Movement of Raw Logs." EWITS Research Report Number 15. May 1997.
16. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Highways: Part 3 Shipment from Mills." EWITS Research Report Number 16. May 1997.
17. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Highways: Part 4 Commercial Shipments." EWITS Research Report Number 17. February 1997.
18. Jessup, Eric L., John Ellis, and Kenneth L. Casavant. "A GIS Commodity Flow Model for Transportation Policy Analysis: A Case Study of the Impacts of a Snake River Drawdown." EWITS Research Report Number 18. May 1997.
19. Lee, Nancy S. and Kenneth L. Casavant. "Rail Traffic in Washington: A Commodity and Origin-Destination Analysis 1990 to 1995." EWITS Research Report Number 19. December 1997.

20. Edwards, Richard, Eric L. Jessup, and Kenneth L. Casavant. "Eastern Washington On-Farm and Commercial Grain Storage." EWITS Research Report Number 20. January 1998.
21. Painter, Kathleen M. and Kenneth L. Casavant. "Washington State Freight Truck Origin and Destination Study: [County Series]." EWITS Research Report Number 21. January 1998.

EWITS Previous Working Paper Series Now Available

1. Lee, Nancy and Ken Casavant. "Grain Receipts at Columbia River Grain Terminals." EWITS Working Paper #1, March 1996.
2. Lenzi, Jerry, Eric Jessup, and Ken Casavant. "Prospective Estimates for Road Impacts in Eastern Washington from a Drawdown of the Lower Snake River." EWITS Working Paper #2, March 1996.
3. Ellis, John, Eric Jessup, and Ken Casavant. "Modeling Changes in Grain Transportation Flows in Response to Proposed Snake River Drawdowns: A Case Study for Eastern Washington." EWITS Working Paper #3, March 1996.
4. Painter, Kate and Ken Casavant. "A Comparison of Canadian Versus all Truck Movements In Washington State With A Special Emphasis On Grain Truck Movements." EWITS Working Paper #4, March 1996.
5. Jessup, Eric L. and John Ellis, and Kenneth L. Casavant. "Estimating the Value of Rail Car Accessibility for Grain Shipments: A GIS Approach." EWITS Working Paper #5, April 1996.
6. Painter, Kathleen M. and Kenneth L. Casavant. "Truck Movement Characteristics on Selected Truck Routes in Washington State." EWITS Working Paper #6, August 1996.
7. Lee, Nancy S. and Kenneth L. Casavant. "Grain Receipts at Columbia River Grain Terminals, 1980-81 to 1995-96." EWITS Working Paper #7. January 1997.
8. Jessup, Eric L. and Kenneth L. Casavant. "Economic Evaluation of Grain Shipment Alternatives: A Case Study of the Coulee City and Palouse River Railroad." EWITS Working Paper #8. March 1997.
9. Casavant, Ken and Nancy S. Lee. "Grain Receipts at Columbia River Grain Terminals: 1980-81 to 1996-97." EWITS Working Paper #9. January 1998.

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Executive Summary

The forest products industry is an important segment of the Pacific Northwest economy. The State of Washington ranks as the second largest producer of wood products among the states in the Western region, and Eastern Washington accounts for over one-fifth of the total timber harvest for Washington. In order to better understand the transport of forest products on Eastern Washington roadways, and to plan for future improvements, a study of the transportation of forest products was conducted as part of the Eastern Washington Intermodal Transportation Study (EWITS). Four previous EWITS reports, detailing the economic structure of the industry and the results of three mail surveys, form the basis of this report, which is focused on road usage and other characteristics.

Implications

It is very evident that the forest products industry is heavily dependent on trucks and highway movement of their products, both as inputs into the mills and processing plants and for access to ultimate markets. Finally, roads are used and needed year round by a significant truck volume, especially by the high value processed products shipments. Seasonality in road use is, however, prevalent in the movement of raw logs, a segment of the industry heavily affected by road weight restrictions and weather.

Truckers did identify recurring problems and concerns in safety and cost efficiency, detailing the location, extent, and possible remedies for these concerns. Weight restrictions, bridge laws, short corners were particularly noted. SR's 195, 12, 395 and 2 provide a critical transportation backbone to the forest products movement; with SR's 20, 155 and 21 also moving many products. County roads, in many instances, provide the initial access to the transportation system and are the local connectors to the state and federal highway system.

Specific Findings

Road usage by the forest products industry presents a varied picture that is complicated. The industry relies both on county roads (mostly for the northern counties of Stevens, Ferry, Okanogan, and Pend Oreille counties) as well as state roads that provide access to final markets. The analysis of the survey information yields the following specific findings:

- Analysis of the seasonality of forest product movements shows that the shipment of raw logs exhibits the greatest amount of seasonality. Shipments are reduced during January through April due to road weight restrictions resulting from the spring thaw. One route that is particularly affected by weight restrictions is a section of SR 20 from Colville, Washington to Tiger, Washington (the "Tiger Highway"). All alternative routes are out of direction, very costly, and affect the orderly deliver of raw logs to North Pend Oreille County and Idaho.

- Respondents noted the following unusual transportation problems were affecting the industry: weight restrictions, available drivers, and lack of turnouts. More specific issues identified by truckers include (1) the varying weight restrictions and bridge laws between Washington, Idaho, and Canada, (2) the safety problems due to SR 20 and SR 231 being narrow and rough, (3) the safety problems because of the rock overhang on SR 20 (“The Rock”) approximately 25 miles west of Republic, Washington, (4) the use of a weight ratio to axle spread by DOT and not absolute weight, and (5) the problems involving the traffic congestion of SR 395 between Kettle Falls and Colville and the resultant potential road hazard during bad weather where the South Boise Road connects with SR 395.
- Truck movements to final domestic destination from mills and commercial shippers are predominant over truck shipments to river ports and ocean ports for the three categories of forest products: raw logs; hogfuel, woodchips, and sawdust (HWS) products; and plywood, lumber, posts, poles, pilings and other products (labeled as PLPO).
- With regard to the origin and destination of forest product shipments, Stevens, Okanogan, and Ferry counties in the north have the highest volume of truck shipments. For raw log shippers in the southeast, Oregon, Walla Walla County, and Columbia County are the largest points of origin while Oregon, Walla Walla County and Asotin County are the largest destination points. For a large percentage of forest products shipped by commercial shippers, the origins of these shipments are from sources outside Eastern Washington. Oregon, Idaho and Canada are the origin of most HWS product shipments by commercial shippers, while Western Washington and Oregon are the origin of most PLPO shipments by commercial shippers.
- An examination of road usage by these respondents shows that the main state roadways with the most volume of forest products are SR 395 (908,924 tons), SR 195 (741,053 tons), SR 2 (428,857 tons) and SR 12 (233,765 tons). The other state routes with the highest volume include SR 20 (650,049 tons), the Okanogan County stretch of SR 155 (336,441 tons) and SR 21 (93,340 tons). Also, state routes with at least 70,000 tons of forest product movement are SR 25, SR 211, and SR 31. County roads with the highest volume include Aladdin Road (Stevens County) with 109,308 tons, Campbell and Elder Roads (Spokane) with 79,988 tons, and Inchelium and Bridge-Cache Creek Roads in Ferry County with 69,028 tons and 51,348 tons respectively. The counties with the highest volume of raw log shipments on county roadways are Stevens, Ferry, and Spokane counties.

Introduction

The forest product industry is an important segment of the economy of the Pacific Northwest. The northwestern states of Washington, Oregon, Idaho and Montana contain 14 percent of the total timberland area in the U.S. These areas also contain 24 percent of the net volume of timber in the U.S. Given the abundance of timber resources, there is a high concentration of natural forest production in the Northwest. The state of Washington ranks as the second largest producer of wood products among states in the Western region. Eastern Washington accounts for over one-fifth of the total timber harvest for Washington.

In order to better understand the transport of forest products on Eastern Washington roadways and to plan for future improvements, a study of the transportation of forest products was conducted as part of the Eastern Washington Intermodal Transportation Study (EWITS). The research objectives of the study included: (1) identifying the various characteristics that link all forest product commodities to the respective markets the industry serves, (2) identifying the various characteristics that affect the movement of raw logs to their respective markets, (3) identifying the various transportation issues that affect the movement of mill shipments to their respective markets, and (4) identifying the various characteristics that affect the movement of forest products by commercial truckers in Eastern Washington to their respective markets.

The transportation of forest products, both to the mill and then to market, involves a complex array of enterprises. Several natural divisions among forest transportation firms became apparent during the course of the study. These included:

- 1) Transporters of raw logs. These include a number of different types of business entities from an individual who is a logger, a mill or larger logging operation possessing several trucks, or an individual transporter specializing in the movement of raw logs. Due to the geographic differences between northeast Washington raw log shippers and Southeast Washington raw log shippers, a different questionnaire was administered to each region. The northeast region is comprised of shippers located in Stevens, Ferry, Okanogan, Pend Oreille, and Spokane counties while the southeast region is comprised of Asotin, Garfield, and Columbia and Walla Walla counties.
- 2) Transporters of forest products leaving forest product mills including the use of transportation owned by the mill or the use of an outside source.
- 3) Commercial transporters hired by forest products firms that have tailored their equipment to meet the needs of these firms. Commercial trucking operations locate near areas where forest timberland and mills are located.

For this reason, this overall study is being reported in a series of five written reports, as follows:

Part 1: Economic Structure of the Industry. The first publication gives a broad background on the economic structure of the wood products industry. General location, proportion of timberland, and Washington State's role in the western region of the United States are discussed in detail as a prelude to examining how and where products move to market.

Part 2: Movement of Raw Logs. Raw log transportation issues are set apart from the remainder of the industry. This report deals exclusively with a survey of the shipment of raw logs, from the woods, to their designated markets. Inherent characteristics of raw log movements, such as truck configurations, roads utilized, seasonal use and problem areas are some of the items discussed.

Part 3: Shipment from Mills. Transportation characteristics of wood products leaving the mill are identified in this report. Mode of transportation, origin, destination, problems encountered, rate structure, types of commodity shipped and inside/outside shipping sources receive attention.

Part 4: Commercial Movements. Shipment by sources outside of the forest industry processing firms occurs by commercial truckers. Market characteristics, origin, destination, rate structure, roads used and timing of shipments are a few of the items discussed.

Part 5: Road Usage and Characteristics. The location and characteristics of road usage determined in the three industry surveys are summarized in this final report. Implications for road investments are offered.

Summaries of the Previous Reports on Forest Product Transportation

This report represents Part 5 in the series. As this is a summary of information from the previous reports for this project, the key findings of these reports are presented below.

Part 1: Economic Structure of the Industry (EWITS Research Report #13)

- 1) Eastern Washington accounted for 20 percent of the total timber harvest for Washington State between 1985 and 1994, with the last five years showing a modest increase of 2.7 percent over the previous five.
- 2) Ferry, Pend Oreille and Stevens counties have the highest ratio of forestland to non-forest land in eastern Washington: 81.7 percent, 75.9 percent, and 71.9 percent respectively.
- 3) Changes due to environmental and endangered species concerns have reduced the amount of public forest for harvest. As of 1994, Washington State sawmills

received 81 percent of their raw product from private timber sources. Of the final products leaving these mills, 62.5 percent remained in the West, 10.6 percent was exported overseas, and 26.9 percent was transported to more eastern destinations.

- 4) For products leaving Washington State sawmills, 59 percent were transported by truck, 32 percent by rail, and 9 percent by water. Truck transportation generally occurs close to the origin; while rail is used for longer distances (due to lower rates). Most waterborne transportation is headed to ocean ports for export.
- 5) Plywood mills within the Inland Washington region ship 45 percent of their products to western markets, with 55 percent going to more eastern destinations. Truck and rail are used exclusively, 35.7 percent and 64.3 percent respectively.

Part 2: Movement of Raw Logs (EWITS Research Report #15)

- 1) Eastern Washington is dependent on the timber community as a viable economic source for the citizens who reside there. Revenue received from National Forest Receipts is distributed 50 percent for public schools and 50 percent for public roads and other public uses. Ferry, Lincoln, Okanogan, Pend Oreille, Spokane, and Stevens counties received a total of \$7,332,728 per annum based on a five-year average between 1991 and 1995. Asotin, Columbia, Garfield, Walla Walla, and Whitman counties received a total of \$949,348 per annum.
- 2) A survey of raw log shippers in eastern Washington was conducted to understand raw log shipments in eastern Washington. The survey found that highways in eastern Washington carry raw logs that originate from four states: Washington, Idaho, Montana, and Oregon. In northeast Washington, Stevens, Ferry, and Okanogan counties are the prominent providers of raw logs while Walla Walla and Columbia counties are the prominent providers in southeast Washington.
- 3) Stevens and Okanogan counties are the most common destinations in northeast Washington for raw logs used to produce lumber, plywood, and wood residuals, while in southeast Washington, raw logs shipped to Walla Walla County and to the state of Oregon are used for lumber.
- 4) Highway use is heaviest in northeast Washington for raw log movements from May to February and May to December in the southeast region, due to road restrictions imposed during other months. Shipments from southeast Washington traverse longer distances to market raw logs and operate fewer weeks per year than firms in the north, again due to road restrictions.
- 5) Highways with the highest use in northeastern Washington are SR 395 in Stevens County and SR 155 in Okanogan County. SR 12 in Walla Walla and

Columbia counties is the most prominently used roadway in the southeastern region.

- 6) The most important transportation problems in the northeast region were: weight restrictions and bridge laws; short corners in cities, in mills and on haul roads were common problems for drivers.

Part 3: Shipments from Mills (EWITS Research Report #16)

- 1) Western states produce 63 percent of US softwood lumber production. Washington is the second largest producer and eastern Washington produces almost a fourth of that production. Access to markets affects this region's competitive ability. A survey of mills in eastern Washington and northern Idaho was conducted to understand shipment of forest products in eastern Washington.
- 2) Eighty-eight percent of the products shipped from mills are by non-mill truckers, railroads or barges.
- 3) Mills that utilize wood resources are located in rural areas of the Inland Northwest near their source of supply. These mills are often a significant employer to the area and stimulate many indirect jobs. Some communities are dependent on the timber industry.
- 4) Housing starts and interest rates dictate the demand for most softwood products. Washington's lumber production is driven by this demand. Eastern Washington, like the rest of the US, experienced a decline in production from 1987 to 1992; a modest increase has begun since that time.
- 5) Mills vary greatly in tonnage produced. The median tonnage produced was in the 75,000 to 400,000 tons per annum range. The mills often are located in close proximity to each other.
- 6) Mills producing wood products are decreasing in number and increasing in size, following a similar pattern of production agriculture in the region.
- 7) Total volume of products shipped in 1996 as reported was: raw logs (33 percent); hogfuel, woodchips and sawdust (37 percent); and plywood-post-poles and other (30 percent).
- 8) Truck shipments of all wood products from mills remains in the states west of the Mississippi River 93 percent of the time. Rail movements are split; 66 percent go west of the Mississippi River and 34 percent east.
- 9) Truck movements from firms to final destination of all wood products ranged from 65 percent to 99 percent. Truck movements to river ports, ocean ports and other

destinations ranged from 0.3 percent to 29 percent, depending on the commodity type.

- 10) Major transportation problems mentioned by mills were weight restrictions (cited by 65 percent of the firms), rates (43 percent), temporary road closures during the year (41 percent), and available drivers (38 percent).

Part 4: Commercial Shipments (EWITS Research Report #17)

- 1) A survey of commercial shippers in eastern Washington and northern Idaho was conducted to understand commercial truck movements in eastern Washington. The survey produced the following results. Hogfuel, woodchips, and sawdust (HWS) products comprise 99 percent (1,254,046 tons) of the movements reported.
- 2) Major origins of HWS products moved on eastern Washington highways were from two sources outside of Washington: Idaho with 452,610 tons (36 percent) and Oregon with 366,225 tons (29 percent).
- 3) Lewiston, Idaho/Clarkston, Washington, eastern Washington and Canada were the three primary destinations for HWS products. Tonnage of 546,413 (44 percent), 450,083 (36 percent) and 133,322 (11 percent) per annum were reported, respectively.
- 4) Most common routes used in eastern Washington are SR 195, SR 2, SR 20, SR 395 and I-82. These movements are fewest from November to February and almost double in the summer months.
- 5) The most important transportation problems for the commercial firms were: available drivers; short corners in cities (turning radius corners); entrances and exits from mills and some mill yards; weight restrictions; and lack of turn outs.

Scope of Analysis

This report summarizes and analyzes the location and characteristics of road usage by the transporters of forest products on Eastern Washington roadways. This analysis is based on information collected from a series of mail surveys to organizations operating in three different sectors of the forest products industry: raw log shippers, forest product mills, and commercial shippers. The focus of this report will be to provide a broader industry overview of current transportation patterns based on common questions used on each survey. A complete discussion of the data collection methods and the results from each survey can be found in Part 2 (Movements of Raw Logs - EWITS Research Report #15), Part 3 (Shipments From Mills - EWITS Research Report #16) and Part 4 (Commercial Shipments - EWITS Research Report #17) of the series.

The discussion will begin with descriptions of the survey instruments that will identify the questions on transportation and road usage common to each survey. The analysis will proceed with an examination of (1) the seasonality of forest product shipments, (2) the experience of unusual transportation problems, (3) the amount of forest products trucked to final destination, including river ports or ocean ports during an average year, (4) the origin and destination of forest products shipped during an average year, and (5) the county and state roads most frequently used to transport forest products.

Design of Questionnaire

Each of the mail surveys contained common questions relating to road use in Eastern Washington. These questions included:

- 1) the seasonality of when forest products are shipped to market,
- 2) how often shippers experience any unusual transportation problems and why,
- 3) the volume of different forest products that are shipped by truck in an average year (mill shipments and commercial shipments only)
- 4) the origin and destination of forest products shipments from raw log transporters, mill shipments (truck shipments only), and commercial truck shipments, and
- 5) the county and state roads that are used most frequently used to transport forest products in a typical market year (raw log shipper and commercial shippers only).

Table 1 presents the response rates for the three separate surveys. The response rate from the mail survey of raw log shippers had the highest return of 76 percent, followed by the forest product mills survey with 47.6 percent and the commercial shipper survey with 46 percent. Since the survey information will be used to make inferences about the transport of forest products in Eastern Washington, there are three methodological issues that the reader should be aware of.

First, four mills have recently been permanently closed and one mill's production was curtailed during the survey time period. Accordingly, it was uncertain how this might affect, in the longer term, the other mills currently operating and the responses to the survey questions. The change mostly affected the marketing of raw logs. Second, the population of raw log shippers moving product through Eastern Washington is unknown. While several sources of information were used to identify the population, there were problems with identifying raw log shippers in Southeast Washington; so the data collected, while factual and valuable, may not necessarily reflect the current marketing environment for that region. The effect of mill closures to the shipment of raw logs is reported in EWITS Research Report #15, Part 2. Finally, there were only seven firms that responded to the raw log survey from the Southeast region. While probably representative, there is a chance that information from this sample may not reflect the actual raw log shipments by firms in this region.

Table 1--Response Rates for Forest Industry Surveys

Type of Shipper	Population	Completed Surveys	Response Rate
Raw Log Shippers (Northeast Region)	96	73 (66)	76.0%
(Southeast Region)		(7)	
Forest Product Mills	84	40	47.6%
Commercial Shippers	13	6	46.0%

Seasonality of Shipments

All firms responding to the three surveys were asked about when their forest products were shipped to market. Respondents were asked to estimate the percent of shipments made in January-February, March-April, May-June, July-August, September-October, and November-December. The combined responses are laid-out in Figure 1.

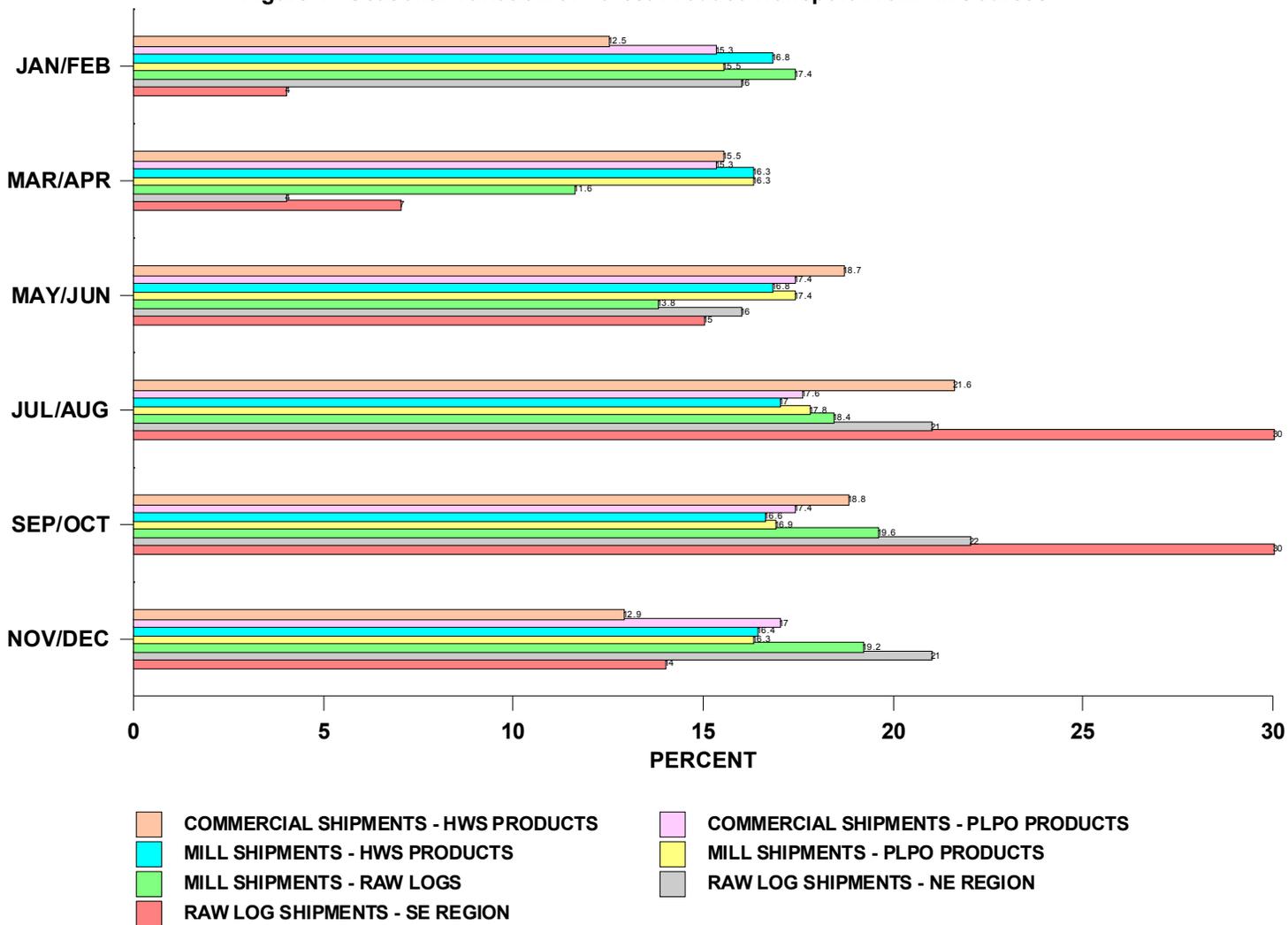
There is very little seasonal variance in the shipment of plywood, lumber, post, poles, pilings and other products (PLPO) from both mills and by commercial shippers, suggesting mill owned trucks were used year round. Mill shipments range from 15.5 percent in January-February to a high of 17.8 percent in July-August and then declining to 16.3 percent in November-December. Commercial shipments range from 15.3 percent in January-February to a high of 17.6 percent in July-August and then declining to 17 percent in November-December.

Shipments of hogfuel, woodchips, and sawdust (HWS) showed little seasonal variation from mills while showing somewhat more variation from commercial shippers. Shipments from mills ranged from a low of 16.3 percent in March-April to a high of 17 percent in July-August. Commercial shipments ranged from 12.5 percent in January-February to a high of 21.6 percent in July-August and then declines to 12.9 percent in November-December. The variation in the movements of HWS for commercial shippers is probably due to the other sources of wood residuals that come from outside the mill. Wood residuals are also produced in wooded areas where log harvesting occurs. Access to these sites is reduced during the spring when roadways can be restricted or closed because of thawing conditions.

The greatest seasonal variation is exhibited in the shipments of raw logs, both to the mills by raw log shippers and from the mills to markets. The variation in raw log movements to the mills is stratified by location of shipper - northeastern Washington shippers and southeastern Washington shippers (as identified in Report 2). Again using Figure 1, shipments range from 16 percent in January-February, declining to 4 percent in March-April, then increasing up to 22 percent in September-October, and slightly reducing to 21 percent in November-December. In the Southeast, the variation in shipments is more pronounced with a low of 4 percent in January-February, increasing to a high of 30 percent for both July-August and September-October and then declining to 14 percent in November-December.

The seasonal variation for raw log shippers is due to road closures in harvest areas and weight restrictions on access roads that can occur during the spring thaw. This can prevent access to highways for raw log shippers. Roadway weight restrictions can occur any time within a 5 to 15 week period from January to June, thus affecting the number of raw log shipments within this time period. The southeast region incurs restrictions and closures on highways for a longer period of time, while there are more roads in the northeast region that can be affected by restrictions and closures.

Figure 1: Seasonal Variation of Forest Product Transport From All Sources



There is greater stability in raw log movements that come from mills. Shipments range from 17.4 percent in January-February, decline to 11.6 percent in March-April, and then increases to over 19 percent for both September-October and November-December. The greater stability for mill shipments is probably due to the fact that mills are located closer to state highways which do not suffer as much from the seasonal problems described above.

The overall picture on the seasonality of shipments indicates greater variation among shipments of raw logs. These transporters must rely on local roads for access to raw log supplies, which are in more remote areas. However, raw log shippers in the northeast region indicated that one state highway, SR 20 from Colville, Washington to Tiger, Washington (the Tiger Highway) can have restrictions placed on it during the spring thaw. The weight restrictions of this road forces shippers to take alternative routes. Respondents indicated that these alternatives increase travel time, mileage and operational expense resulting from a decline in the daily volume of raw logs per truck. This affects deliveries to mills in Northern Pend Oreille County and Idaho. With regard to the truck movements of the other forest products, only HWS shipments by commercial shippers exhibits some seasonality with smaller volume in November through February and higher volume in May through October.

Unusual Transportation Problems

All three surveys asked respondents to indicate how often they had experienced unusual transportation problems with items on a list including: road closures, weight restrictions, rates, permits, short corners, available drivers, safety issues, bridge laws, lack of turnouts, or for some other problem. Figure 2 and Figure 3 presents the combined percentage of responses for either “often” or “sometimes” for each item.

Once again, responses by transporters of raw logs to mills are stratified by region as was done in Part 2 (EWITS Report #15). Shippers of raw logs in the northeast region indicated greater problems with weight restrictions, bridge laws, lack of turnouts, and road closures. The percentage of respondents answering often or sometimes were 84 percent for weight restrictions, 60 percent for bridge laws, 49 percent for lack of turnouts, and 45 percent for road closures.

For shippers of raw logs in the southeast region, the greater problems occurred with weight restrictions, available drivers, bridge laws, and lack of turnouts. The percentage of respondents answering often or sometimes were 100 percent for weight restrictions, 67 percent for available drivers, 75 percent for bridge laws, and 100 percent for lack of turnouts.

Respondents to the mill survey indicated more problems with road closures, weight restrictions, rates, and available drivers. The percentage of respondents answering often or sometimes were 41 percent for road closures, 65 percent for weight restrictions, 43 percent for rates, and 38 percent for available drivers. Overall, mill respondents had fewer problems with all of the items asked than raw log shippers with the one exception being rates. Transportation problems were less of an obstacle to mills than raw log shippers, which again can be attributed to mills being located closer to state highways.

Commercial shippers indicated greater problems with weight restrictions, rates, short corners and available drivers. The percentage of respondents answering often or sometimes was 67 percent for weight restrictions, 66 percent for rates, and 100 percent for available drivers. With the exception of safety issues and bridge laws, at least 50 percent of commercial shippers indicated experiencing problems either often or sometimes with the remaining items on the list.

From a larger industry perspective, Figure 2 and 3 indicate greater overall problems with weight restrictions (responses ranging from 100 percent for southeast region raw log shippers to 65 percent for mills), available drivers (responses ranging from 100 percent for commercial shippers to 38 percent for northeast region raw log shippers and mills), and lack of turnouts (responses ranging from 100 percent for southeast region raw log shippers to 14 percent for mills).

Figure 2: Percent Answering Often and Sometimes to Transportation Problems

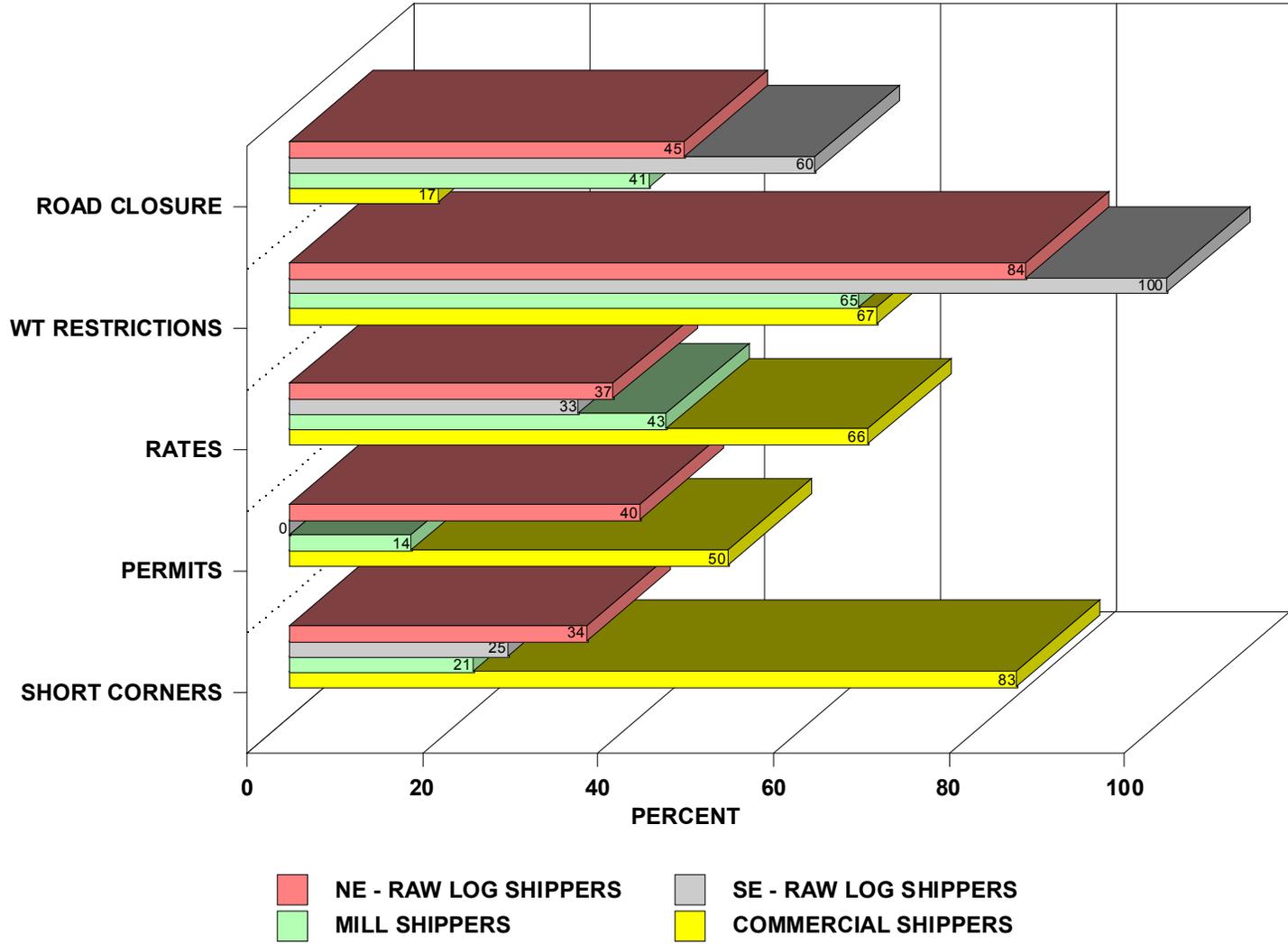
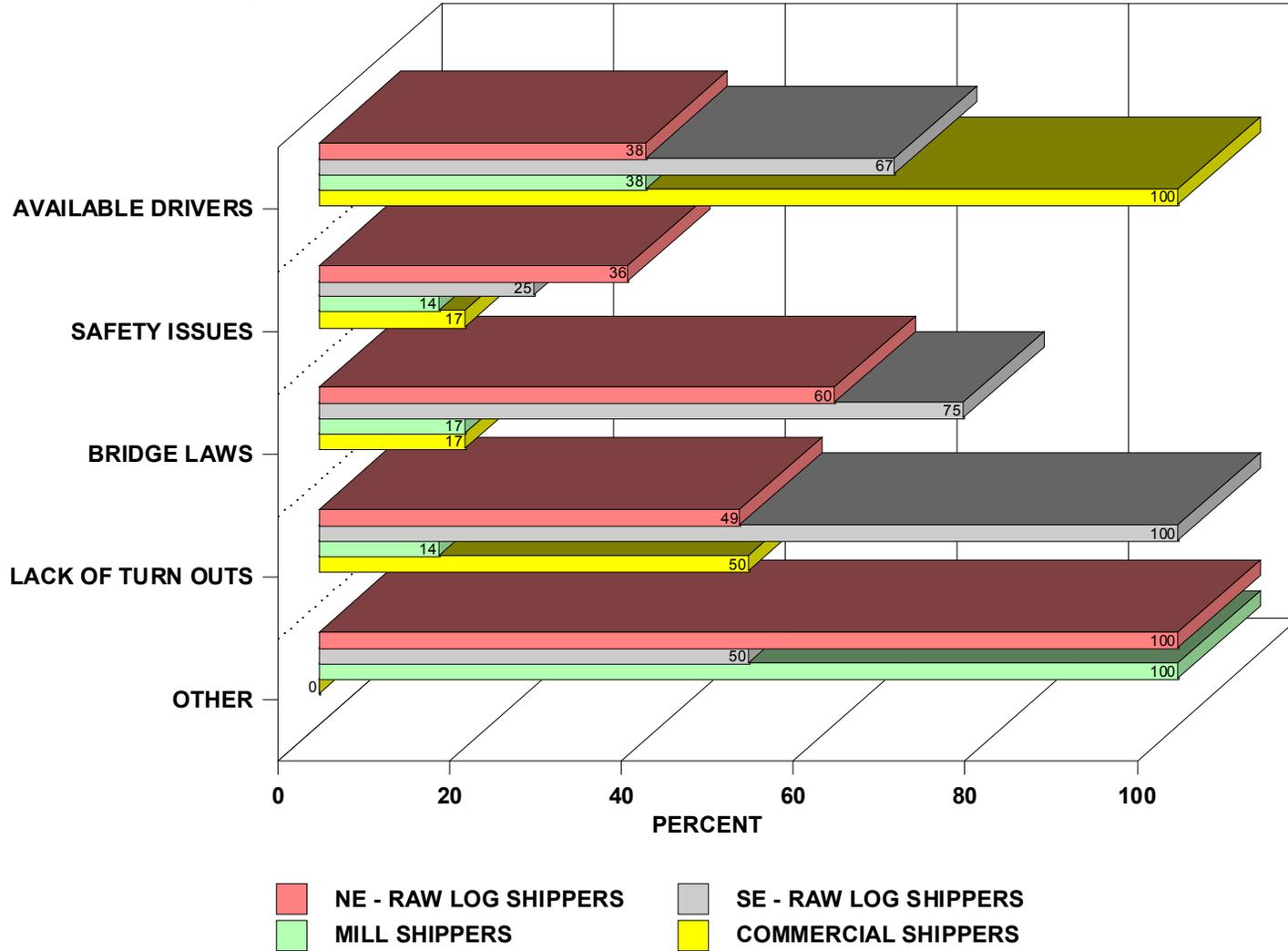


Figure 3: Percent Answering Often and Sometimes to Transportation Problems



Other comments from respondents concerned the differences in weight restrictions between Montana, Idaho, and Washington, which can cause problems for interstate shipping. There was also concern that some weight scales use by the Washington State Patrol may not be able to accommodate some truck and trailer combinations. Estimates of weight must be made by the load (based on axles) and not absolute weight.

Safety concerns were expressed for state route SR 20 which was cited as being narrow and rough. This same concern was expressed for SR 231 even though it is a low volume route. Two other firms commented that a rock overhang on SR 20 between Tonasket and Republic, referred to as "The Rock", is another safety problem. This trouble spot is located 25 miles west of Republic on the northern side of the road. Trucks heading west are forced to go over the centerline to avoid the rock overhang, which, in turn, reduces clearance for traffic in the eastbound lane.

Another safety issue concerns the use of a weight ratio to axle spread by the Washington State Patrol and the Department of Transportation, rather than assigning a specified weight for the number of axles. To maintain the 80,000 pound gross weight limit, the length between the front axle and the back axle must be 35.6 feet. The most common raw log length is 33 feet, thus it is possible that raw logs can slip off the last axle during shipment. It was suggested by respondents that this span be decreased by two feet while maintaining the 80,000 pound weight limit.

Other comments from raw log shippers included the congestion of SR 395 between Kettle Falls and Colville, Washington in Stevens County, which prevents easy passing. Another problem is with the South Boise Road where it connects with SR 395. This road is steep and has a 90-degree turn, which is hazardous when snow and ice are present. Passage through the entrance to SR 395 is difficult, particularly in bad weather. Also mentioned were antiquated - from the trucker drivers perspective - Washington bridge laws that are different from laws in British Columbia and Idaho and the need for truck speed limits that are the same as for automobiles to reduce congestion.

Volume of Truck Shipments by Mills and Commercial Shippers

Respondents to the mill and commercial shipper surveys were asked about the destination of all truck movements by their firms. Figure 4 shows the percentage of truck movements that were to the final domestic destination, to a river port, or to an ocean port. The results are aggregated into three product categories: raw logs, HWS (hogfuel, woodchips, and sawdust) products, and PLPO (plywood, lumber, post, poles, pilings and other products).

The vast majority of truck shipments by commercial shippers are to the final domestic destination. Truck shipments to final domestic destination range from 96.4 percent for PLPO products shipped by mills to 100 percent HWS products shipped by commercial shippers. HWS products are a heavy weight, low value product that are usually shipped fewer miles to markets in Eastern Washington. Since none of the HWS products are being shipped to river ports, they are probably shipped to mills in the area. The PLPO products are also primarily trucked to final domestic destinations with only a small percentage being exported (3.6 percent).

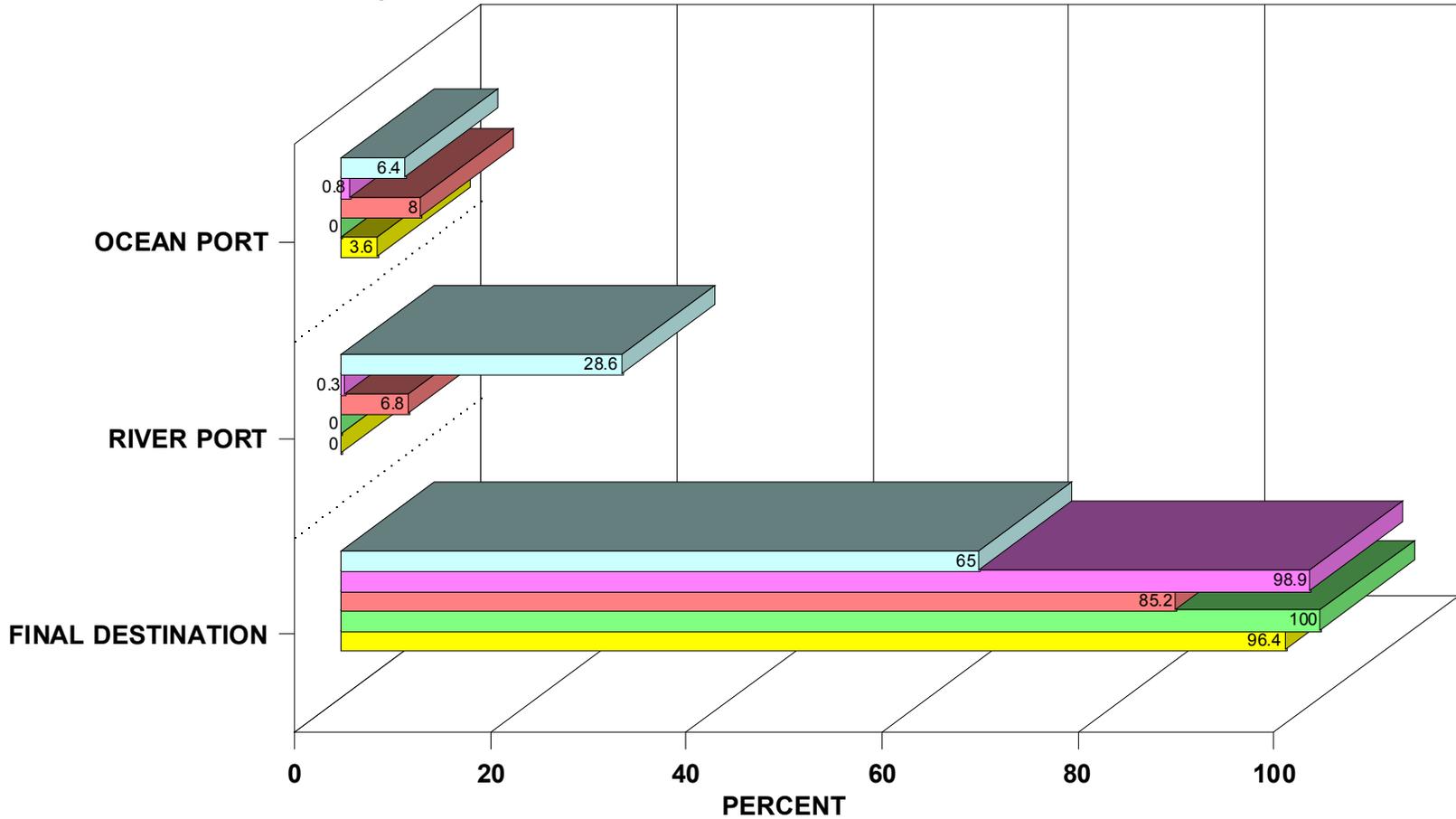
There is more diversity in shipments from mills. As reported in Part 3 (EWITS Report #16), truck movements to final destination from mills was reported at 3,473,913 tons which represents 57.3 percent of the total movement of forest products from mills. The percentage of the total volume of raw logs, HWS products, and PLPO products shipped by truck were 82.3 percent, 63.7 percent and 63 percent respectively. Of these truck movements, Figure 4 shows the percent of each product category that was trucked to a final domestic destination, to a river port.

Raw Log Origin and Destination

Raw log transportation constitutes a large volume of traffic on eastern Washington or to an ocean port. Truck to final domestic destination for raw logs ranked lower than the other two product categories at 65 percent. Truck to final domestic destination for HWS products and PLPO products was 98.9 percent and 85.2 percent, respectively. Trucks used to ship raw logs to a river port accounted for 28.6 percent of raw log truck movements, while trucks used to ship PLPO products and HWS products to a river port accounted for 6.8 percent and 0.3 percent of total truck shipments for each product category, respectively. Eight percent of PLPO products and 0.8 percent of HWS products that were moved by truck were shipped by truck to ocean ports.

Figure 4 illustrates the large extent to which the forest product industry relies on roadways in eastern Washington for delivering forest products to final markets. Truck shipments to final domestic destination had a majority of the volume for the three forest products categories discussed.

Figure 4: Truck Movements for Mills and Commercial Shippers



- MILL SHIPMENTS/RAW LOG (2,007,610 TONS ANNUAL MOVEMENTS REPORTED)**
- MILL SHIPMENTS/HWS (2,214,273 TONS ANNUAL MOVEMENTS REPORTED)**
- MILL SHIPMENTS/PLPO (1,841,011 TONS ANNUAL MOVEMENTS REPORTED)**
- COMMERCIAL SHIPMENTS/HWS (1,254,046 TONS ANNUAL MOVEMENTS REPORTED)**
- COMMERCIAL SHIPMENTS/PLPO (12,650 TONS ANNUAL MOVEMENTS REPORTED)**

Origin and Destination of Forest Product Shipments

Determining the origin and destination of raw log shipments, and the destination of raw logs, HWS products, and PLPO products from mills and commercial shippers, helps identify the location of usage in eastern Washington. This discussion will begin with the results from the survey of raw log shippers, and then focus on the marketing and delivery of products from mills and by commercial shippers.

highways. The highest volume of raw log traffic, identified by this study, occurs in the northeast section of Washington with a smaller amount in the southeast. Respondents to the raw log movements survey were asked to best estimate the percent of raw logs shipped in an average year. For eastern Washington raw log shippers, origins include Okanogan, Ferry, Stevens, Pend Oreille, Spokane, Lincoln, Whitman, Garfield, Columbia, Asotin, and Walla Walla counties in eastern Washington. Raw logs shipments can also originate from Idaho, Oregon and Canada. The destination of raw log shipments includes Okanogan, Ferry, Stevens, Pend Oreille, Spokane, Whitman, Garfield, Columbia, Asotin, Walla Walla and Yakima counties. Destinations of raw log shipments outside of eastern Washington include King County (in western Washington), Oregon, Idaho, and Canada.

Figure 5 presents the movements of raw logs by raw log shippers located in the northeast region of eastern Washington (based on a reported 2,994,553 tons per annum), as to their origin, their destination, and their retention (the percent of total raw log volume where the origin and destination are in the same area). For shippers in the northeast region, Stevens County provides the highest volume as to the origin (23 percent of total volume), destination (41.4 percent of total volume), and retention (16.6 percent of total volume). Okanogan County provides the next highest volume as origin (22 percent), destination (19.7 percent), and retention (11.5 percent). The third largest is Ferry County, which is the origin of 22 percent of total volume, the destination for 8.35 percent of total volume while retaining 6.7 percent.

Figure 6 displays the movements of raw logs by raw log shippers in the southeast region. Based on a total raw log volume reported at 269,438 tons per annum, the state of Oregon is the origin for the largest volume at 15.4 percent for this region. Oregon is also the destination for 65.7 percent of total volume. Also, Oregon retains 12 percent of raw log volume shipped by southeastern Washington shippers. The next largest volume is Walla Walla County as to origin (31.7 percent), destination (2.9 percent), and retention (10 percent). This is followed by Columbia County as to origin (27.1 percent), destination (3.5 percent), and retention (1.0 percent).

Origin of Commercial Shipments

Wood commodities origination and shipment destination by commercial firms are presented in Figure 7. For HWS products, two sources outside Washington State were major suppliers of wood residual movements on eastern Washington highways. Based on a reported 1,254,046 tons in HWS movements per annum by eastern Washington

shippers, Idaho and Oregon provide 36.1 percent and 29.2 percent of total HWS volume. This indicates a major source of movements of wood residual products on eastern Washington highways are from sources outside the state.

For PLPO products, Figure 7 shows the origin of the reported annual tonnage of 12,650 moved by eastern Washington commercial shippers. Oregon provides the highest percentage with 39.7 percent of total volume. Second is western Washington, which provides 39.5 percent. Thus, the origins of a large percentage of wood products shipped by commercial shippers in eastern Washington are from sources outside of eastern Washington.

Destination of Forest Products from Mills and Commercial Shippers

Respondents to both the mill survey and commercial shipper survey were asked to identify the regions where their products are shipped to final destination by truck. Figure 8 presents the combined responses from both surveys.

Figure 8 shows that a large percent of the forest products are shipped by truck to destinations in eastern Washington. Sixty percent of raw logs volume from mills (based on a reported annual movement of 1,087, 444 tons) remained in eastern Washington. Except for states east of the Mississippi River, raw log movements from mills to other destinations were fairly uniform with states west of the Mississippi River receiving 9 percent, California receiving 8 percent, and Canada receiving 7 percent of raw log volume shipped by truck to final destination.

Truck movements of HWS products to final destination from both mill shipments and commercial shipments are also presented in Figure 8, based on reported annual movements of 1,398,108 tons from mills and 1,254,046 tons from commercial shippers. The destination with the largest percentage of volume for commercial shippers is eastern Washington with 89.5 percent. Of this percentage, it was reported that over half this volume is shipped to the Clarkston, WA/Lewiston, ID area. Canada and western Washington receives 10.6 percent and 9.5 percent of the volume of commercial shipments of HWS. For shipments from mills, eastern Washington is the destination for the largest volume with 36 percent. Canada, states west of the Mississippi River, Oregon, and western Washington were tied at 14 percent each. HWS products are commonly hauled over shorter distances as a high volume, low value products and have no value-added qualities.

Conversely, PLPO commodities are finished products made from raw logs. These products are a high volume, high value commodity and are usually shipped by rail to more distant markets. Therefore, truck shipments are expected to be concentrated in areas in close proximity of eastern Washington. Figure 8 displays PLPO product movements to final destination by truck, based on reported annual movements for 988,365 tons from mills and 12,650 from commercial shippers.

Figure 5: Origin, Destination and Retention of Raw Logs-NE Washington Shippers

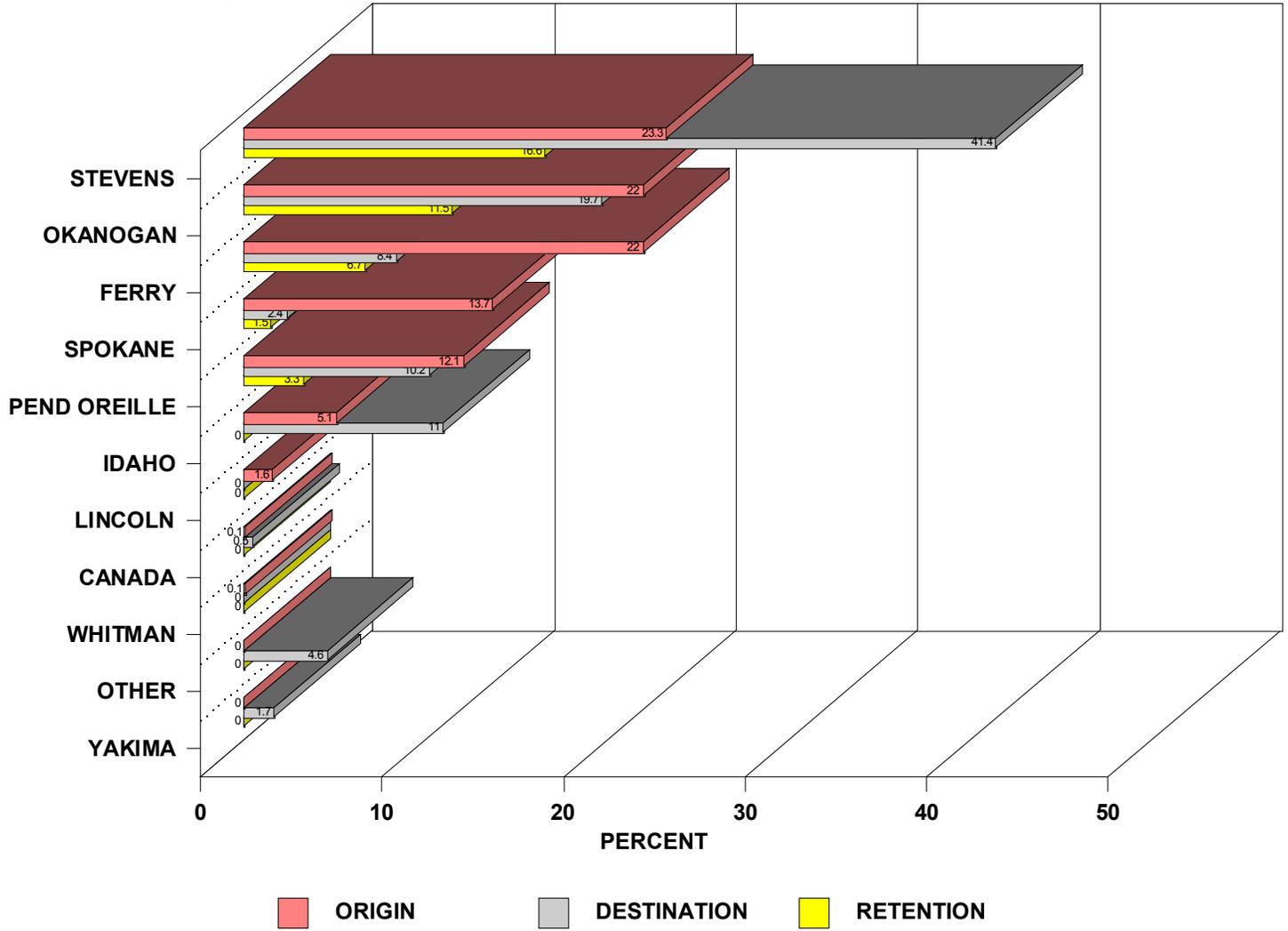


Figure 6: Origin, Destination and Retention of Raw Logs-SE Washington Shippers

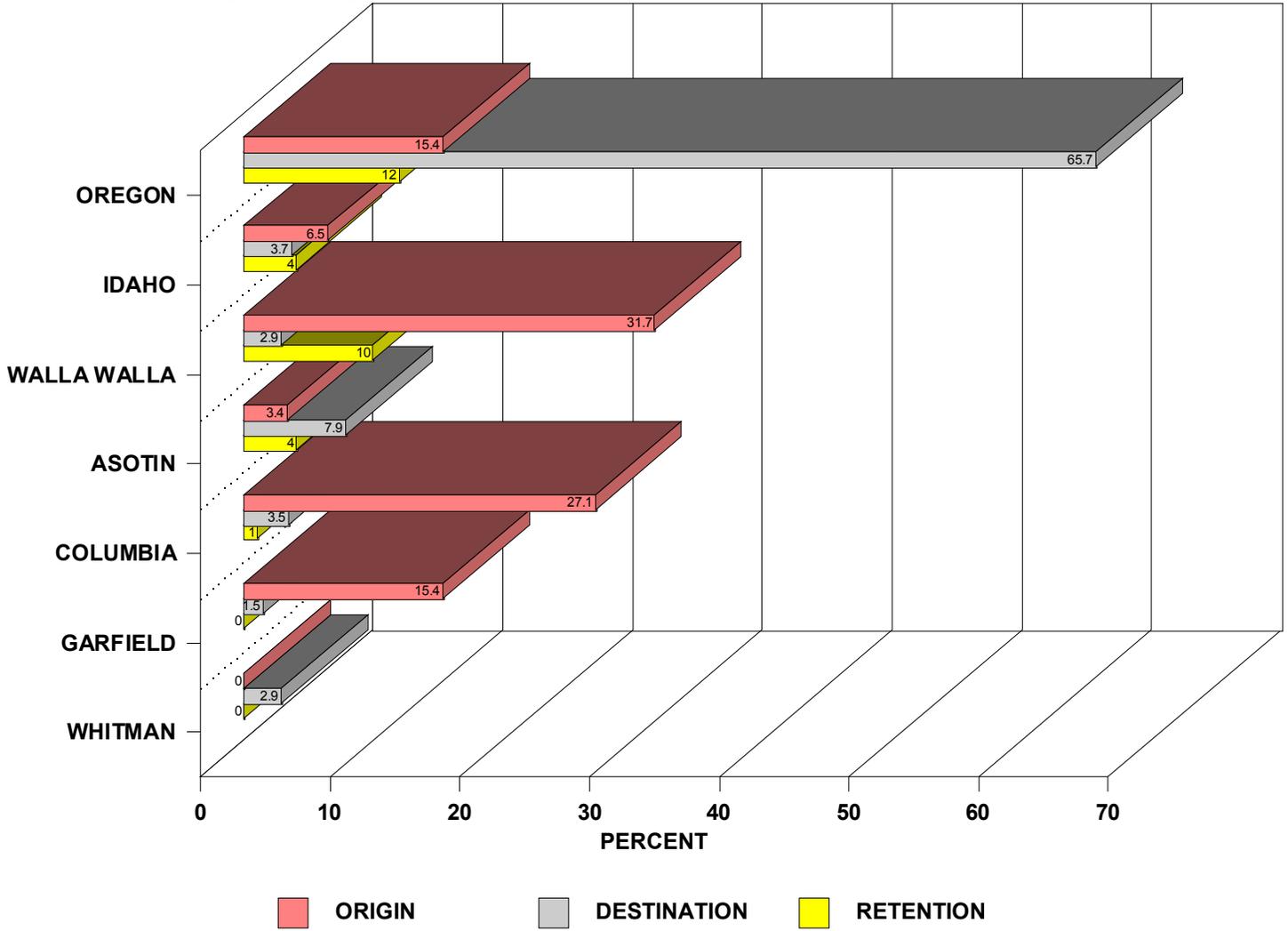
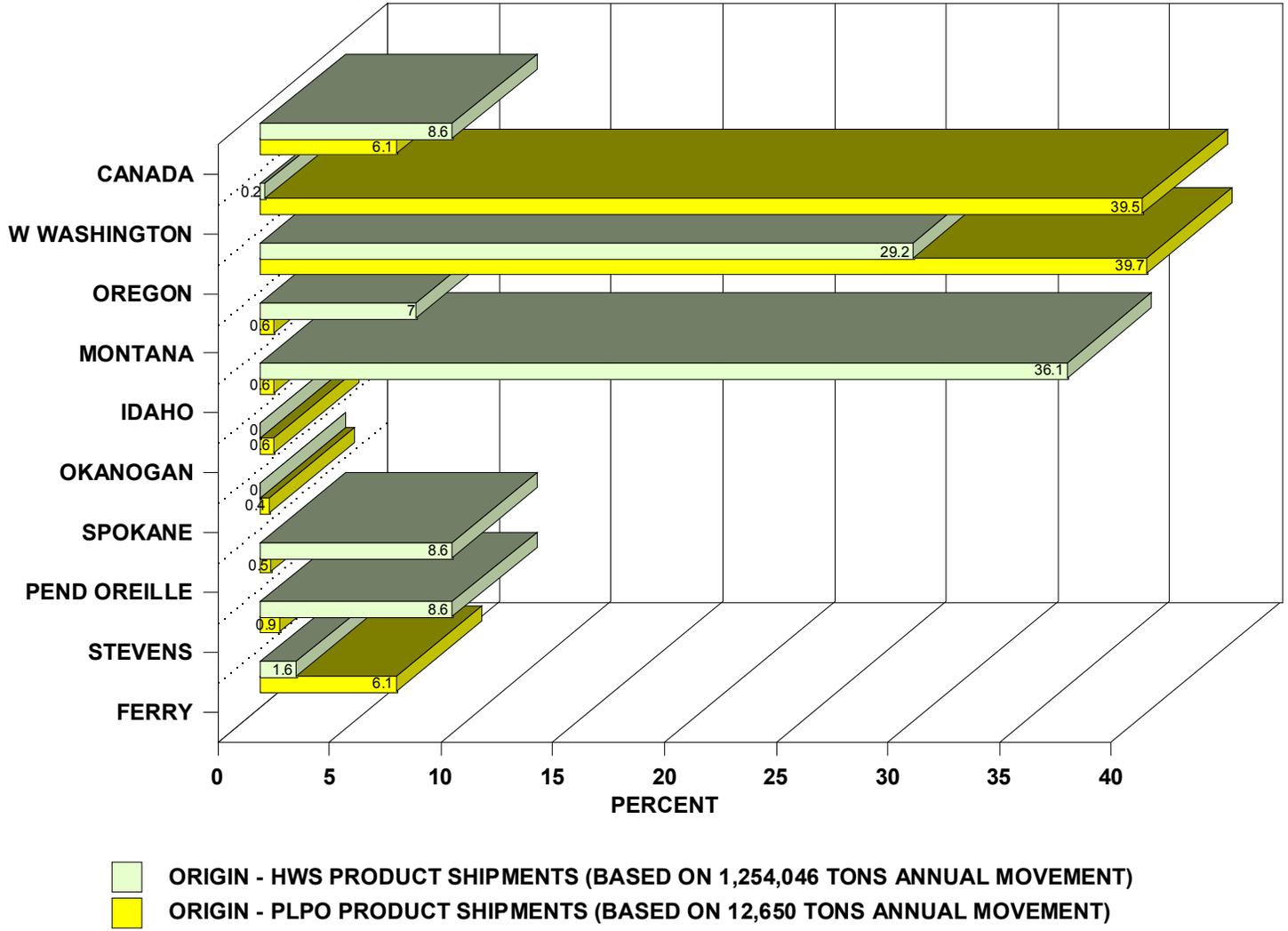


Figure 7: Origin of Forest Products - Commercial Shippers

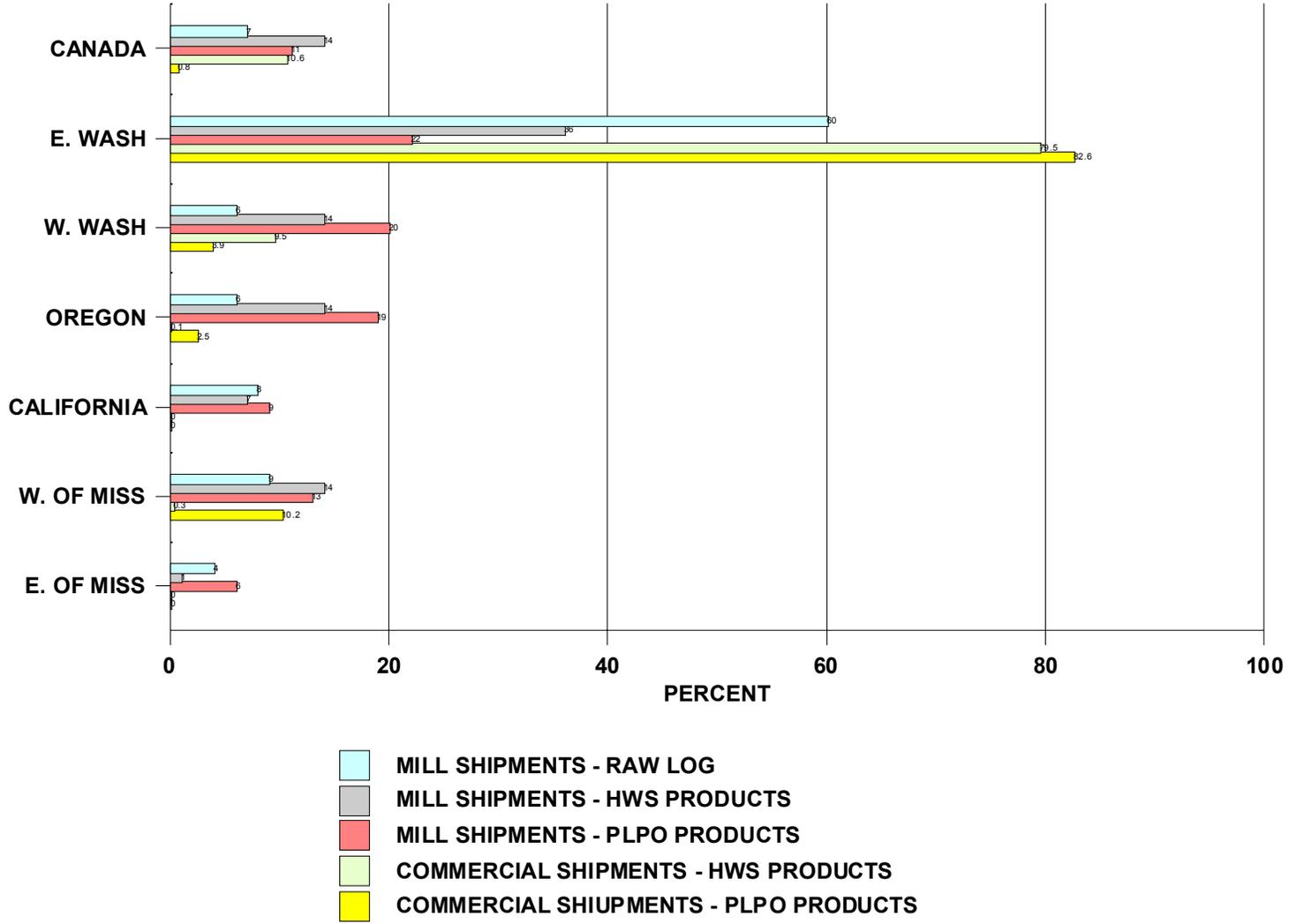


For commercial shippers, 82.6 percent of volume trucked to final destination remains in eastern Washington. Another 10 percent is shipped to other states west of the Mississippi. For shipments from mills, eastern Washington receives the highest volume at 22 percent. Western Washington is second with 20 percent and Oregon is third with 19 percent. Canada and California were fifth and sixth with 11 percent and 9 percent respectively.

One note of caution should be offered regarding shipments of PLPO products by commercial shippers. The reported volume of shipments (12,650 ton per annum) is so low that it may not reflect the actual movements of PLPO products by commercial shippers in eastern Washington. Therefore, these data should be considered only tentative.

Overall, Figures 5, 6, 7, and 8 show that eastern Washington roadways are used to ship a large volume of forest products, both as a source of supply, but also as a final market destination. Therefore, maintaining an efficient highway system can reduce industry costs, and affect the economic welfare of eastern Washington consumers by reducing price pressures on forest products due to transportation costs. A significant percentage of products from mills and commercial shippers are also shipped to areas outside the region, including Western Washington, Oregon, California, and Canada. Maintaining efficient roadways to these markets is important to the industry.

Figure 8: Truck Shipments to Final Destination by Type



Road Use by Raw Log Shippers and Commercial Truckers

The surveys for raw log shippers and commercial shippers contain questions that identified the roadways that they utilize (the survey of mill shipments did not ask these respondents about roadway use as the bulk of mill shipments of raw logs, HWS products, and PLPO products are done by outside sources). It should also be noted that the volume estimates by road reflect the responding firms and should be considered extremely conservative.

Main Roadways

Table 2 contains the volume of forest products (in tons) shipped on the major state roadways in eastern Washington. The highest volume is shipped on SR 395 with a reported 908,924 tons shipped via this roadway. The next highest volume is SR 195 with 741,053 tons followed by SR 2 with 428,857 tons. It should be noted that shipments on SR 12 by southeast region raw log shippers were broken out by county. Here, raw log shipments within each county segment are 108,000 tons for Walla Walla County, 101,000 tons for Columbia County, 15,000 tons for Garfield County, and 8100 tons for Asotin County.

Table 2--Major State Highways Used by Raw Log and Commercial Shippers

Federal Roads	NE Raw Log Shippers (in tons)	SE Raw Log Shippers (in tons)	HWS by Commercial (in tons)	PLPO by Commercial (in tons)	Total (in tons)
SR 395	811,074	-	97,736	114	908,924
SR 195	-	-	741,002	51	741,053
SR 2	282,242	-	146,615	-	428,857
SR 12	-	232,425	-	1,340	233,765
SR 97	77,005	-	1,254	63	78,322
I-90	943	-	1,254	3,097	4,355
I-82	-	-	1,254	3,100	4,354

Other Roadways

Table 3 displays the use of other state routes by respondents to the raw log and commercial shipper surveys. The state route with the highest volume of forest product shipments is SR 20 with over 650,000 tons in shipments. The use of SR 20 by northeast region raw log shippers was broken out by county. Pend Oreille, Stevens, Ferry, and Okanogan counties have SR 20 traversing them in an east-west direction. Raw log shipments within each county segment of SR 20 was approximately 198,000 tons for Stevens County, 158,000 tons for Ferry County, 110,000 tons for Pend Oreille County, and 89,000 tons for Okanogan County of the 554,497 total. The next highest volume route is the stretch of SR 155 that is located in Okanogan County. Approximately 336,000 tons of raw logs are shipped on this roadway. Other high volume routes used are SR 21 (93,000 tons), the stretch of SR 231 in Stevens County (91,000 tons), SR 25 (78,000 tons), SR 211 (75,000 tons) and SR 31 (74,000 tons).

Table 3: Other State Routes Used by Raw Log and Commercial Shippers

State Routes	NE Raw Log Shippers (in tons)	SE Raw Log Shippers (in tons)	HWS by Commercial (in tons)	PLPO by Commercial (in tons)	Total (in tons)
SR 14	-	-	-	860	860
SR 20	544,497	-	105,286	266	650,049
SR 21	93,340	-	-	-	93,340
SR 22	-	-	502	1,300	1,802
SR 25	65,338	-	12,540	-	77,878
SR 28	-	-	-	101	101
SR 31	-	-	73,760	51	73,811
SR 125 (Walla Walla Co.)	-	1,265	-	-	1,265
SR 128 (Asotin Co.)	-	14,924	-	-	14,924
SR 129 (Asotin Co.)	-	4,047	-	-	4,047
SR 153	2,333	-	-	-	2,333
SR 155 (Okanogan Co.)	336,441	-	-	-	336,441
SR 174	9,332	-	-	-	9,332
SR 211	-	-	73,760	1,800	74,560
SR 221	-	-	1,254	101	1,355
SR 231 (Stevens Co.)	91,006	-	-	-	91,006
SR 281	-	-	-	405	405

The total sum of tonnage (from Table 2 and 3) shipped by raw log and commercial shippers is approximately 3.8 million. The appendix contains a map (Figure A-1) that depicts the volume of road usage by raw log and commercial shippers on roadways in eastern Washington.

County Roads

Shippers of raw logs were also asked about the county roads they utilized to market raw logs. For the northeast Washington, the reported annual base was 662,044 tons. Table 4 shows the road with the highest use is Aladdin Road in Stevens County with 16.5 percent of the total base (109,308 tons). This is followed by Campbell and Elder roads in Spokane County at 12.1 percent each (79,988 tons). In Ferry County, Inchelium and Bridge-Cache Creek roads handled 10.4 percent (69,028 tons) and 7.8 percent (51,348 tons) of the total base each. Table 4 also indicates that the greatest volume of raw log truck movements was in Stevens County with 34.9 percent of the total (231,020 tons). Second in volume was Ferry County with 27.9 percent (184,745 tons) and third was Spokane County with 25.5 percent (168,699 tons).

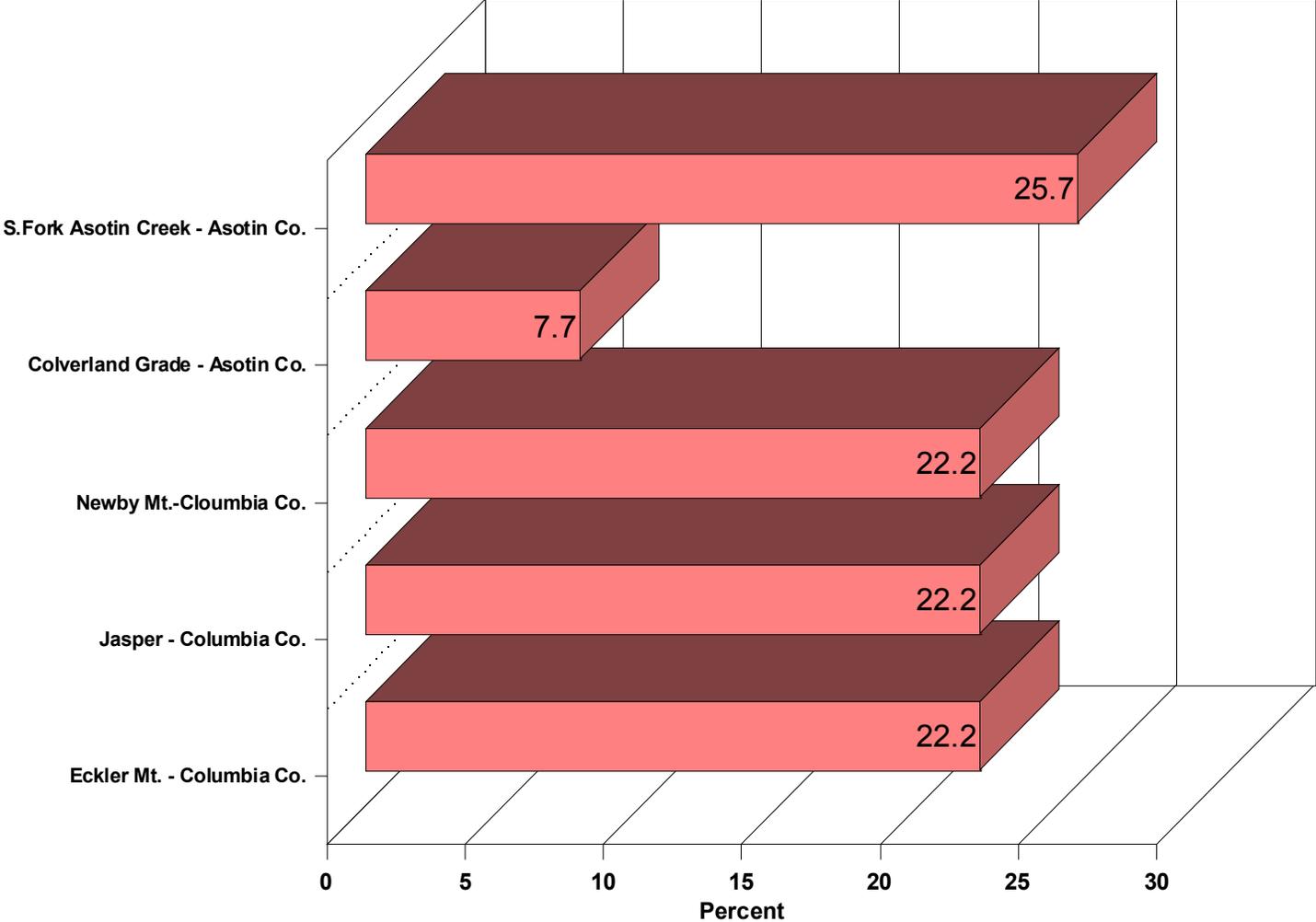
Figure 9 displays the five county roads that are the primary roads for raw log shippers in the southeast region. The reported base by these shippers is 21,537 tons of raw logs. Overall, the South Fork of Asotin Creek had the highest use with 25.7 percent (5,499 tons). In Columbia County, the combined shipment volume for Newby Mountain, Jasper, and Eckler Mountain was 66.6 percent (14,208 tons) - 22.2 percent for each segment (4,736 tons).

Road usage by forest product firms presents a varied picture of use. Raw log shippers must rely on county roads for access to supply. The volume of forest products moved on some county roads in northeastern Washington is significant. Mills and commercial shippers must rely on eastern Washington roads not only to provide access to raw log supply, but are also to ship forest products to various out-of-state markets.

Table 4--County Highways Utilized in Northeastern Washington

Stevens		Ferry		Okanogan		Pend Oreille		Spokane		Lincoln	
Addy-Gifford	1.9%	Lake Ellen	1.4%	Riverside Hwy E.	0.6%	Kings Lake	0.1%	Campbell	12.1%	Mile-Creston	1.4%
Williams Lake	1.3%	Boulder	4.9%	#9129	0.1%	Tacoma	0.1%	Elder	12.1%		
Sand Canyon	0.5%	San Poil	0.7%	Toroda	3.4%	West Calispell	0.1%	Deer Park-Milan	0.5%		
Addy-Cedonia	0.7%	Elbow-Seylor	0.6%	County Other	0.9%	LeClair	1.5%	Blanchard	0.8%		
Arden Cutoff	0.0%	Bridge-Cache Crk	7.8%			Spirit Lk Hwy 41	0.3%				
Aladdin	16.5%	Inchelium	10.4%			County Other	3.0%				
Flowery Trail	1.9%	County Other	2.2%								
Garden Spot	2.9%										
Swenson	2.9%										
Loon Lk-Eloika Lk	1.2%										
Springdale-Hunters	1.6%										
Onion-Clungston	0.6%										
County Other	2.9%										
Total	34.9%	Total	27.9%	Total	5.0%	Total	5.3%	Total	25.5%	Total	1.4%
Tonnage	231,020	Tonnage	184,745	Tonnage	33,286	Tonnage	34,957	Tonnage	168,699	Tonnage	9,338

Figure 9: County Roads Utilized by Southeast Region Raw Log Shippers



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Appendix

Figure A.1: Map of Highways Used by Raw Log and Commercial Shippers

