

## 2.0 Freight Trends

Population and consumption increases, along with technological advances in manufacturing and shipping have raised freight to be among the most important of modern transportation issues. In 2005, over 4.5 trillion ton-miles of freight were shipped in the United States – about 15,300 ton-miles per capita. Rail transportation represented the largest share of that, 38 percent, and the fastest growing.

The United States and its trading partners are engaged in a continual pursuit to move goods more efficiently and cost-effectively. Montana shippers and their trading partners are no exception. This section begins with a discussion of current national freight trends, then proceeds to profile freight flows at the state level. It concludes with an analysis of Montana freight rail operations in relation to state and national freight movements.

### 2.1 NATIONAL FREIGHT TRENDS

In order to frame the role of Montana rail freight, it is important to recognize state and local goods movement in the context of the national freight trends. Historically, truck shipments have largely dominated the freight transportation system in the United States; however, recent trends indicate gradual but consistent increases in rail freight shipments. This increase in rail may be related to the benefits of rail over truck freight, which include: transportation system capacity and highway cost savings; economic development and productivity; international trade competitiveness; environmental health and safety; and improved emergency response.<sup>15</sup>

As a resource to assist in understanding goods movement origin and destination patterns in the United States, the Federal Highway Administration (FHWA) produced the Freight Analysis Framework (FAF and FAF2), which represents an extensive commodity flow database incorporating data from a range of public sources and is representative of each major mode of freight transportation.<sup>16</sup> FAF2 is a useful tool for identifying broad freight trends and goods movement interactions between regions. That said, this information is not likely to accurately capture aspects such as the effect of current volatility in the global economy or specific short-term nuances in freight trip patterns between sectors at the local level.

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<sup>15</sup>AASHTO *Freight-Rail Bottom Line Report*, <http://freight.transportation.org/doc/FreightRailReport.pdf>.

<sup>16</sup>While FAF2 has resulted in vast improvements over the initial FAF database, this dataset is based on commodity flow survey data, and its results are inherently subject to both sample size limitations as well as the accuracy of economic growth projections.

At the national level, FAF2 projects substantial freight growth across all modes, with domestic shipments showing exceptionally large increases. Table 2.1 displays tonnages by mode for the entire United States for 2002 and 2035. The data shows that total freight tonnage is expected to nearly double by 2035, and to remain dominated by truck transport (+96 percent). Rail (+87.5 percent), intermodal (+101 percent), and pipeline (+83.6 percent) also are projected to increase at impressive paces.<sup>17</sup>

**Table 2.1 Summary of U.S. Shipments by Mode**  
*2002 and 2035 (Millions of Tons)*

|                      | (Millions of Tons) |               |
|----------------------|--------------------|---------------|
|                      | 2002 Total         | 2035 Total    |
| Truck                | 11,539             | 22,814        |
| Rail                 | 1,879              | 3,525         |
| Water                | 701                | 1,041         |
| Air, Air, and Truck  | 10                 | 27            |
| Intermodal           | 1,292              | 2,598         |
| Pipeline and Unknown | 3,905              | 7,172         |
| <b>Total</b>         | <b>19,326</b>      | <b>37,178</b> |

When analyzing shipments by mode and value – shown in Table 2.2 – projections reveal substantial gains across every category. With total value of shipments expected to increase nearly 193 percent from \$13,120 billion to \$38,399 billion, all modes increase: truck by 168 percent, rail by 83 percent, and intermodal and pipeline by 356 percent and 105 percent, respectively.

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<sup>17</sup>Intermodal freight transport is a separate category characterized by the movement of freight in a container or vehicle across multiple modes of transportation, including rail, ship, and truck.

**Table 2.2 Summary of U.S. Shipments by Mode**  
*2002 and 2035 (Billions of Dollars)*

|                      | (Billions of Dollars) |                 |
|----------------------|-----------------------|-----------------|
|                      | 2002 Total            | 2035 Total      |
| Truck                | \$8,856               | \$23,767        |
| Rail                 | \$382                 | \$702           |
| Water                | \$103                 | \$151           |
| Air, Air, and Truck  | \$663                 | \$455           |
| Intermodal           | \$1,967               | \$8,966         |
| Pipeline and Unknown | \$1,149               | \$2,357         |
| <b>Total</b>         | <b>\$13,120</b>       | <b>\$38,399</b> |

Tables 2.3 and 2.4 show total freight flows by mode for 2002 and 2035, broken down by domestic trade, exports, and imports, by volume and value, respectively. In 2002, domestic movements made up the lion's share of freight flows by both weight (91 percent) and value (84 percent). This trend is expected to continue in the future, with domestic movements accounting for about 91 percent (by weight) and 77 percent (by value) of total freight flows by 2035. In Montana, this likely will be reflected by increasing shipments of basic commodities like grain and minerals.

Although domestic freight shipments clearly make up the majority of total goods movement in the United States, foreign trade (imports and exports) is expected to grow faster. According to FAF2, the total weight of foreign freight shipments will grow by 2.3 percent annually between now and 2035, compared to 2 percent per year for domestic movements. This will cause the total volume of these shipments to expand by 112 percent (to about 3.5 million tons) by 2035. When measured by value, the growth is even more dramatic: 4.5 percent annually for foreign trade compared to 3 percent per year for domestic. As a result, the value of foreign trade will more than quadruple in the coming years, to \$8.8 trillion. In Montana, this growth will manifest itself in terms of increasing cross-border trade with Canada as well as growing east-west movements; for example, of goods imported through West Coast seaports on their way to midwestern and eastern markets.

**Table 2.3 U.S. Shipments by Mode and Weight**  
*2002 and 2035 (Millions of Tons)*

|                      | 2002          |            |              | 2035          |              |              |
|----------------------|---------------|------------|--------------|---------------|--------------|--------------|
|                      | Domestic      | Exports    | Imports      | Domestic      | Exports      | Imports      |
| Truck                | 11,336        | 106        | 97           | 22,231        | 262          | 320          |
| Rail                 | 1,769         | 32         | 78           | 3,292         | 57           | 176          |
| Water                | 595           | 62         | 44           | 874           | 114          | 54           |
| Air, Air, and Truck  | 3             | 3          | 4            | 10            | 7            | 10           |
| Intermodal           | 196           | 317        | 780          | 334           | 660          | 1,604        |
| Pipeline and Unknown | 3,772         | 4          | 130          | 6,926         | 5            | 240          |
| <b>Total</b>         | <b>17,670</b> | <b>524</b> | <b>1,133</b> | <b>33,668</b> | <b>1,105</b> | <b>2,404</b> |

Notes: Intermodal includes U.S. Postal Service and courier shipments and all intermodal combinations except air and truck.

Pipeline and unknown shipments are combined because FAF2 data on region-to-region flows by pipeline are statistically uncertain.

**Table 2.4 U.S. Shipments by Mode and Value**  
*2002 and 2035 (Billions of Dollars)*

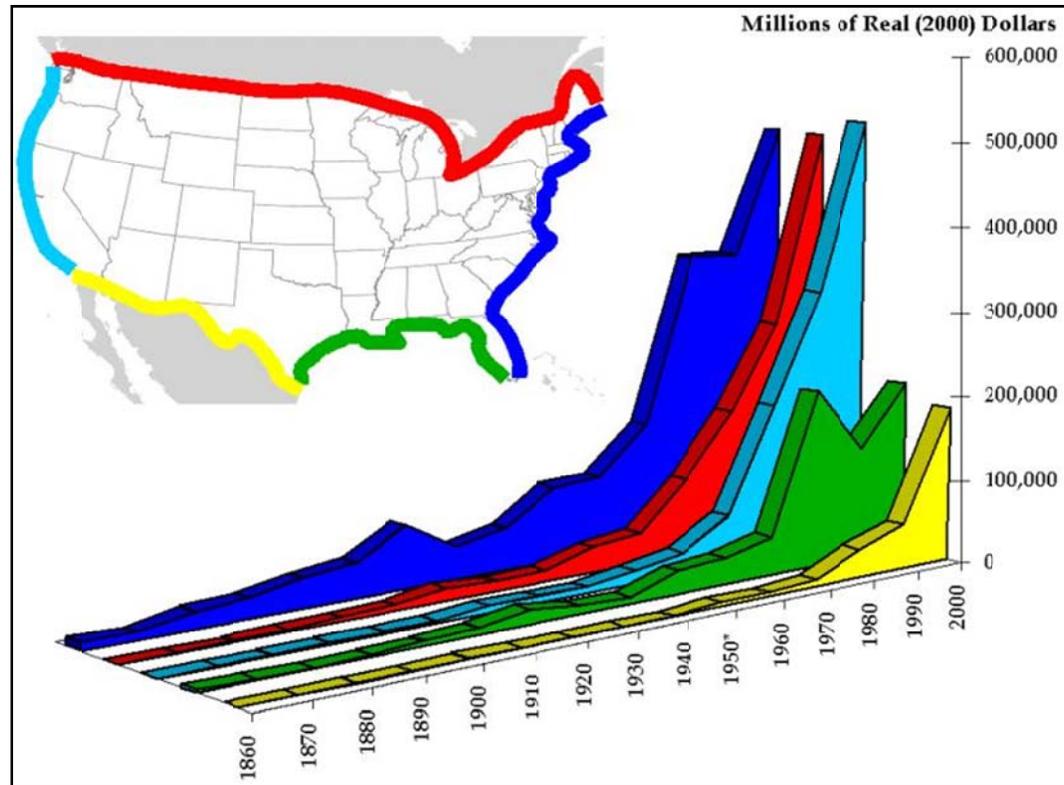
|                      | 2002            |              |                | 2035            |                |                |
|----------------------|-----------------|--------------|----------------|-----------------|----------------|----------------|
|                      | Domestic        | Exports      | Imports        | Domestic        | Exports        | Imports        |
| Truck                | \$8,447         | \$201        | \$208          | \$21,655        | \$806          | \$1,306        |
| Rail                 | \$288           | \$26         | \$68           | \$483           | \$63           | \$156          |
| Water                | \$76            | \$13         | \$13           | \$103           | \$31           | \$18           |
| Air, Air, and Truck  | \$162           | \$226        | \$275          | \$721           | \$778          | \$955          |
| Intermodal           | \$983           | \$268        | \$716          | \$4,315         | \$943          | \$3,708        |
| Pipeline and Unknown | \$1,127         | \$1          | \$22           | \$2,315         | \$1            | \$41           |
| <b>Total</b>         | <b>\$11,083</b> | <b>\$735</b> | <b>\$1,302</b> | <b>\$29,592</b> | <b>\$2,623</b> | <b>\$6,184</b> |

Notes: Intermodal includes U.S. Postal Service and courier shipments and all intermodal combinations except air and truck.

Pipeline and unknown shipments are combined because FAF2 data on region-to-region flows by pipeline are statistically uncertain.

The above tables suggest the growing role of the U.S. in the global economy. Both imports and exports are expected to continue to increase in volume and value in the long term, notwithstanding current downward trends in freight shipments and the general weakening of the economy since 2008. Figure 2.1 depicts historical trade value trends on each U.S. border. This figure helps illustrate several patterns. Historically, the East Coast has been dominant in value of goods shipped in comparison to other borders. However, both the West Coast and Canadian border regions grew in importance beginning in the 1960s and achieved relative parity by 2000.

Figure 2.1 Growth in Value of Imports and Exports from 1860 to 2004  
By U.S. Coast and Border Region



Source: Analysis by Cambridge Systematics, Inc.

This trend has been driven by several key factors. For instance, the advent of containerization (generally assumed to be higher-value goods) in the 1950s and the continuing advances in technology enabled larger ships and efficient port and intermodal operations. West Coast growth also is due in large part to the emergence of Asian shipping utilizing direct shipping lanes to West Coast ports. The North American Free Trade Agreement, which went into effect in 1994, greatly expanded trade opportunities between the United States, Canada, and Mexico and likely contributed to higher trade volume and value along the Canadian border. Generally speaking, each border region can be seen making gradual recovery from decreases in the early 2000s. This figure is particularly germane from a Montana perspective, due to the State's active trading relationships with both the Canadian border as well as the West Coast trade centers.

## 2.2 STATE FREIGHT TRENDS

By narrowing the focus to Montana statewide freight data and forecasts (using the FAF2 database), it is evident that national freight flows are not representative of Montana freight trends. Table 2.5 identifies Montana shipments by weight for the 2002 base year and as projected for 2035.<sup>18</sup>

**Table 2.5 Montana Shipments by Weight**  
*2002 and 2035 (Millions of Tons)*

|                     | 2002         |             |             | 2035         |             |             |
|---------------------|--------------|-------------|-------------|--------------|-------------|-------------|
|                     | Within State | From State  | To State    | Within State | From State  | To State    |
| Truck               | 36.6         | 7.2         | 8.6         | 92.7         | 15.6        | 26.0        |
| Rail                | 4.4          | 48.1        | 1.6         | 1            | 71.8        | 6.5         |
| Water               | 0.1          | 0.1         | 0.1         | 0.1          | 0.1         | 0.1         |
| Air, Air, and Truck | 0.1          | 0.1         | 0.1         | 0.1          | 0.2         | 0.1         |
| Intermodal          | 0.2          | 0.6         | 0.2         | 1.1          | 0.9         | 0.5         |
| <b>Total</b>        | <b>41.4</b>  | <b>56.1</b> | <b>10.6</b> | <b>95.0</b>  | <b>88.6</b> | <b>33.2</b> |

Source: Freight Analysis Framework 2.2, State Summary Information, FHWA, Office of Freight Management and Operations.

Freight shipments by value (Table 2.6) differ significantly from shipments by weight. Trucks typically haul higher-value, time-sensitive cargo, and the data reflects that. Without exception, the estimated value of truck shipments is substantially higher than all the other modes. Higher-volume, lower-value goods tend to be shipped by rail, and the FAF2 data shows that, in 2035, rail shipments to, from, and within the State will expand. Higher-value intermodal shipments (mostly truck-and-rail) to the State will more than quadruple. By value, however, the major growth is expected in truck freight.

By 2035, total tonnage is projected to increase by 101 percent to 216.8 million tons. In both 2002 and 2035, truck shipments account for the largest share of within-state tonnage, with rail transport a distant second. The majority of freight shipped to Montana is similarly split between truck and rail. However, rail dominates from-state tonnage and is expected to account for 81 percent of exports from the State in 2035.

<sup>18</sup>FAF2 includes pipeline movements with those of unknown mode. Because these shipments are subject to large uncertainty and can skew results when analyzing mode split patterns, pipeline and unknown movements are analyzed separately.

**Table 2.6** Montana Shipments by Value  
2002 and 2035 (Millions of Dollars)

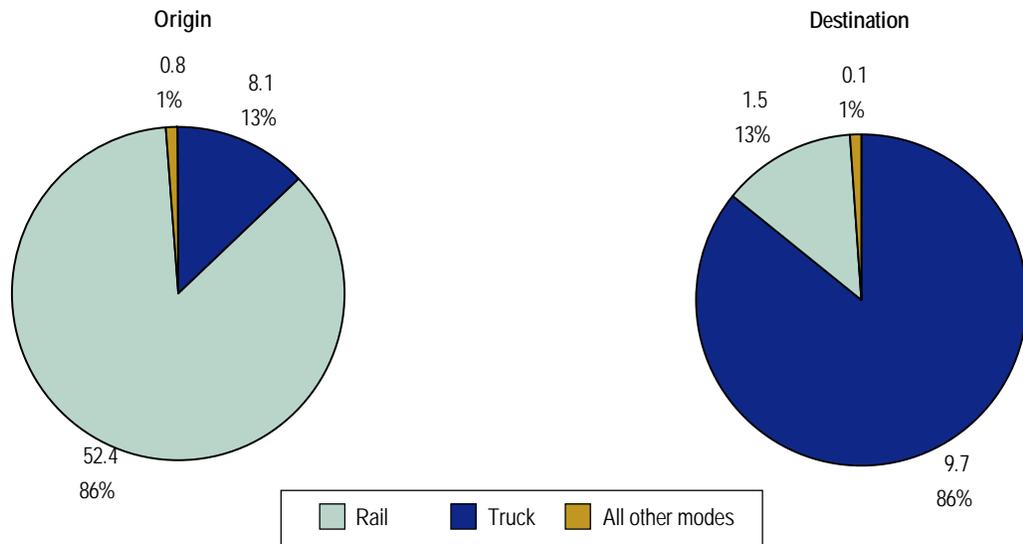
|                     | 2002            |                |                 | 2035            |                 |                 |
|---------------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|
|                     | Within State    | From State     | To State        | Within State    | From State      | To State        |
| Truck               | \$13,908        | \$3,885        | \$11,046        | \$39,780        | \$8,337         | \$39,923        |
| Rail                | \$122           | \$1,769        | \$223           | \$381           | \$2,033         | \$394           |
| Water               | \$0             | \$0            | \$0             | \$0             | \$0             | \$0             |
| Air, Air, and Truck | \$7             | \$91           | \$358           | \$21            | \$166           | \$755           |
| Intermodal          | \$308           | \$633          | \$2,312         | \$852           | \$1,874         | \$10,500        |
| <b>Total</b>        | <b>\$14,345</b> | <b>\$6,379</b> | <b>\$13,939</b> | <b>\$41,034</b> | <b>\$12,410</b> | <b>\$51,572</b> |

Source: Freight Analysis Framework 2.2, State Summary Information, FHWA, Office of Freight Management and Operations.

In 2008, FHWA released a provisional FAF2 database intended to establish interim adjustments to previous versions. That database includes information for 2007, and provides richer detail about the specific commodities being shipped in, from, and to the State. As mentioned, commodity flow databases' utility tends to be in their ability to identify broader trends rather than to establish highly detailed commodity interactions. But in the case of Montana, the FAF2 2007 provisional database provides a useful frame of reference. The next several graphics consider state freight movements by weight, value, and commodity from this data source.

Figure 2.2 displays weights by mode (excluding pipeline and unknown) for freight with Montana both as an origin and destination. There is a dramatic difference in rail tonnage for shipments that are entering versus leaving the State. Overall, origin tonnage is more than five times destination tonnage, and for rail, the disparity is even greater (more than 52 million tons leaving the State, compared to about 1.5 million tons entering it). Truck freight is the reverse, with the vast majority (86 percent) of tonnage entering the State coming in by truck, compared to 13 percent of originating tonnage.

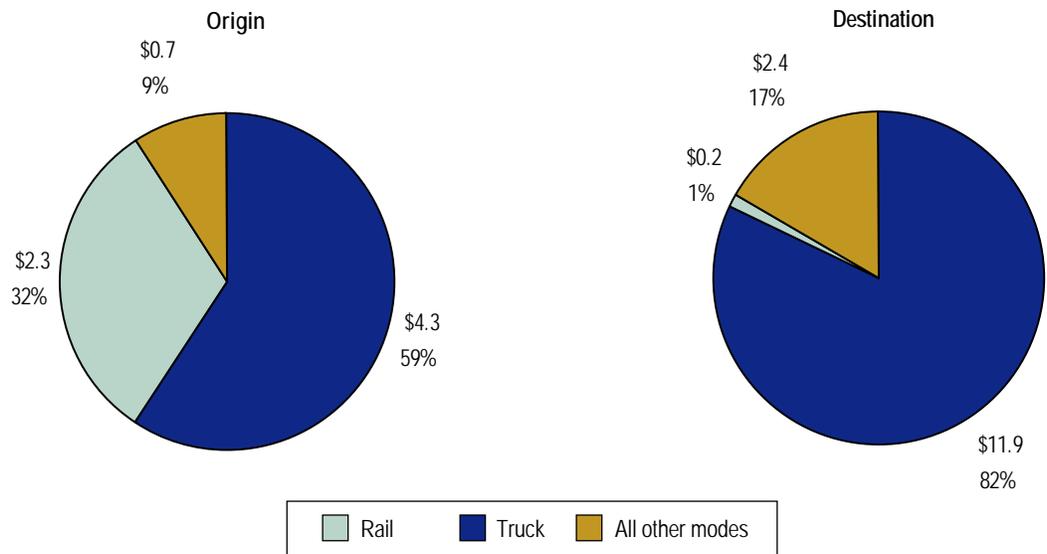
**Figure 2.2 Montana Freight Weight by Mode**  
*2007 (Millions of Tons)*



Source: Freight Analysis Framework, 2007 Provisional Database. Excludes pipeline and unknown movements.

Freight by value for 2007 is shown in Figure 2.3, again excluding pipeline and intermodal shipments. The chart shows that trucks carry a substantial majority of freight value both originating and terminating in Montana. Rail accounts for 32 percent of the freight value originating in Montana but only 1 percent of terminating value. Other modes occupy a notable portion of total value in both categories, which mostly reflects higher-value truck-rail intermodal shipments. The truck and intermodal modes represent a large proportion of overall value of freight shipped because more valuable commodities tend to be transported as containerized or truck trailer freight. Moreover, trucks (hauling containers or trailers) are better suited to distributing finished goods to diffuse markets – e.g., retail and commercial locations, restaurants and grocery stores, and various types of manufacturing and light industrial establishments – and this type of freight tends to be higher value.

**Figure 2.3 Montana Freight Value by Mode**  
*2007 (Billions of Dollars)*



Source: Freight Analysis Framework, 2007 Provisional Database. Excludes pipeline and unknown movements.

As discussed earlier, the FAF2 database bundles pipeline and unknown modes due to the large amount of uncertainty associated with pipeline movements and the difficulties associated with validating these movements. As a result, pipeline and unknown shipments have been excluded from the discussion to this point. Table 2.7 summarizes the volume and value of all shipments made via pipeline and unknown modes in Montana for 2002 and 2035. Given the importance of the energy industry to Montana’s economy, it is reasonable to assume that most of these movements are by pipeline. As can be seen from the table, these movements constitute a significant portion of the volume and value of freight movements in Montana, and are particularly important to the State’s growing oil and gas industries. Pipelines in Montana principally carry petroleum and natural gas, which is both high value and high volume, with growth in all flows.

**Table 2.7 Shipments via Pipeline and Unknown Modes in Montana**  
*2002 and 2035*

|                                   | 2002         |            |          | 2035         |            |          |
|-----------------------------------|--------------|------------|----------|--------------|------------|----------|
|                                   | Within State | From State | To State | Within State | From State | To State |
| By Weight<br>(Millions of Tons)   | 18.4         | 20.3       | 9.3      | 79.5         | 50.4       | 25.9     |
| By Value<br>(Billions of Dollars) | \$1.3        | \$5.7      | \$2.1    | \$4.3        | \$13.3     | \$7.1    |

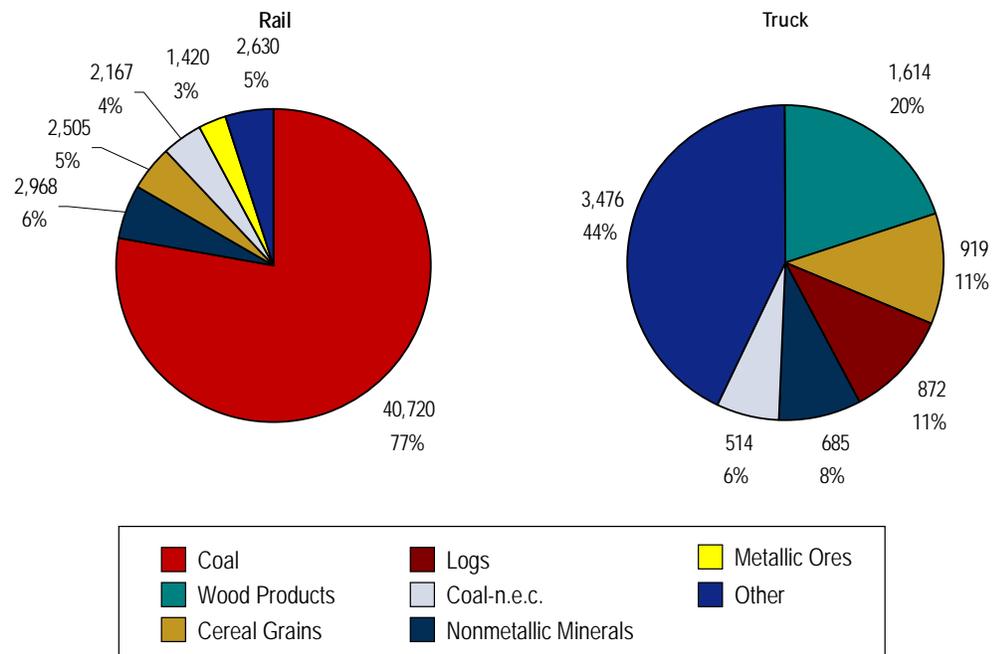
Source: Freight Analysis Framework 2.2.

The following graphics focus on the types of commodities which have a shipping origination or destination point in Montana.

Figure 2.4 provides a breakdown of the top five commodities – by tonnage – originating in the State by rail and truck. Coal (and coal not elsewhere classified) shipments are the dominant presence among goods shipped by rail; combined, they make up 81 percent of the tonnage originating in Montana. Other important rail commodities include minerals, metallic ores, and cereal grains.

The truck commodity mix is more diverse. Wood products make up 20 percent of tonnage leaving Montana by truck (about 1.6 million tons). Cereal grains and logs each comprise another 11 percent. Other commodities, which include things like food products, mixed freight, and manufactured goods, makes up about 3.5 million tons, or 44 percent of truck freight originating in Montana.

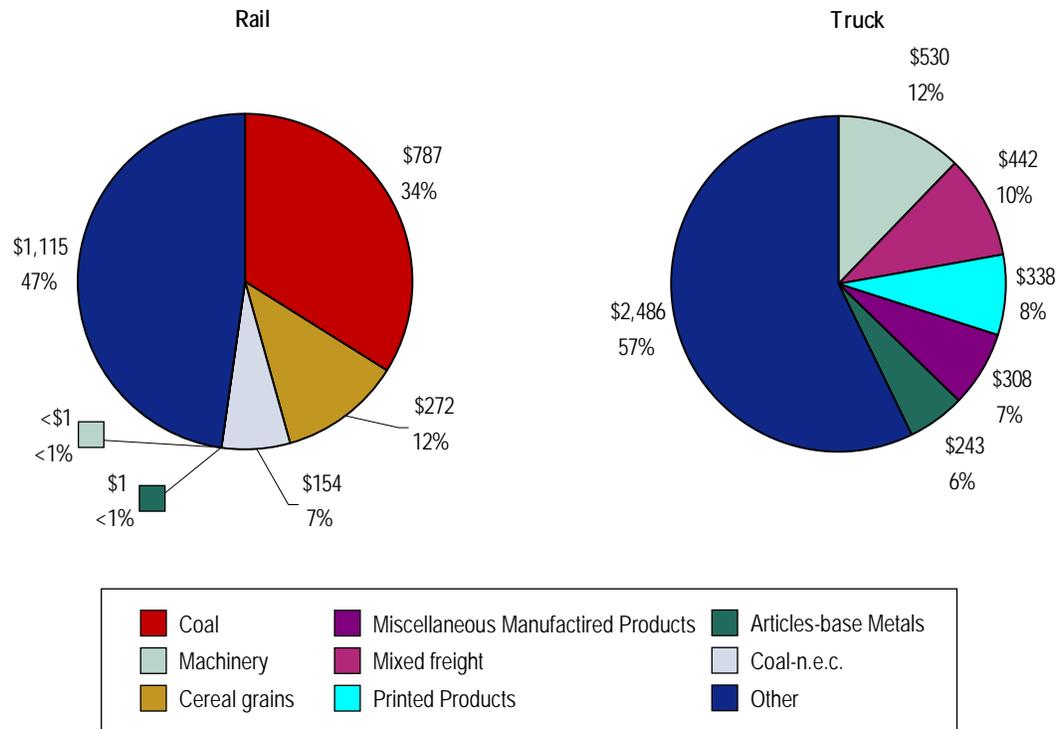
**Figure 2.4 Commodities Originating in Montana by Weight  
2007 (Thousands of Tons)**



Source: Freight Analysis Framework, 2007 Provisional Database.

Figure 2.5 presents the top five commodities originating in Montana by value for the truck and rail modes. The commodity mix is noticeably more diversified, with “Other” commodities representing 47 percent of rail value and 57 percent of truck value. Rail shipments are predominately coal, cereal grains, and other commodities. Truck shipments constitute about twice the value of the rail shipments, and include machinery, miscellaneous manufactured products, mixed freight (intermodal), and articles of base metal, as well as the large “other” commodity group.

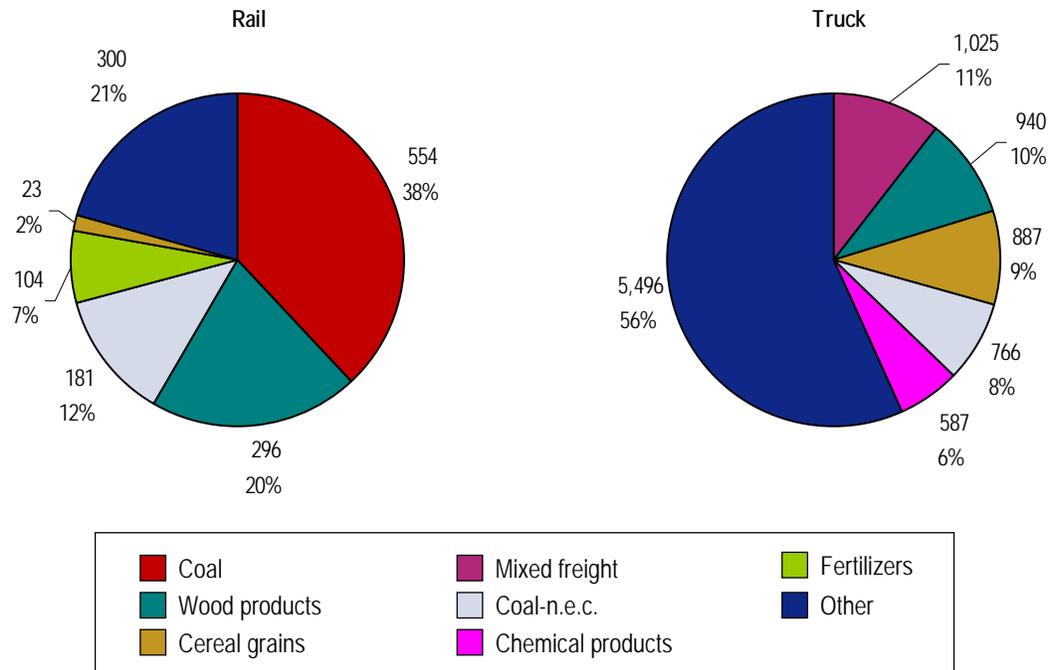
**Figure 2.5 Value of Commodities Originating in Montana by Mode**  
*2007 (Millions of Dollars)*



As previously shown, the amount of freight tonnage terminating in Montana is far less than tonnage originating. The graphics below show the mix of commodities destined for Montana.

Figure 2.6 depicts top commodities terminating in Montana by tonnage. Note that this source (the 2007 provisional FAF2) estimates that total truck tonnage terminating in the State exceeds rail tonnage by more than nine times (a much greater difference than was shown in the FAF2 database, where the multiple is about five times as much). Inbound truck cargo is spread among several commodity categories, the largest being “all other commodities” (56 percent of the total); followed by mixed freight (intermodal), wood products, cereal grains, coal and petroleum products not elsewhere classified, and chemical products.

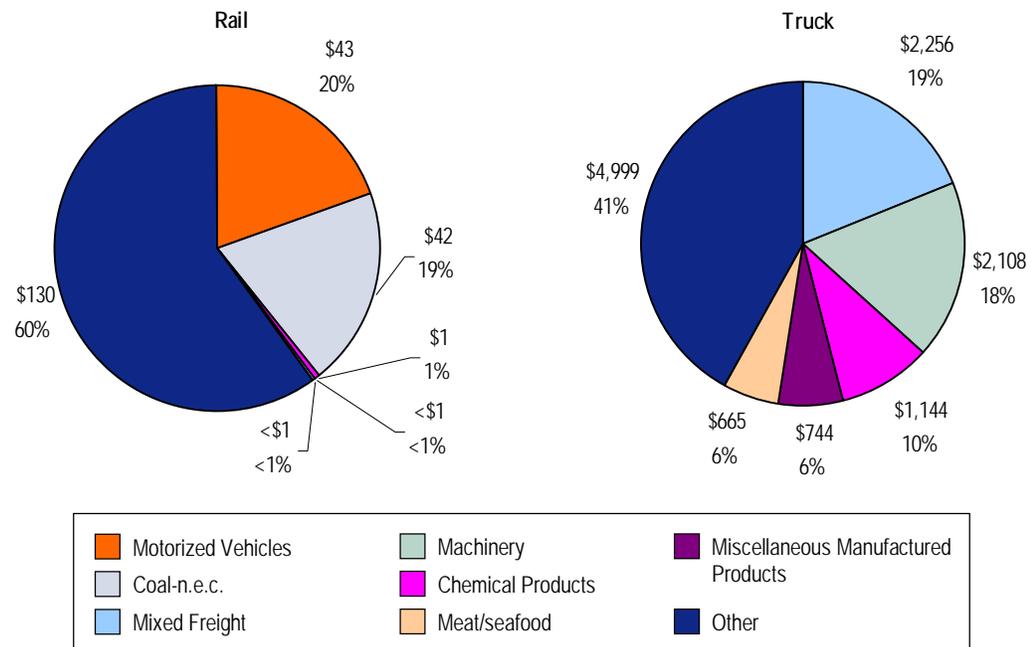
**Figure 2.6 Tonnage of Freight Commodities Terminating in Montana 2007 (Thousands of Tons)**



When measured by value, freight moving into Montana is dominated by the truck mode. Overall, truck freight terminating in Montana was worth almost 55 times total rail freight value in 2007. This reflects the fact that trucks are the preferred mode for transporting light, higher-value commodities.

Figure 2.7 shows the top five commodities destined for Montana by value for the truck and rail modes. Top inbound goods shipped via truck include mixed freight (intermodal), machinery, chemical products, and other miscellaneous manufactured goods. Motorized vehicles (which are predominantly moved by train) and coal and petroleum products each make up about one-fifth of the incoming rail freight bill, followed by chemical products, mixed freight, machinery, and all other commodities.

Figure 2.7 Value of Commodities Terminating in Montana  
2007 (Millions of Dollars)



## 2.3 STATE FREIGHT RAIL TRENDS

Data from the Freight Analysis Framework (FAF) helps describe freight movements from a multimodal perspective but does not provide a level of detail needed to examine some conditions and trends of interest in rail planning. To consider the role of freight rail in the context of statewide goods movement, this section examines characteristics specific to rail freight in Montana using the 2005 Carload Waybill Sample, maintained by the Federal Surface Transportation Board. The Waybill Sample identifies rail-specific commodity flow trends by:

- Isolating goods that were transported on rail;
- Describing the weight of rail shipments by commodity, and the line-haul freight revenues received by the railroads for transporting them; and
- Characterizing the nature of rail moves, considering specific origins, destinations, and through trips.

The Waybill Sample reports four types of movements in relation to Montana:

1. **Intrastate** - Originating and terminating within the State;
2. **Through** - Passing through the State but neither begin nor end in the State;
3. **Originating** - In the State but terminating in another state; and
4. **Terminating** - In the State but originating in another state.

The section also examines common trip combinations, rail commodities, and county-level shipments. Table 2.8 presents summary information extracted from the Waybill Sample regarding trip type, tonnage, and line-haul freight revenue.

**Table 2.8 Summary of Rail Freight Tonnage and Revenue by Trip Type**

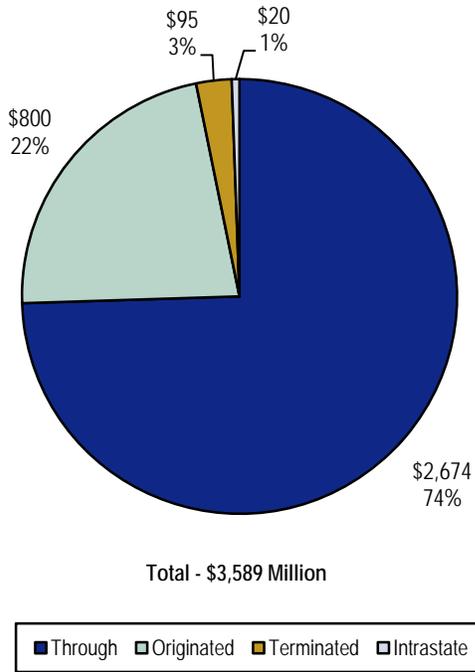
| Trip Type        | Tonnage (Millions) | Revenue (Millions Dollars) |
|------------------|--------------------|----------------------------|
| Through Trips    | 56.4               | \$2,673.9                  |
| Originated Trips | 42.0               | \$800.4                    |
| Terminated Trips | 2.8                | \$94.5                     |
| Intrastate Trips | 2.1                | \$20.4                     |
| <b>Total</b>     | <b>103.4</b>       | <b>\$3,589</b>             |

### Rail Freight Trip Types

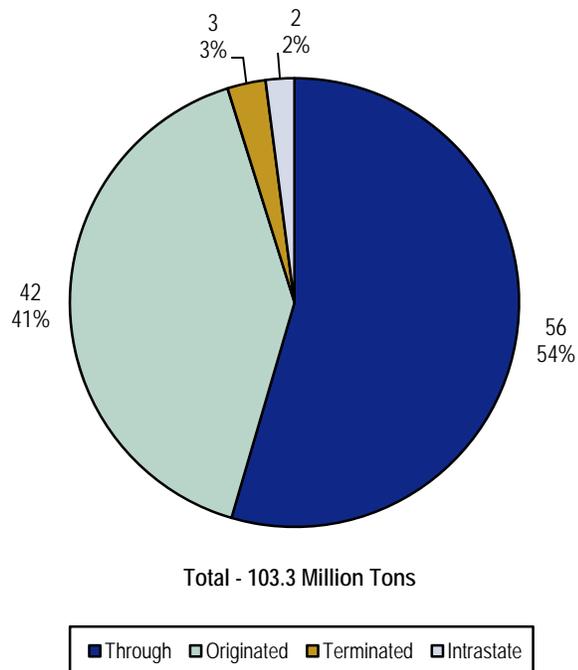
Montana is situated on a trade corridor that links the midwestern and north-western port markets. As a result, there is significant demand for through-bound rail service. Figure 2.8 highlights the dominant role of through traffic to Montana. Fully 74 percent of rail freight by revenue is just passing through the State. Originating shipments account for most of the remainder (22 percent by revenue). Rail trips terminating in Montana (3 percent by revenue) and those completely contained within the State (1 percent by revenue) make up smaller shares of the total, reflecting the State's relatively low population and status as a net exporter of goods shipped by rail.

When measured in tonnage in Figure 2.9, the picture is altered slightly, primarily because of the high amount of bulk commodities shipped from Montana. Through trips account for 54 percent of the total tonnage, while 41 percent originates in the State. Total terminated and intrastate tonnage account for far smaller shares at 3 percent and 2 percent, respectively.

**Figure 2.8 Total Rail Revenue by Trip Type**  
*Millions of Dollars*



**Figure 2.9 Total Rail Tonnage by Trip Type**  
*Millions of Tons*



## Rail Freight Originating in Montana

Montana provides over 7 percent of U.S. wheat, 5 percent of coal, and about 2 percent of nonmetallic minerals.<sup>19,20</sup> These shipments reach markets across the United States and around the world, and rely on rail services. The Waybill Sample shows what is shipped from Montana by rail by commodity.

Coal shipments dominate both the tonnage and revenue categories in relation to other commodities shipped by rail from the State. The commodities were categorized into broad groups using Standard Transportation Commodity Codes (STCC) at the two-digit level. (STCC codes represent more detailed commodity descriptions, using up to seven digits. For example, wheat and barley products are classified under the broader “Farm Products” classification, and plywood, treated lumber, and saw logs are all classified under “Lumber or Wood Products.”) The following figures show top originating commodities by revenue (Figure 2.10) and tonnage (Figure 2.11). Coal represents nearly half of the overall commodity mix by revenue (\$381 million) and 71 percent by weight (about 30 million tons). Farm products (which includes grain) makes up the next largest share, comprising 24 percent (\$187 million) by revenue and 15 percent (6 million tons) by weight. Petroleum or coal products, lumber or wood products, and clay, concrete, glass, or stone products round out the top five commodities. All other commodities make up only 6 percent of the total by revenue (\$51 million) and 4 percent by weight (about 2 million tons).

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<sup>19</sup>U.S. Department of Agriculture, National Agricultural Statistics Service.

<sup>20</sup>Freight Analysis Framework, 2007 Provisional database.

Figure 2.10 Top Originating Commodities by Revenue  
Millions of Dollars

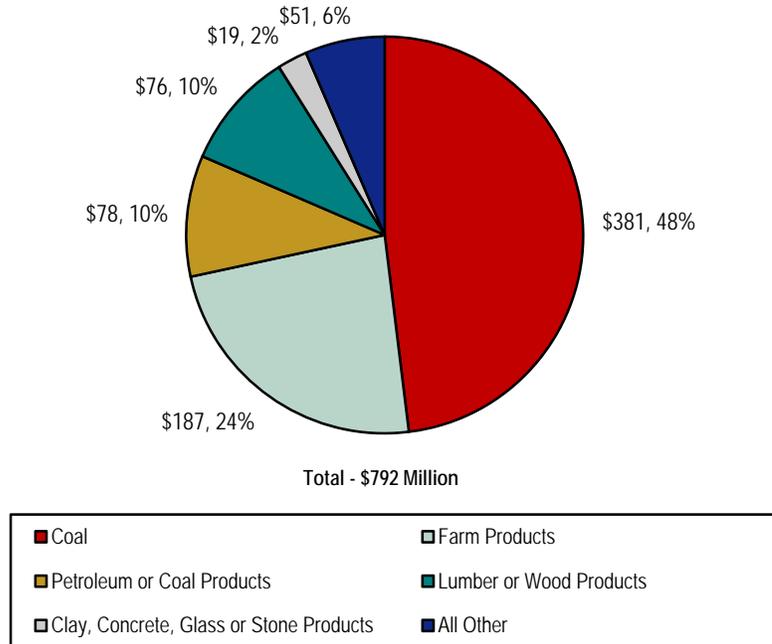
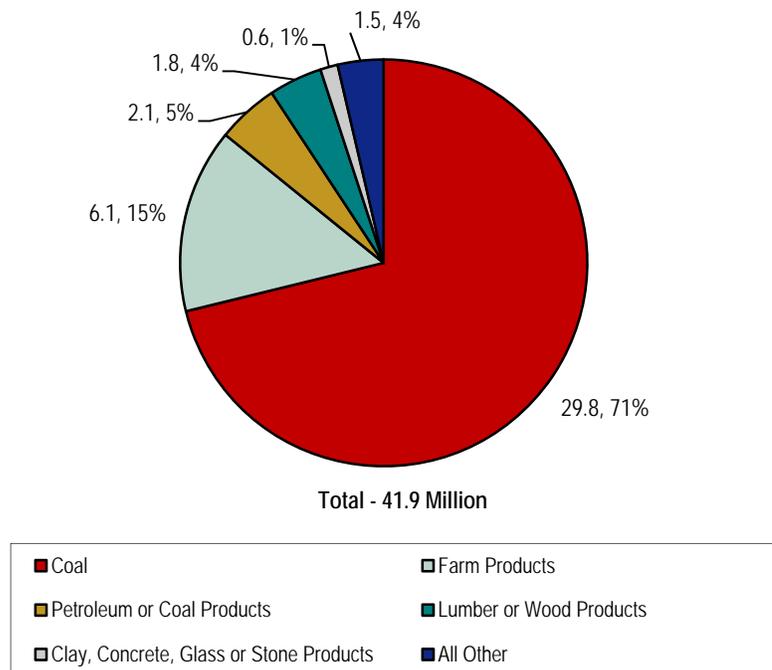


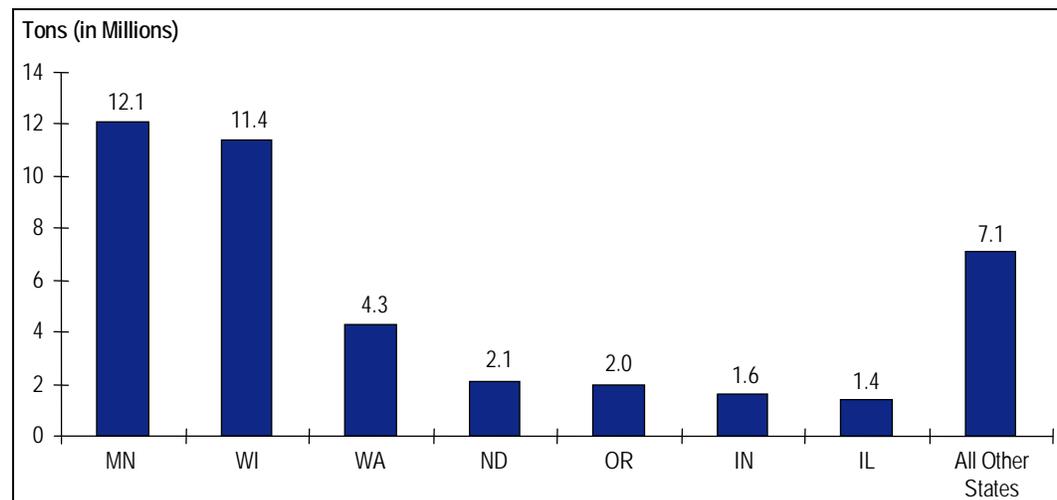
Figure 2.11 Top Originating Commodities by Tonnage  
Millions of Tons



The two following figures consider the main destination states of rail freight originating in Montana, by weight (Figure 2.12) and by revenue (Figure 2.13). The majority (56 percent) of rail freight originating in Montana, by weight, is bound for either Minnesota (29 percent, or 12.1 million tons) or Wisconsin (27 percent, or 11.4 million tons). Washington is the terminus for 10 percent (4.3 million tons), and the remaining 34 percent is spread across North Dakota, Oregon, Indiana, Illinois, Texas, and others. By revenue, Minnesota receives the highest percentage (19 percent, or \$154 million), followed by Washington (14 percent, or \$108 million), Wisconsin (13 percent, or \$102 million), and Oregon (8 percent, or \$62 million).

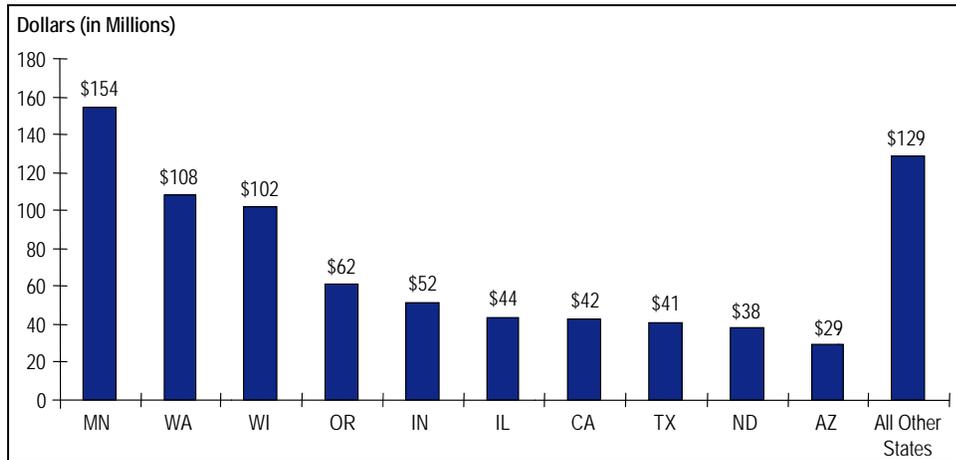
Many of these shipments are destined for export markets throughout the world. For instance, grain shipments are often transshipped at ports on the West Coast or Great Lakes for further distribution to Montana’s foreign trading partners. In addition, Montana conducts significant cross-border trade with Canada, which is the State’s number one foreign trading partner. According to *Export Montana*, the top five export markets for Montana products in 2007 were: 1) Canada (\$584.7 million); 2) Japan (\$101.7 million); Germany (\$58.9 million); Taiwan (\$52.5 million); and China (\$43.6 million).<sup>21</sup>

Figure 2.12 Total Tonnage by Destination State



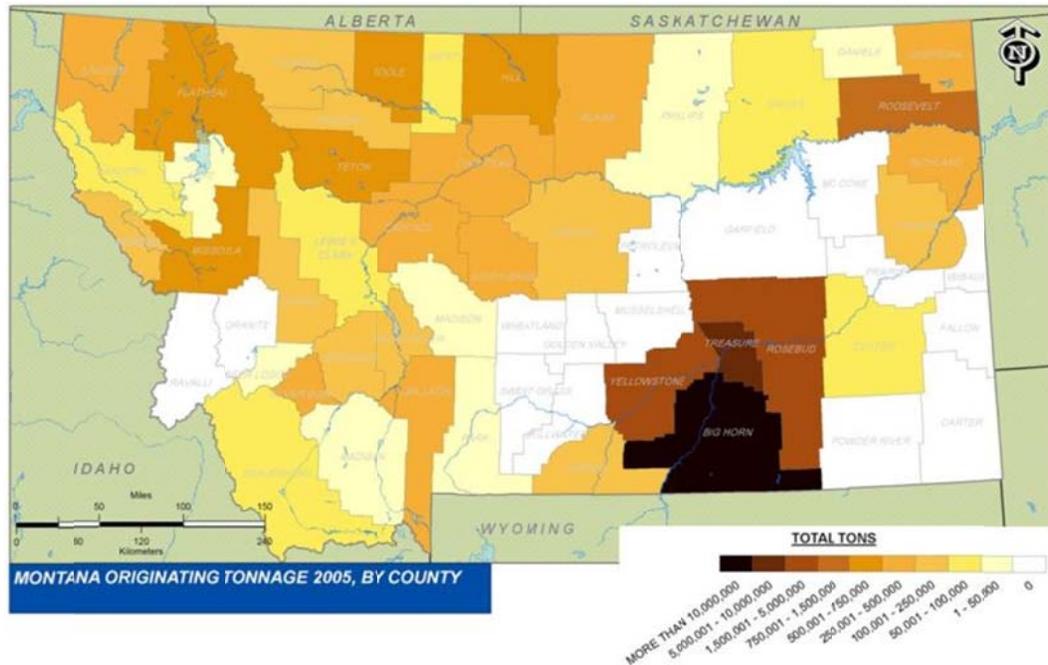
<sup>21</sup><http://www.exportmontana.com/Exstats.asp>.

Figure 2.17 Total Revenue by Destination State



At the county level, a substantial amount of tonnage originates from a select group of the coal-producing counties. As shown in Figure 2.14, Big Horn and Treasure generate the most tonnage, followed by Yellowstone and Rosebud counties. The remainder of the tonnage primarily comes from counties in the north-central and northwest quadrant of the State – Missoula, Flathead, Teton, and surrounding counties – which ship other products, including grains and forest products.

Figure 2.14 Originating Tonnage by County



### Rail Freight Terminating in Montana

As noted earlier, terminating trips are a relatively minor percentage of overall rail freight trips in the State compared to through-bound or originated traffic. Rail freight terminated in Montana is more diverse by commodity types. Figure 2.15 exhibits, by revenue, the top 10 commodities imported to the State by rail. Transportation equipment, lumber or wood products, chemicals or allied products, petroleum or coal products, and coal combine to represent about two-thirds of the total (\$59.5 million) in this category. Figure 2.16 shows the top 10 commodities terminating in the State by tonnage. Coal, lumber products, chemicals, and petroleum are the top 4 commodities.

The majority of freight originating in other states/provinces and terminating in Montana by tonnage (Figure 2.17) is from: Wyoming (31 percent); Alberta (13 percent); British Columbia (7 percent); and Washington (7 percent). By revenue (Figure 2.18), Illinois is largest, at 21 percent, followed by Alberta (13 percent), Wyoming (10 percent), and British Columbia (7 percent).

Figure 2.15 Top Terminating Commodities by Revenue

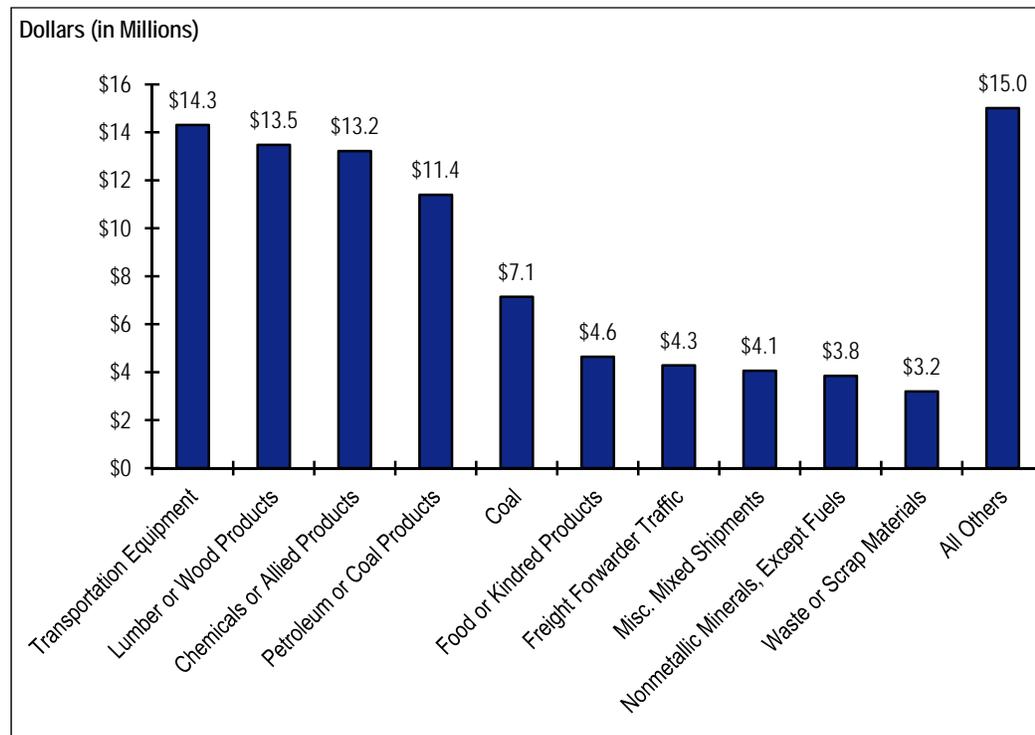


Figure 2.16 Top Terminating Commodities by Tonnage

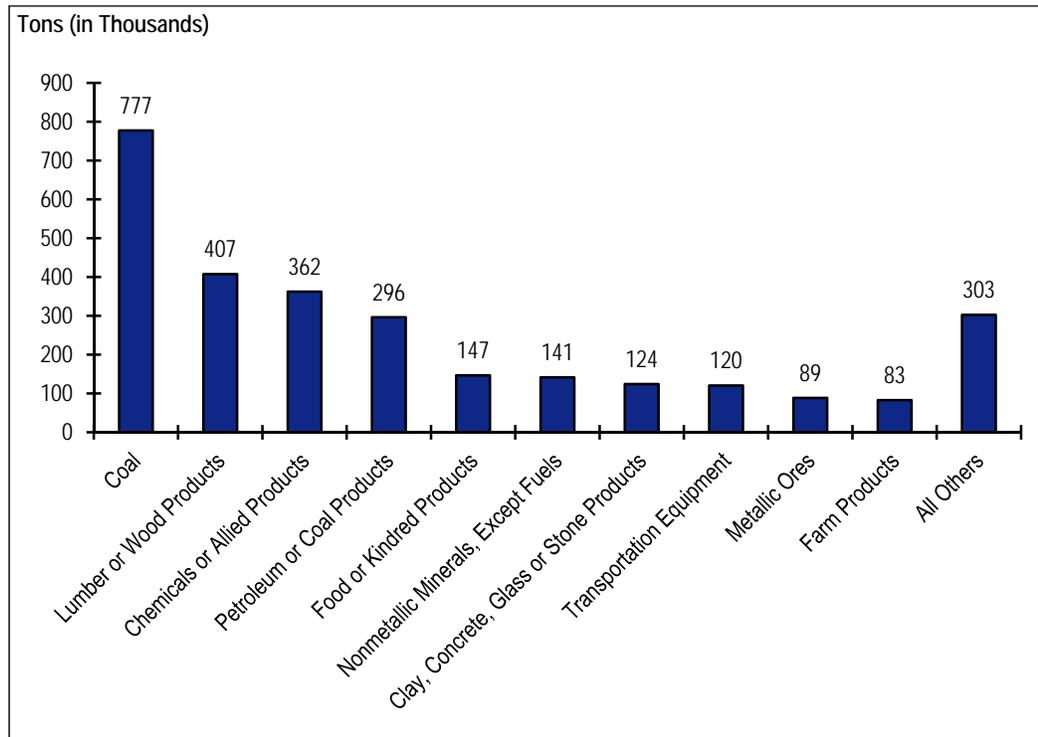


Figure 2.17 Total Tonnage by Origin State

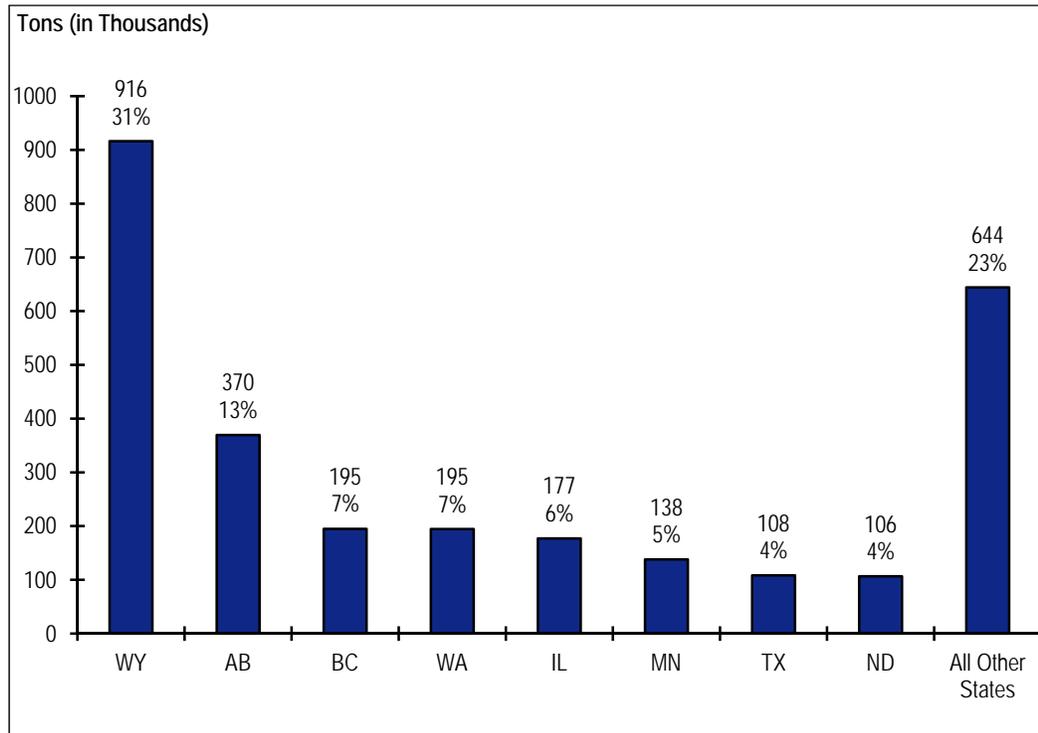


Figure 2.18 Total Revenue by Origin State

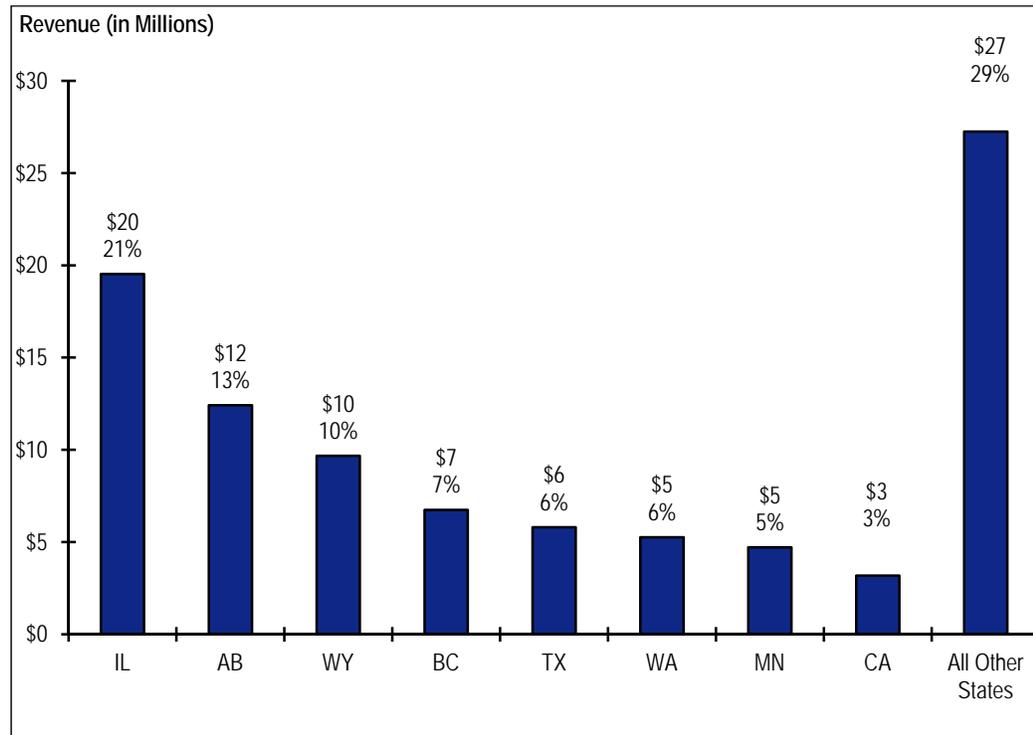
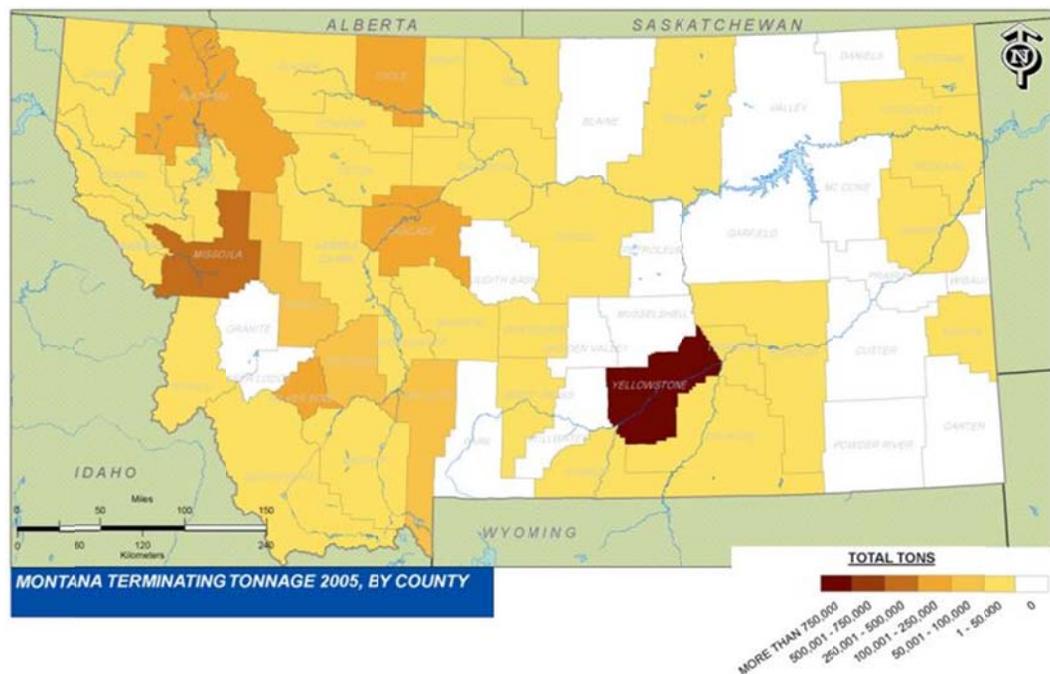


Figure 2.19 shows rail freight terminating in Montana at the county level. Yellowstone County is the single largest destination for rail freight tonnage. The area has large-scale refineries, major manufacturing operations, and the city (Billings) is an expansive trade and distribution center for eastern Montana, Wyoming, and the western Dakotas. The next level shown on the map (500,000 to 750,000 tons delivered) includes only Missoula County, the State’s second largest economic center. The next highest category includes Lake, Cascade, Silver Bow, and Hill counties. In all, the pattern suggests distribution and processing centers as locations of relatively concentrated rail freight destination.

Figure 2.19 Terminating Tonnage by County



### Montana Rail Freight Through Trips

As stated earlier, the Waybill Sample data show that through trips dominate rail freight traffic in Montana by both tonnage and revenue. The following figures highlight top through-bound commodities. The largest by revenue (Figure 2.20) are two product categories: miscellaneous mixed shipments, which is mostly intermodal traffic (\$674 million); and farm products, including grain (\$659 million). Of the remaining commodities, lumber/wood products represent approximately \$250 million, and transportation equipment, food/kindred products, containers, hazardous materials, and pulp/paper/allied products each fall into the \$100 to \$200 million range.

By tonnage (Figure 2.21), farm products generates the most through trips, more than 21 million tons. Miscellaneous mixed shipments are a distant second, at 10.5 million tons, followed by lumber or wood products, food and kindred products, and coal. With anticipated new coal development in Montana (and Wyoming) more coal traffic can be expected on Montana rail lines.

Figure 2.20 Through Trip Commodities by Revenue

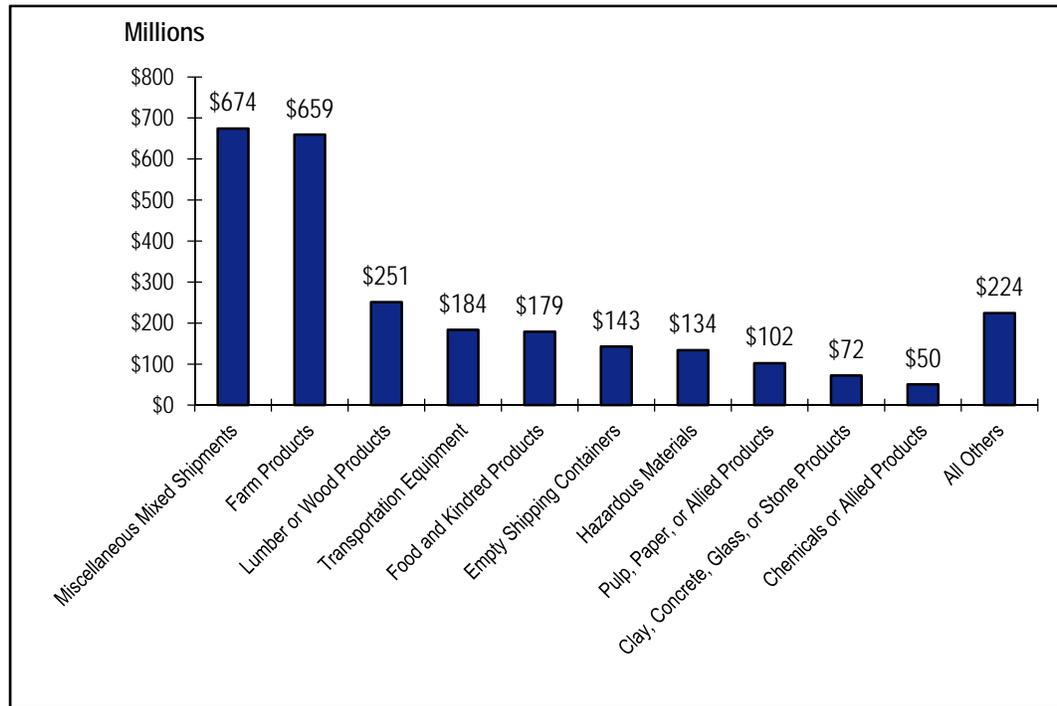
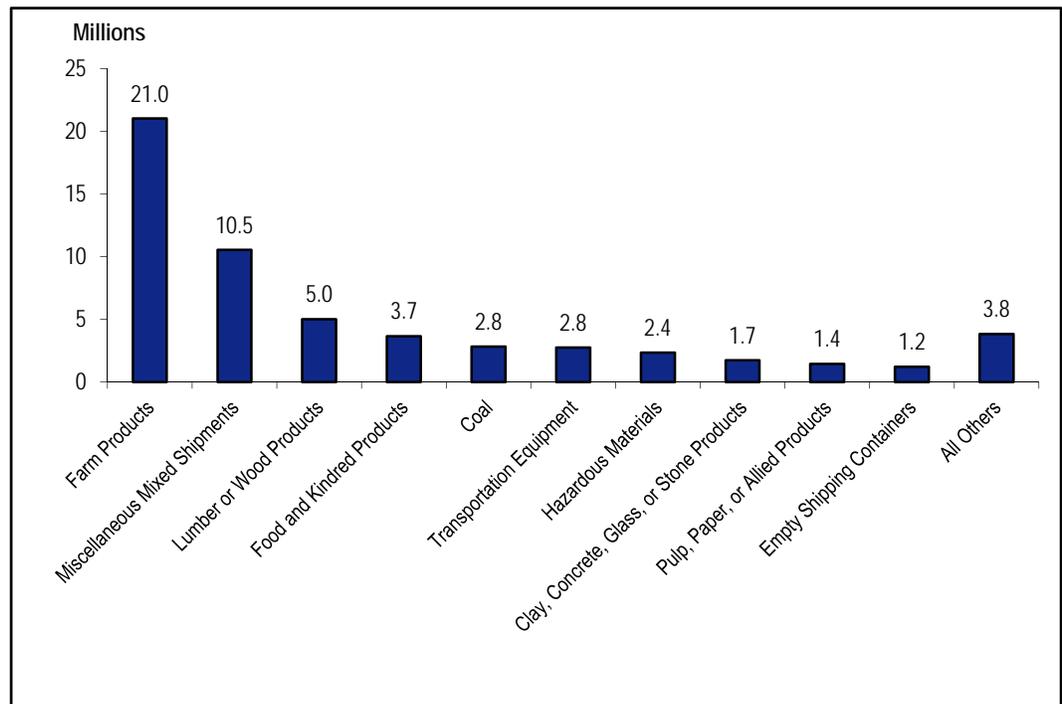


Figure 2.21 Through Trip Commodities by Tonnage

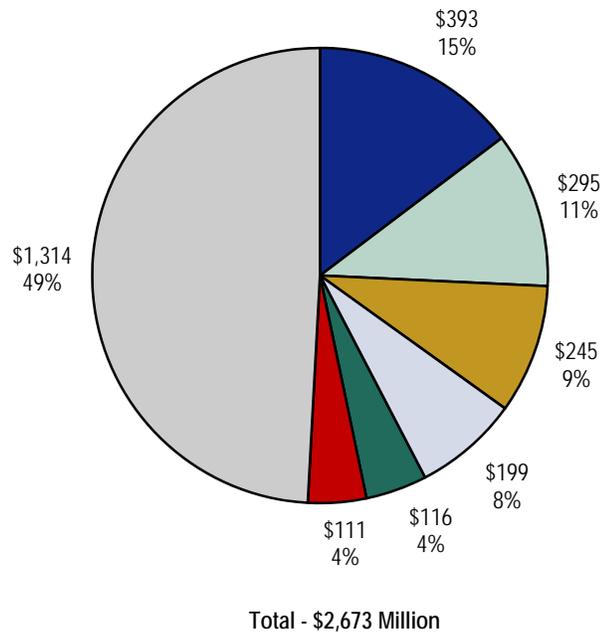


The following figures show the states in terms of most-often reported origins and destinations for rail traffic through Montana. Most of the traffic is between the upper Midwest and the Pacific port states, and most of it is westbound.

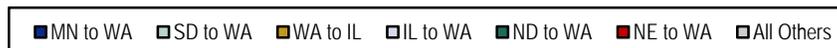
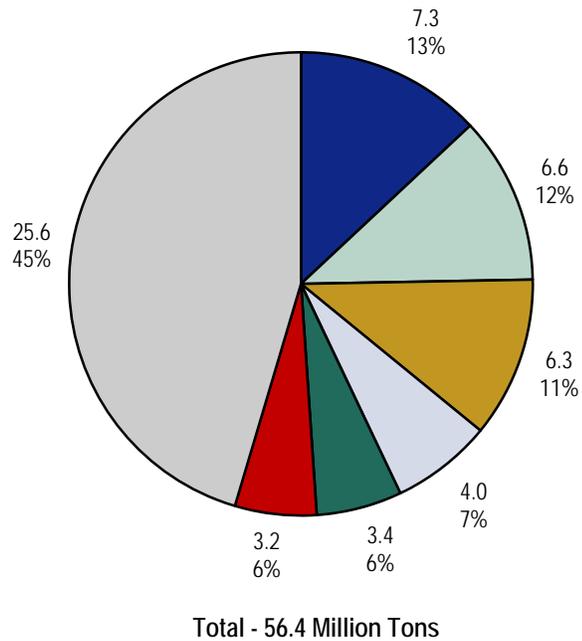
By revenue (Figure 2.22), Washington to Illinois and Illinois to Washington account for more than 26 percent of total through trips, suggesting the significant role of intermodal facilities in the Chicago area. Other significant state-to-state combinations include: Minnesota to Washington (9 percent), South Dakota to Washington (7 percent), Illinois to Oregon (4 percent), and North Dakota to Washington (4 percent). The remaining origin-destination pairs combined are about 50 percent of total through-bound freight by revenue. The majority of these are movements between the West Coast states (Washington, Oregon, and California) and various Midwest states (such as Nebraska, Iowa, and Minnesota). There are also significant movements between these West Coast states and several Rocky Mountain states like Colorado and Wyoming, and between various states and Canada.

Tonnage of through trips, shown in Figure 2.23, reflects the role of bulk commodities. Linkages between Illinois and Washington total only 18 percent by weight (versus 26 percent by value). Largest linkages by weight are Minnesota to Washington (13 percent) and South Dakota to Washington (12 percent), followed by the eastbound link, Washington to Illinois (11 percent), then Illinois to Washington (7 percent). Shipments from Nebraska and North Dakota to Washington are 6 percent each. Nearly half (45 percent) of remaining trip combinations are dispersed in smaller tonnages between other origins and destinations. As with revenue, most of these remaining through shipments are made up of movements between the West Coast and Midwest/Rocky Mountains, and between U.S. states and several Canadian provinces.

**Figure 2.22 Through Trip Revenue by Route**  
*Millions of Dollars*



**Figure 2.23 Through Trip Tonnage by Route**  
*Millions of Tons*



## 2.4 POPULATION ISSUES INFLUENCING RAIL TRANSPORTATION

Montana ships bulk commodities out of the State by rail, and transports freight through the State by rail. Through shipments include high-value interurban shipments and bulk commodity shipments originating elsewhere. Most higher-value (i.e., finished) goods produced and consumed in the State rely on truck traffic. Overall population and economic projections suggest that this will probably remain the pattern of transportation through the planning horizon.

Montana has a small population (44<sup>th</sup> smallest by Census 2008 estimates) and large land mass (4<sup>th</sup> largest).<sup>22</sup> In 2007, the United States had 85 people per square mile, on average, while Montana's average was 6.6. The State's situation between more populous areas shapes transportation services within the State.

County-level population projections for Montana suggest that, at the state level, population growth rates will keep pace with other states, but that Montana is expected to remain in the bottom 20 percent of state populations through 2030.<sup>23</sup>

The map in Figure 2.24 shows projected population growth of Montana counties between 2005 and 2030. Several counties in western Montana are expected to grow, in some cases by more than 60 percent. Population growth in Flathead, Ravalli, Jefferson, Gallatin, Lake, Lewis and Clark, and Broadwater counties is expected to exceed 50 percent in the 25-year period. The counties that comprise the larger population centers in Montana – such as Yellowstone, Missoula, Cascade, Gallatin, Flathead, and Lewis and Clark counties – will absorb the bulk of these population gains. Meanwhile, counties located adjacent to larger urban areas (such as Ravalli County, near Missoula) will also experience significant growth.

Both consumption and production of goods may be expected to increase roughly proportionally with these population increases. However, since the State's share of total U.S. population will remain roughly the same, growth in some parts of the State appears unlikely to change the overall balance of freight shipment by rail, truck, intermodal service to and from the State. However, freight volumes will increase to serve these growing populations.

Census County Business Patterns 2006 data for the State is shown in Table 2.9. Industries that are relatively reliant on freight transportation are shown here. These industries include agriculture/forestry, mining, utilities, construction, manufacturing, wholesale trade, retail trade, and transportation and warehousing. These seven sectors total about 15,890 establishments (43 percent of the state total) and nearly 140,000 employees (41 percent of the total).

<sup>22</sup>U.S. Census Bureau. National and State Population Estimates. Available at: <http://www.census.gov/popest/states/NST-ann-est.html>.

<sup>23</sup>Census and Economic Information Center, Montana Department of Commerce, analysis by NCS Data Services, 2007.

Figure 2.24 Projected Population Change 2005-2030  
By County

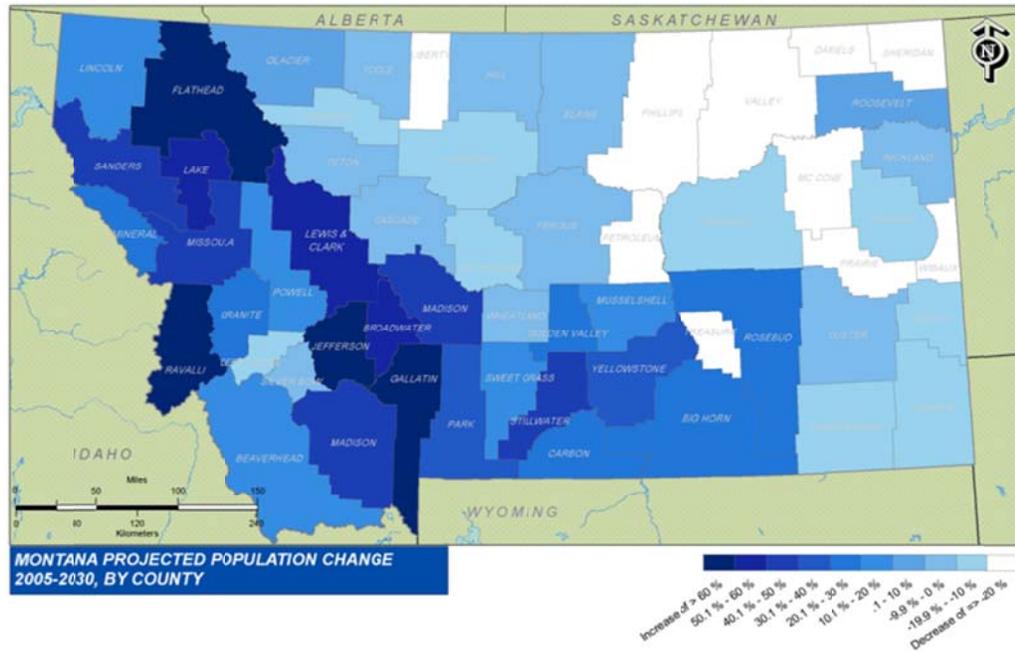


Table 2.9 Montana Industry Information by Industry Classification  
2006

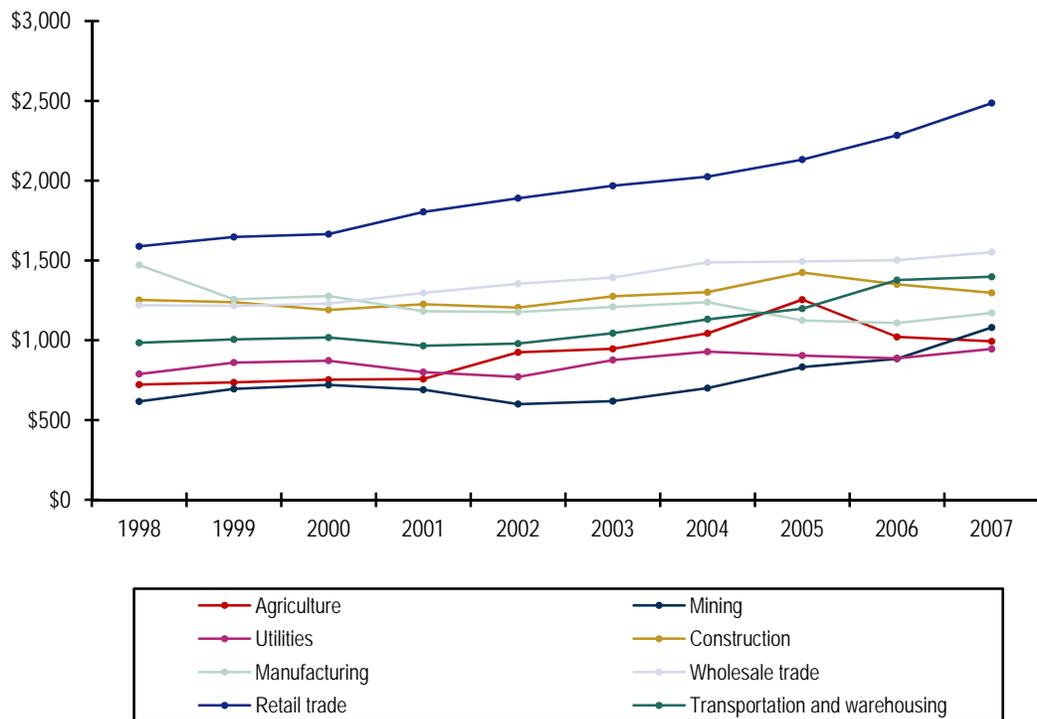
| Industry  | Establishments | Employees | Annual Payroll (Millions) |
|---|----------------|-----------|---------------------------|
| Forestry, Fishing, Hunting, and Agriculture Support | 399            | 1,580     | \$56.1                    |
| Mining  | 310            | 5,863     | \$393.3                   |
| Utilities   | 217            | 2,744     | \$177.1                   |
| Construction  | 5,769          | 26,879    | \$1,039.6                 |
| Manufacturing                                       | 1,274          | 19,878    | \$763.5                   |
| Wholesale Trade                                     | 1,480          | 14,643    | \$568.7                   |
| Retail Trade  | 5,192          | 57,949    | \$1,261.3                 |
| Transportation and Warehousing                      | 1,249          | 10,339    | \$327.6                   |
| All Other   | 20,759         | 202,651   | \$5,251.4                 |
| Total Transportation Reliant                        | 15,890         | 139,875   | \$4,587.2                 |
| Total Montana                                       | 36,649         | 342,526   | \$9,838.6                 |
| Percent Transportation Reliant                      | 43%            | 41%       | 47%                       |

Source: U.S. Census Bureau, 2006 County Business Patterns.

Not only do these industries account for a significant share of Montana employment, they also contribute a large share of the State's economic output. Figure 2.25

shows the growth in Gross State Product (GSP) for transportation reliant industries in Montana. Over the past 10 years, there has been significant output expansion in these key industries. Growth has been especially pronounced in agriculture, retail and wholesale trade, mining, utilities, and transportation and warehousing. Output growth in these freight transportation-dependent industries leads directly to increasing freight volumes by all modes, including rail.

**Figure 2.25 Montana Gross State Product by Industry**  
*1998 to 2007 (Millions of Chained 2000 Dollars)*



Source: U.S. Bureau of Economic Analysis Regional Economic Accounts.

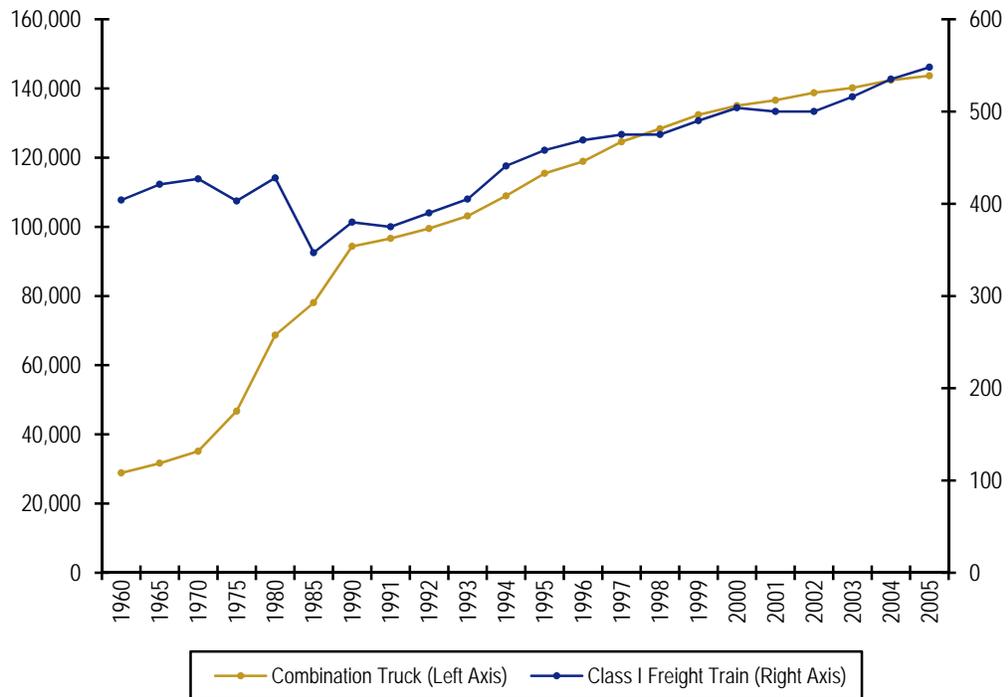
## 2.5 DEMAND FOR RAIL SERVICE

As consumer demand for goods has increased over the past several decades, freight service demand has grown along with it. Figure 2.26 plots combination truck vehicle miles and Class I train miles from 1960 through 2005.<sup>24</sup> The graph shows parallel growth of the modes after about 1990. Prior to that, combination

<sup>24</sup>U.S. Bureau of Transportation Statistic, National Transportation Statistics 2008. Available at: [http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/). A train-mile is the movement of a train, which can consist of multiple vehicles (cars), the distance of one mile.

truck vehicle miles increased rapidly, gaining market against rail as the nation’s highway system (particularly the Interstate system) developed. Rail has grown from slightly over 400 million train-miles in 1960 to about 550 million train-miles in 2005.

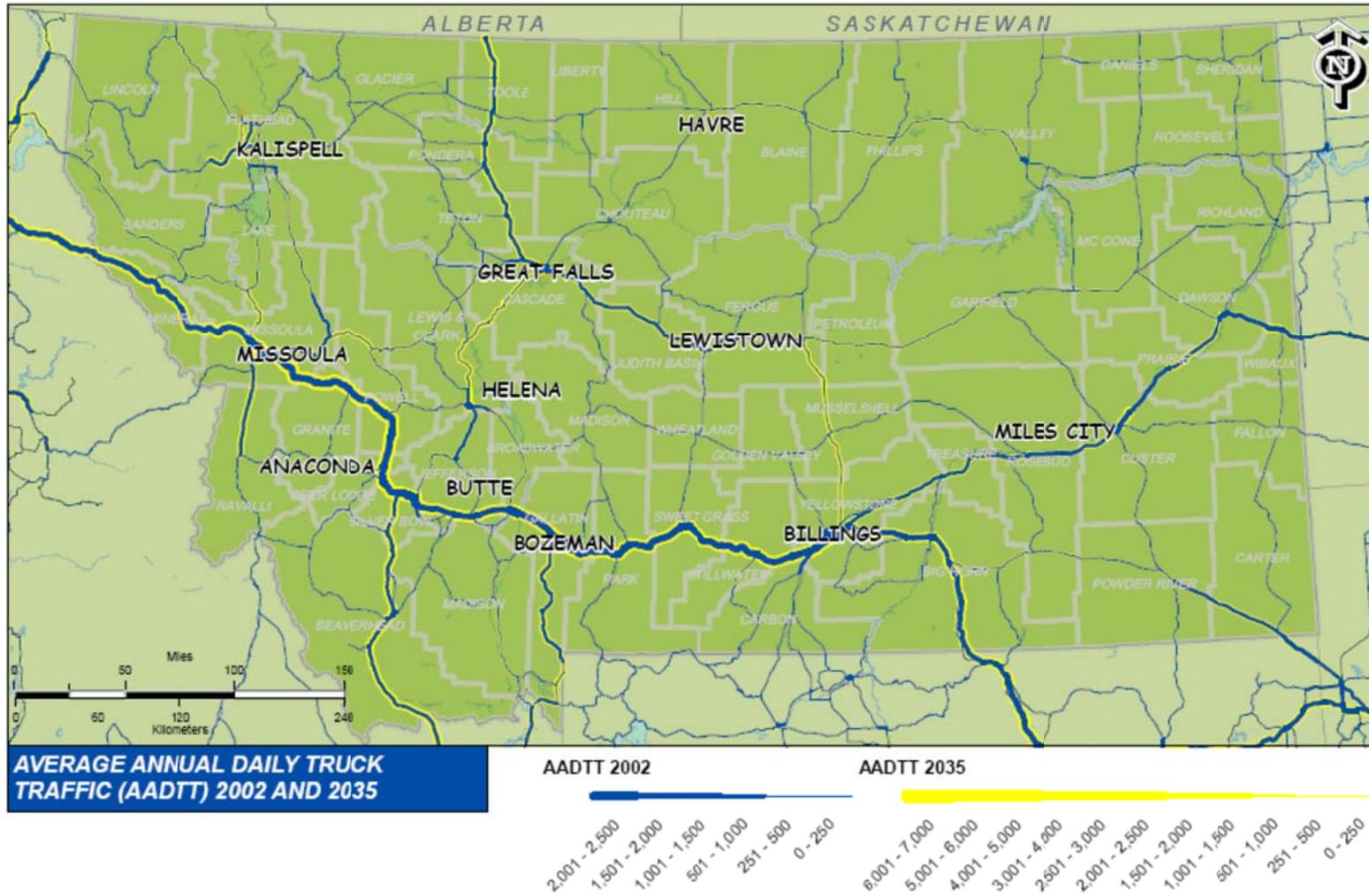
Figure 2.26 U.S. Combination Truck Vehicle-Miles and Train-Miles



Current national recessionary conditions have affected both truck and train volumes. Total vehicle-miles traveled (VMT) declined by 3.6 percent in 2008, according to FHWA Traffic Volume Trends data. The American Association of Railroads reports a comparable downturn in rail traffic.

Much of the State’s railway system parallels primary and secondary roadways that are expected to see growing truck volumes over coming decades. Figure 2.27 shows 2002 and 2035 projected Average Annual Daily Truck Traffic (AADTT) in Montana based on the FAF2 database. The map illustrates projected increases in truck traffic along the main highway corridors, growing from the 2,000 range to the 5,000 to 7,000 range west of Billings with modest increases on sections of I-15. Modest increases are also expected on some non-Interstate routes around the State, such as between Lewistown and Great Falls, and in western and southeastern Montana.

Figure 2.27 Average Annual Daily Truck Traffic (AADTT)  
2002 and 2035



Source: FHWA Freight Analysis Framework 2.2.

Table 2.10 displays 2005 to 2007 statistics for all U.S. Class I railroads, which include: BNSF Railway, Union Pacific (UP), Kansas City Southern, Canadian Pacific, Canadian National, and CSX Transportation.<sup>25</sup> In recent years, railroads have continued to reinvest in infrastructure and streamline operations in efforts to meet expanding demand for service. The table shows that in the most recent three years, Class I carriers have increased incomes, revenues, and profitability. Overall, the railroads reported a 26 percent increase in return on average equity. Volumes rose as well, with tons per train increasing by 5.1 percent and total ton-miles 4.4 percent from 1.696 trillion to 1.771 trillion in the three-year period.

**Table 2.10 U.S. Class I Railroad Statistics**

|                                | 2005   | 2006   | 2007   | Percent Change<br>2005-2007 |
|--------------------------------|--------|--------|--------|-----------------------------|
| <i>Traffic</i>                 |        |        |        |                             |
| Carloads Originated (Million)  | 31.14  | 32.11  | 31.46  | 1.0%                        |
| Intermodal Units (Million)     |        |        |        |                             |
| Containers                     | 8.71   | 9.40   | 9.43   | 8.3%                        |
| Trailers                       | 2.98   | 2.88   | 2.60   | -12.8%                      |
| Total                          | 11.69  | 12.28  | 12.03  | 2.9%                        |
| Tons Originated (Billion)      | 1.899  | 1.96   | 1.94   | 2.2%                        |
| Ton-Miles (Trillion)           | 1.696  | 1.772  | 1.771  | 4.4%                        |
| <i>Operating Statistics</i>    |        |        |        |                             |
| Freight Revenue Per Ton-Mile   | 2.621¢ | 2.840¢ | 2.990¢ | 14.1%                       |
| Average Tons Per Carload       | 61.0   | 60.9   | 61.7   | 1.1%                        |
| Average Tons Per Train         | 3,115  | 3,163  | 3,274  | 5.1%                        |
| Average Length of Haul (Miles) | 893.2  | 905.6  | 912.8  | 2.2%                        |
| <i>Financial</i>               |        |        |        |                             |
| Freight Revenue (Billion)      | \$44.5 | \$50.3 | \$52.9 | 18.9%                       |
| Operating Revenue (Billion)    | \$46.1 | \$52.2 | \$54.6 | 18.4%                       |
| Operating Expense (Billion)    | \$37.8 | \$41.0 | \$42.7 | 13.0%                       |
| Net Income (Billion)           | \$4.9  | \$6.5  | \$6.8  | 38.8%                       |
| Operating Ratio                | 82.1%  | 78.6%  | 78.3%  | -4.6%                       |
| Return on Average Equity       | 9.12%  | 11.30% | 11.49% | 26.0%                       |

Source: AAR, Class I Railroad Statistics, July 17, 2008. Available at: <http://www.aar.org/~media/AAR/Industry%20Info/Statistics.ashx>.

<sup>25</sup> Association of American Railroads.

## 2.6 CONCLUSIONS

Demand for rail service has been growing in recent years both nationwide and in Montana. Although the current economic environment has led to significant idle capacity issues for the railroads, volumes are likely to pick up again once the economy improves. Increasing agricultural output from Montana farms will likely contribute to this volume growth, as will through-trains (including intermodal containers). At the same time, output growth from Montana's key transportation-dependent industries will increase freight demand for all modes, including rail. Many of these industries – such as mining and agriculture – produce basic bulk commodities which are especially dependent on efficient rail transportation. Expected new development in coal mining activity in both Montana and Wyoming will lead to additional rail traffic in Montana.

Forecast population growth (greater than 60 percent from 2005 to 2030 in some counties) will increase the size of local consuming markets in Montana, further increasing the demand for freight transportation. Through-rail freight – which is the largest component of rail movements in Montana by both weight and value – will also expand as population, production, and distribution centers on the West Coast and Midwest grow. Overall, these trends point to long-term growth in demand for freight rail service in Montana.