Status Report

Washington State Department of Transportation

December 2024

Lower Snake River Dams
TRANSPORTATION STUDY

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Acronyms and Abbreviations

BNSF	Burlington Northern Santa Fe
CAC	Community Advisory Committee
CBRC	Columbia Basin Railroad Company, Inc.
CEP	Community Engagement Plan
CWA	Central Washington Railroad Company
CWW	Columbia Walla Walla Railroad
EWG	Eastern Washington Gateway Railroad
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
GRNW	Great Northwest Railroad
HPMS	Highway Performance Monitoring System
KET	Kennewick Terminal Railroad
PCC	Palouse River and Coulee City
PVJR	Portland Vancouver Junction Railroad
RS	Royal Slope Line
RTPO	Regional Transportation Planning Organization
TCRY	Tri-City Railroad Company
TLC	Total Logistics Cost
UPRR	Union Pacific Railroad
USDA	United States Department of Agriculture
USACE	US Army Corps of Engineers
UAN	Urea Ammonium Nitrate
WIR	Washington and Idaho Railroad, Inc.

WSDOT	Washington State Department of Transportation
YCR	Yakima Central Railway

I. Introduction

Study Background

The Lower Snake River from Clarkston to Pasco contains four multipurpose hydropower projects (Lower Granite, Little Goose, Lower Monument, and Ice Harbor). These projects consist of dams, operational facilities and a system of locks which provide a navigable waterway inland to Lewiston, Idaho. Previous studies have investigated issue related to the ongoing and future operation of these projects as a whole, to include a scenario where the dam's embankments are removed. Generally previous studies were conducted at a larger scale and did not analyze in detail the necessary improvements and changes to road and rail infrastructure required to maintain commerce in the event Congress authorizes the breaching of the dams.

In a 2023 budget proviso, the Washington State Legislature directed the Washington State Department of Transportation (WSDOT) to conduct the Lower Snake River Dams Transportation Study to analyze the highway, road, and freight rail transportation needs, options, and impacts from shifting the movement of freight and goods away from barge to other modes. The study will consider the associated material handling and storage needs, such as transload terminals and grain storage facilities, to enable the movement of goods. During the course of this study, the WSDOT will remain neutral on the subject of the dams and will focus on the transportation related topics as the Legislature has directed.

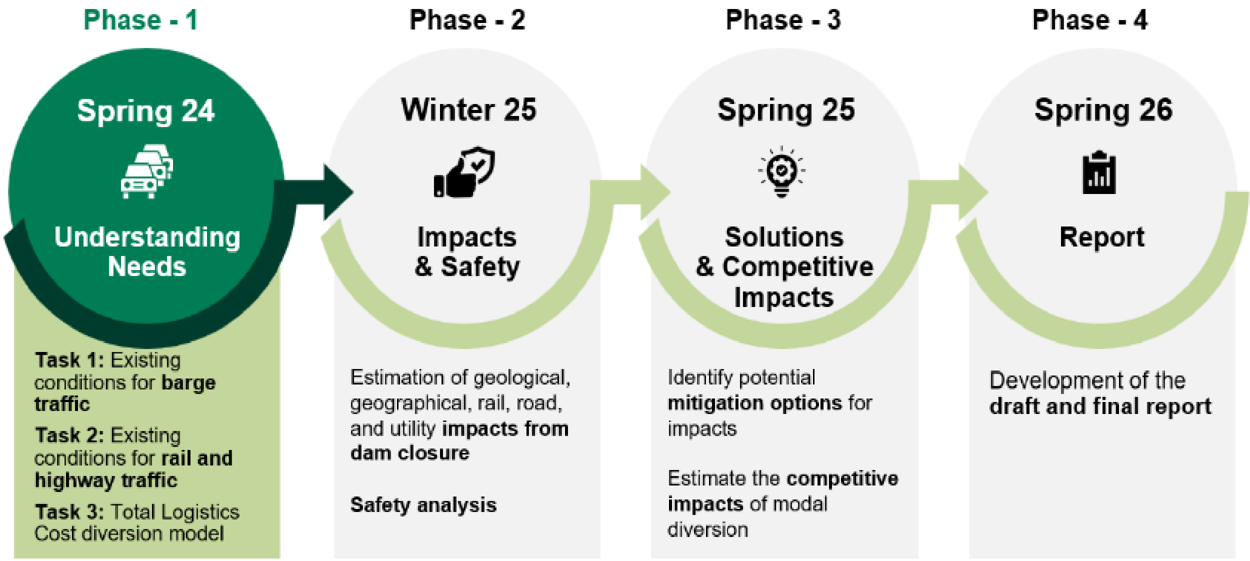
A portion of the analysis will be undertaken in partnership between the State of Washington and the U.S. Army Corps of Engineers (USACE). Contributions from the USACE will primarily entail extending the analysis conducted by the State of Washington to adjacent jurisdictions in Oregon and Idaho. Those contributions will be incorporated into this study as they are completed.

Study Phases

The Lower Snake River Dams Transportation Study is a four-phase study (Figure 1) that continues until December 2026. This Status Report describes information, data, and perspectives based on where the study is as of November 2024 while we conduct Phase 1 of the study. **As we receive feedback on this report and continue with additional outreach and analysis, there is the possibility that some data or information in this report will be updated or adjusted.**

Subsequent work will conduct an analysis of highway, road, and freight rail transportation and infrastructure needs, options and impacts from shifting freight that currently moves by barge through the lower Snake River dams to highways, local roads, and rail. The study will generate volume estimates and evaluate alternative future scenarios to determine a range of potential changes in infrastructure and operations along with a consideration of improvement projects that can mitigate the impacts of additional volumes.

Figure 1. Study Phases



II. Objective of Status Report

This work includes describing existing conditions for barge, rail, and truck activity in the Lower Snake River area, as well as work to date on developing the modal diversion model that will ultimately estimate the amount of traffic that shifts between freight modes under different future scenarios.

Additionally, there has been extensive engagement with stakeholders aimed at:

- Providing information on the status of the study and the steps to be used throughout implementation of the study.
- Gaining input on existing conditions for barge, rail, and truck activity from the perspective of interested parties.
- Receiving information on specific data inputs to incorporate into the modal diversion model.

III. Existing Conditions for Barge Traffic and Major Commodities

This chapter describes inland waterway infrastructure along the Lower Snake River, commodities moved by barge traffic on the river, supporting facilities for these commodities, and historical along with seasonal flows for the top commodities.

Inland Waterway Infrastructure

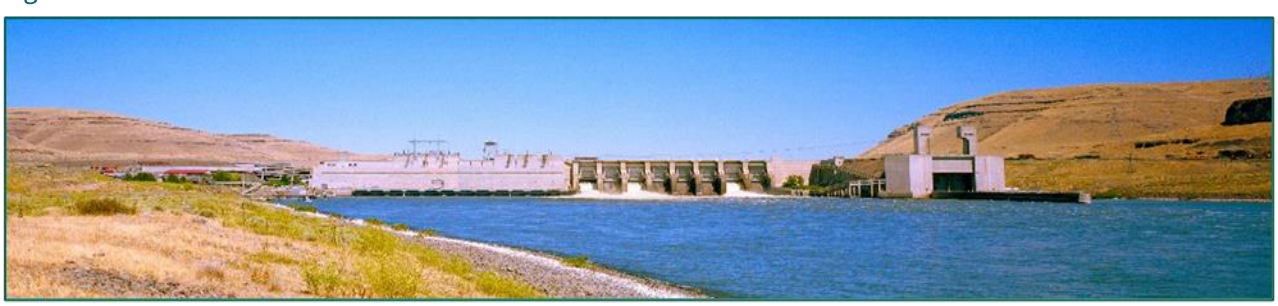
DESCRIPTION OF LOWER SNAKE RIVER DAMS

The Snake River originates in Wyoming, and travels across southern Idaho before turning north along the Idaho-Oregon border. The river then enters Washington and flows west to the Columbia River. The Snake River is the largest tributary to the Columbia River. The Lower Snake River includes the portion of the Snake River between Lewiston and the Columbia River.

Figure 2. Map of Lower Snake River Dams

In the 1960s and early 1970s, the federal government built four large locks and dams on the Lower Snake River: Ice Harbor, Lower Monumental, Little Goose, and Lower Granite (Figure 2 and Figure 3). The U.S. Army Corps of Engineers owns and operates the dams, all of which are multiple-use facilities that provide navigation for barge traffic, hydropower used as part of local energy transmission, recreation, and fish and wildlife conservation benefits[1]. These four locks and dams allow for barge transportation by raising and lowering barges between different pools along the river.

Figure 3. Lower Monumental Dam



[1] U.S. Army Corps of Engineers, Walla Walla District (USACE). n.d. Lower Snake River Dam. https://www.nww.usace.army.mil/missions/lower-snake-river-dams/. Accessed December 2024.

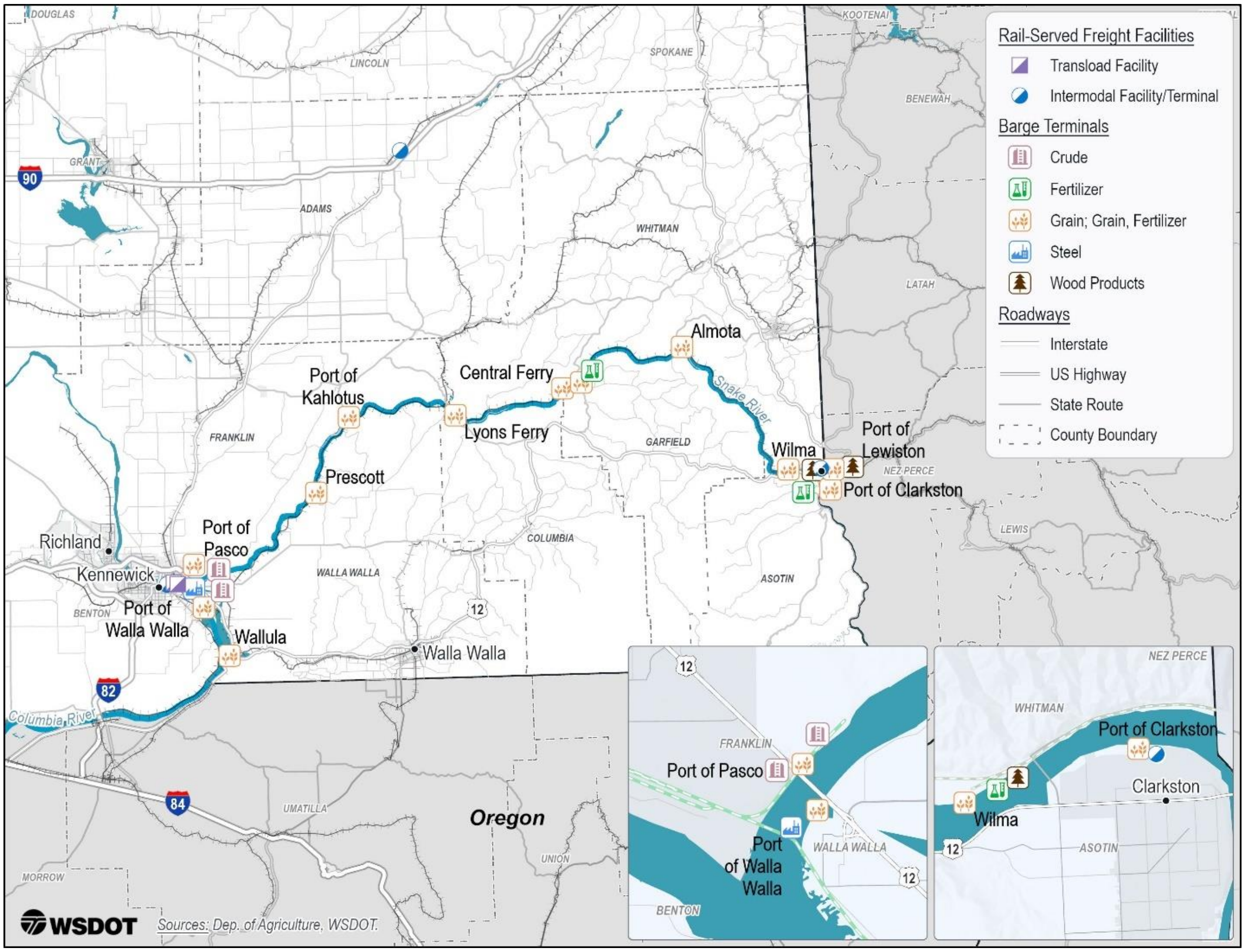
Source: iStock

BARGE PORTS AND TERMINALS

Barge facilities and docks located at the river's edge allow barges to stop for loading and unloading in different river pools. These facilities are located along the entire river, but there are clusters in the area of the Tri-Cities and the Lewiston and Clarkston area, as shown in Figure 4.

Although often part of a public port authority, many of the individual facilities and docks located within a port are owned and operated by farming cooperatives (coops) or private companies. Most barge facilities along the river primarily ship single commodities, in particular grain, but also accommodate smaller volumes of other traffic, including fertilizer, wood, steel, sand/gravel, odd dimension goods, and cruise ships.

Figure 4. Barge Terminals along the Lower Snake River in Washington State



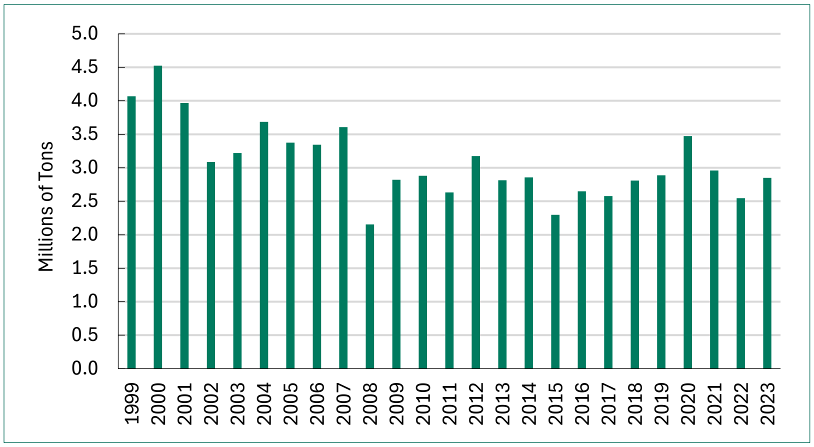
CONNECTING RAIL AND HIGHWAY INFRASTRUCTURE

The barge port and terminal system is supported by rail and highway infrastructure to connect ports to inland locations. Chapter IV of this report describes the supporting rail infrastructure, while Chapter V describes the supporting highway infrastructure.

Barge Flows and Commodities

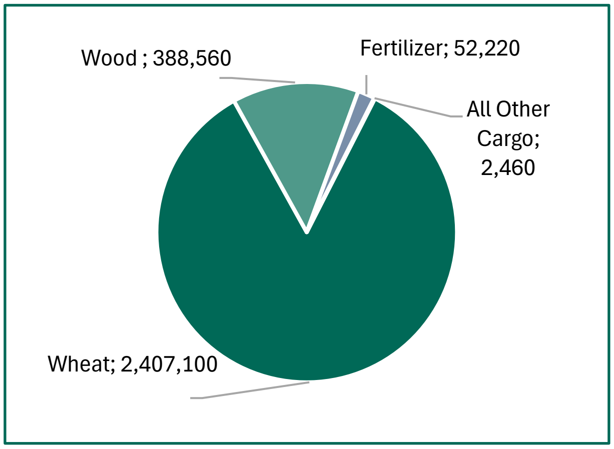
Tonnage of barge cargo traveling into and out of the portion of the Snake River controlled by locks and dams has generally declined over the last 20 years. Figure 5 illustrates this trend in cargo tonnage passing through the Ice Harbor Dam, which is the dam located furthest downstream on the Lower Snake system, and the gateway into and out of the dam-controlled sections of the Lower Snake River. In the past twenty years, the river system experienced its highest tonnage in 2004. After 2004, volumes gradually decreased, although small increases can be observed on a year-to-year basis as agricultural production varies over time. Since 2018, the change in tonnage has relatively steadied, remaining around 2.5 to 3.0 million tons per year.

Figure 5. Snake River Tonnage at Ice Harbor Dam by Year, 1999 to 2023



Although the Snake River transports a variety of goods year-round, some commodities play a more significant role in the annual trends in tonnage and direction of goods flow. The commodities profiled here are considered "primary commodities" due to the share of total Snake River goods volume they make up and the large role they play in the regional economy and freight flow. With 3.4 million tons of goods moving through the Ice Harbor Dam in 2023, 85 percent of that volume was food and agricultural products, specifically wheat. The variability in tonnage moving on the river can be the result of various factors, including weather, global economic conditions, and process or technological improvements in agriculture.

Figure 6. Share of Snake River Commodities by Tonnage Moving through Ice Harbor Dam, 2023



Source: Consultant team analysis of USACE LPMS, Lock Commodity Report, 2024.
Note: Crude materials primarily consists of wood products

The region named as the "Snake River region" in these profiles refers to the seven-county area in Washington surrounding or touching the Lower Snake River that utilize the river to some extent. Seven Washington counties that are heavily reliant on the Snake River are:

- Adams
- Asotin

- Columbia
- Franklin
- Garfield
- Walla Walla, and
- Whitman

There are major grain producing counties in central Idaho and northeast Oregon. The grain from these counties that moves along the Snake River is included in the modal diversion model, as discussed in Chapter VII. The grain from central Idaho and northeast Oregon is also in the data that is developed from the USACE lock commodity reports. Figure 7 reflects the makeup of commodity movements supported by the lock and dam system on the Lower Snake River, as represented by commodity flows through the Ice Harbor Dam.

It is important to note that there are terminals on the Lower Snake River downstream of the Ice Harbor Dam whose port facilities will be directly affected by the closure of dams on the Lower Snake River. These downstream terminals are located in the Pasco and Burbank area, and primarily handle petroleum, wheat, fertilizer and metal products. The USACE has indicated these terminals would remain open, but expects that there would be increased operational costs due to increased dredging. As such, the volume of commodities moved through these terminals is not expected to change significantly and the commodities of concern for this report are the three major commodity groups moving into the dam-controlled sections of the river: grain, fertilizer and wood products. These three commodities make up over 95% of all tonnage handled above Ice Harbor Dam.

Grain

Agricultural production in the seven Washington State counties in the Snake River region, much of which is wheat, represents 14 percent of the seven-county regional Gross Domestic Product (GDP).[2] The wheat farms surrounding the Snake River are crucial to southeastern Washington's regional economy, and the state, national, and international economies. The region's regularly high wheat yields, quality of crops, and delivery time to distributors make it a supplier for much of the Asian market as well as other international markets.

What Is a Grain Elevator?

A grain elevator is a facility designed to stockpile or store grain. The term grain elevator also describes a tower containing a bucket elevator or a pneumatic conveyor which scoops up grain from a lower level and deposits it in a silo or other storage facility for later loading onto a barge, railroad or truck. Grain elevators located away from barge and rail terminals are often referred to as "country elevators." The image below shows a series of grain elevators loading a barge in Garfield County, Washington. There are 174 grain elevators in the Lower Snake River Dam Transportation Study region.

Source: iStock, 2024

Supply Chain

The supply chain for grain grown along the Snake River consists of goods moved from local farms to storage locations and then to export locations on the lower Columbia River. Grain grown in counties surrounding the Snake River is often first routed from a farm to country grain elevators or ground storage operated by grain cooperatives (Figure 7). Grain co-ops then discharge this stored grain to barges, rail terminals, and trucks throughout the year based on farmer and grain co-op preferred mode and cost. Note that farms can also have on-farm storage, which is not shown in the supply chain graphic.

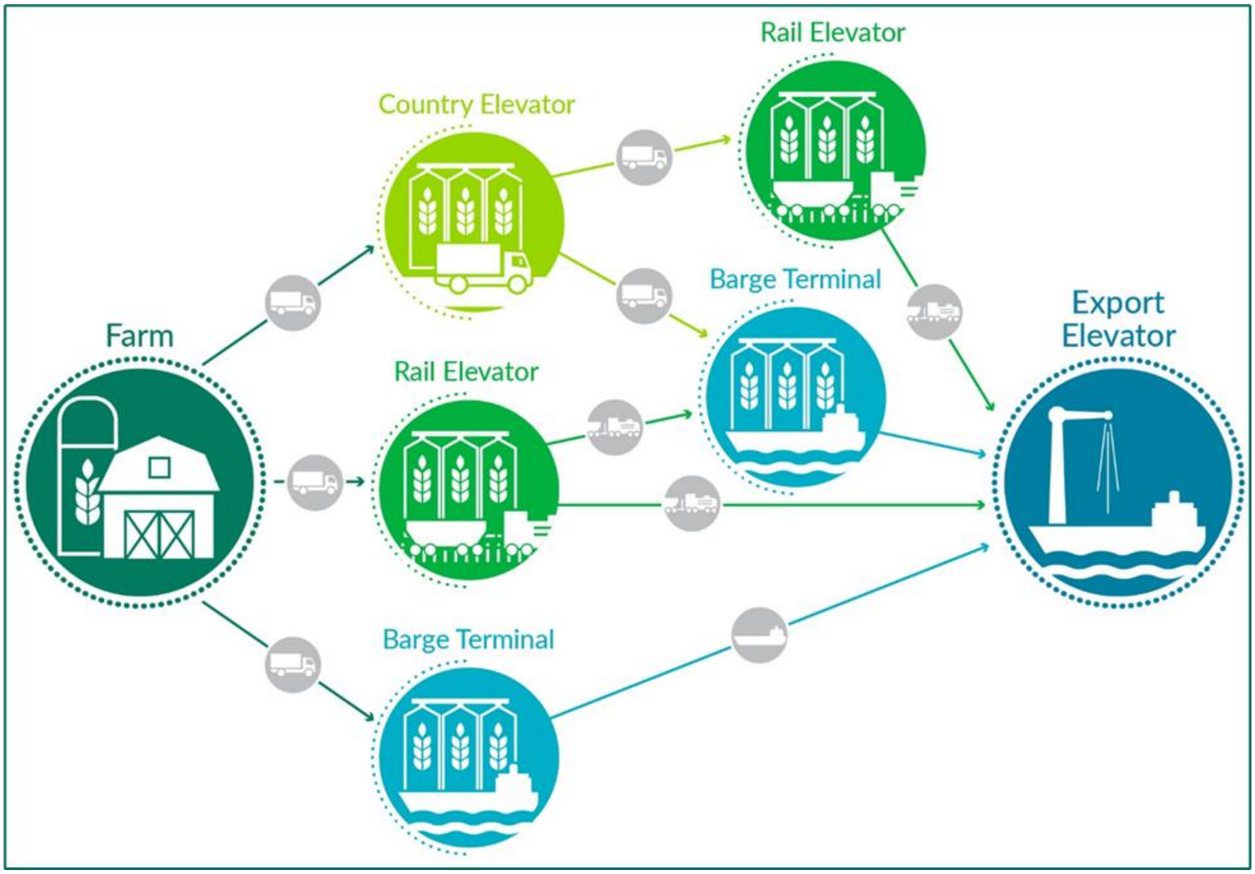
The price for grain is set globally by different economic demand and supply factors that are outside of the control of freight stakeholders in the study area. Companies located in the study area can increase their efficiency by closely managing their supply chain. With barges being typically the cheapest shipping option on a ton-mile basis, grain is moved from country elevators or farms to riverside terminals when possible. With the rapid pace of harvesting, elevator operators and farmers alike rely on quick and reliable transport from elevators to a client or processing facility. It takes about eight hours to fill a grain barge and about six hours to unload it.[3]

A single barge can carry an average of 3,600 tons of grain at a time. By contrast, one rail car carries roughly 100 tons of grain at a time and one semi-truck carries 30 tons per load. In the Pacific Northwest, customers see barge service as having faster end-to-end transit time than rail, more

[2] Bureau of Economic Analysis, GDP by County and Metropolitan Area, 2022.
[3] Consultant team consultations with regional wheat growers and barge companies, June 2024.

reliable arrival times at export facilities, and can accommodate large volumes of wheat relative to truck.[4] By comparison, railroad transportation can have a longer shipping time (though trains average speed is faster than barges) because the process of ordering, receiving, loading, transporting, and unloading rail cars can take longer than a similar process for barge operations.

Figure 7. Simplified Wheat/Grain Supply Chain Diagram



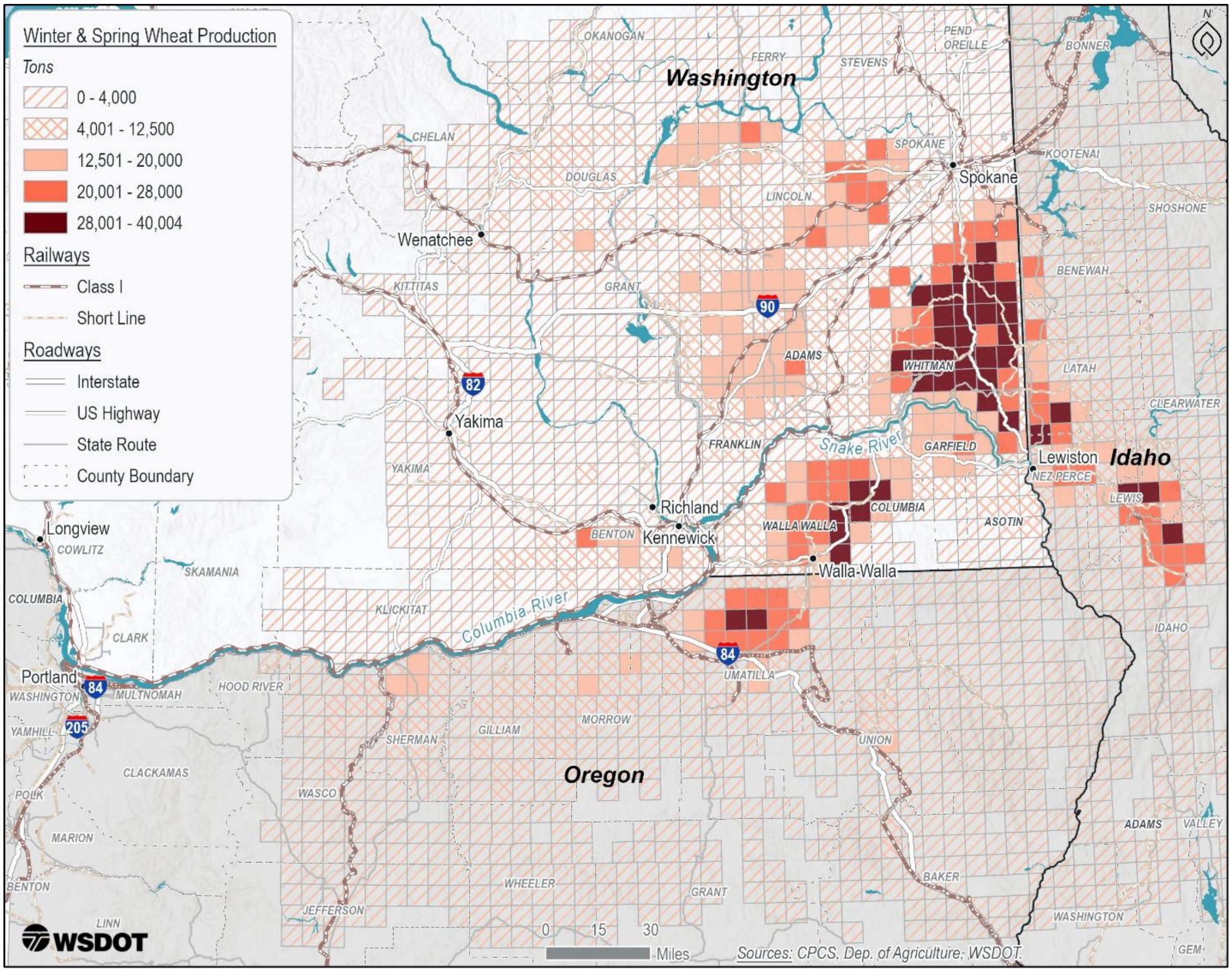
Wheat Volumes

USDA's 2020 state-level crop yields (bushels per acre) were examined to determine crop production by township. USDA's state-level yield for each wheat type was multiplied by each township's calculated acreage of each type of wheat crop area to determine the respective state's total production. This calculated total production was compared against official USDA 2020 wheat production totals to adjust for any discrepancies. The estimated township total was slightly higher than the USDA's statewide total, so an adjustment factor was applied to the estimate to better align the two totals and ensure the status quo model represents current wheat production as accurately as possible.

[4] Ibid.

Figure 8 illustrates where wheat production is located across the study area. For all calculations relating to wheat, the value 60 pounds per bushel of wheat was used to convert wheat bushels into wheat tonnage estimates.

Figure 8. Annual Wheat Production Location, 2020



Source: US Department of Agriculture, Washington Department of Agriculture, Discussions with interested parties.

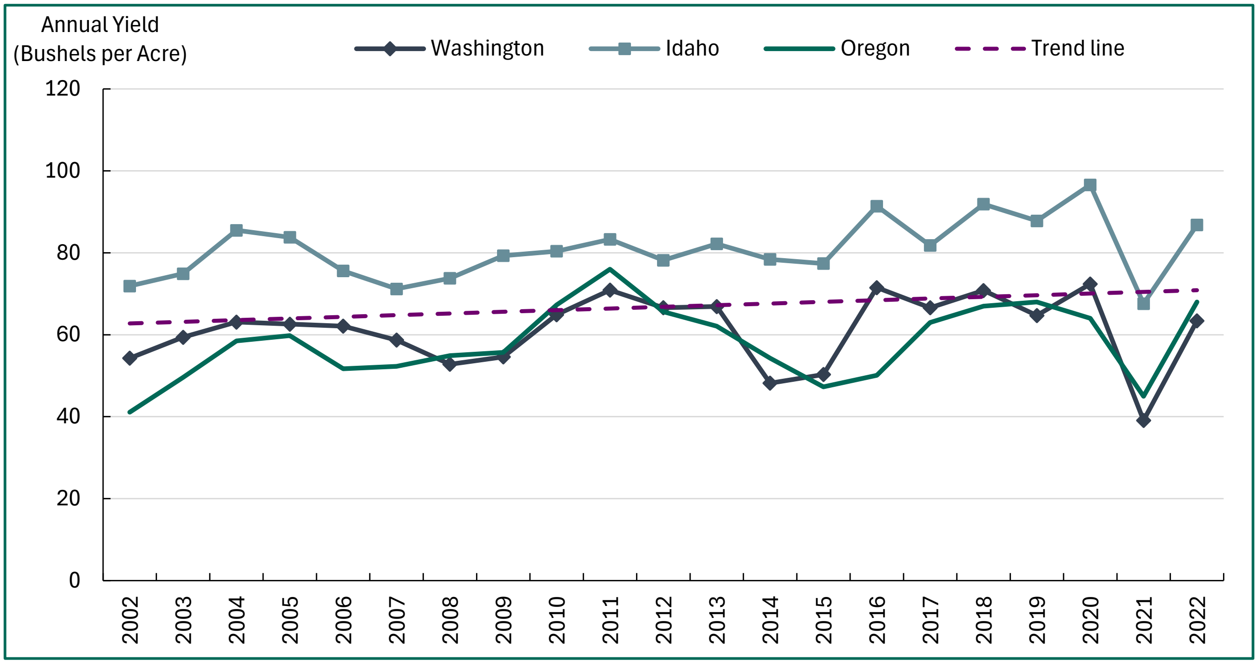
Washington is one of the United States' most productive states for wheat cultivation, and both spring and winter wheat contribute to these high yields, although their harvest times slightly differ. The spring strain of wheat is planted in the early spring months and harvested in the late summer (August and September). Winter wheat is planted in the fall and therefore has an earlier harvest season of June to August.

Wheat yields are expected to continue to increase as technology and farming strategies improve.[5] Climate change may threaten year-to-year production, although trends in harvest over the span of the last 10 years have been relatively steady. Figure 9 illustrates how wheat yields in Washington,

[5] Consultation with wheat producer interested parties, June 2024.

Idaho, and Oregon have been steadily increasing over the past 20 years, but annual yields show high variability due to factors such as precipitation.

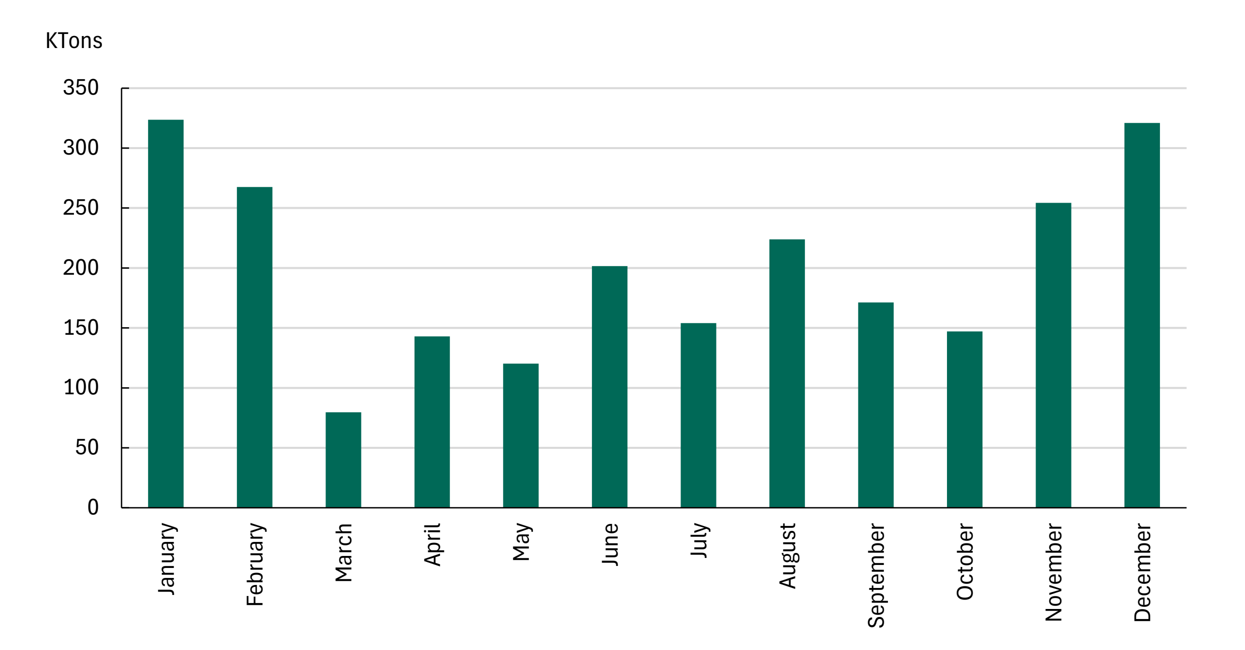
Figure 9. Historic Wheat Yields for Washington, Oregon, and Idaho, 2002 to 2022



Source: Consultant team analysis of USDA Commodity Survey, 2024.

Peak months for grain harvesting are between July and September, although much of the grain is stored during that time, to then be transported downriver during the winter months (Figure 10). Note that March is the lowest month for grain shipping on the Lower Snake River, and this dip in shipping volumes is primarily due to annual scheduled lock maintenance.

Figure 10. Seasonal Flow of Downbound Grain on the Snake River through the Ice Harbor Dam, 2023



Source: USACE Navigation Data Center Lock Performance Monitoring System; Tonnage Report

In addition to using barge terminals, wheat uses a wide network of grain elevators such as unit train terminals, non-unit train terminals, country grain elevators and barge terminals to reach its final destination. The specific location, network connections, and capacities for each of these terminals are important elements impacting the freight flows in the study area. The consultant team relied on information from discussions with grain merchandisers and rail operators as well as publicly available datasets to determine specific locations, connections, and capacities for these grain-handling facilities. The public datasets included the US Department of Agriculture and Washington State Department of Agriculture records of grain facility licenses. Grain merchandiser and co-op websites also provided an initial list of grain facilities, including capacity by bushel, operator, and location. This list was then shared with the region's grain merchandisers for validation and correction. Merchandisers were asked for information on their elevators' annual throughput by bushel as well.

Overlaying grain facility locations and transportation networks, then validating this with facility operators helped define the modal connections available at each facility. Grain facilities were ultimately classified based on their functionality and locations in four ways (some locations may have silos and/or ground storage):

1. **Barge Terminals –** which facilitate the movement of grain from truck or rail into barges.
2. **Unit Train Terminals –** high-capacity and high-throughput facilities that support the movement of grain from truck and railcar into consolidated unit trains for movement to export terminals.

3. **Non-Unit Train Terminals –** smaller rail-served grain elevators that receive grain by truck from local farms.

4. **Country –** local grain elevators that serve as "first mile" storage points for grain harvested from local farms.

174 grain facilities were identified and incorporated into the model, each with an assigned capacity. Throughput information is also incorporated where merchandisers provided the information to better inform the capacity and turnover rate of each facility. Figure 11 shows where the facilities are located.

Figure 11. Study Area Grain Facilities

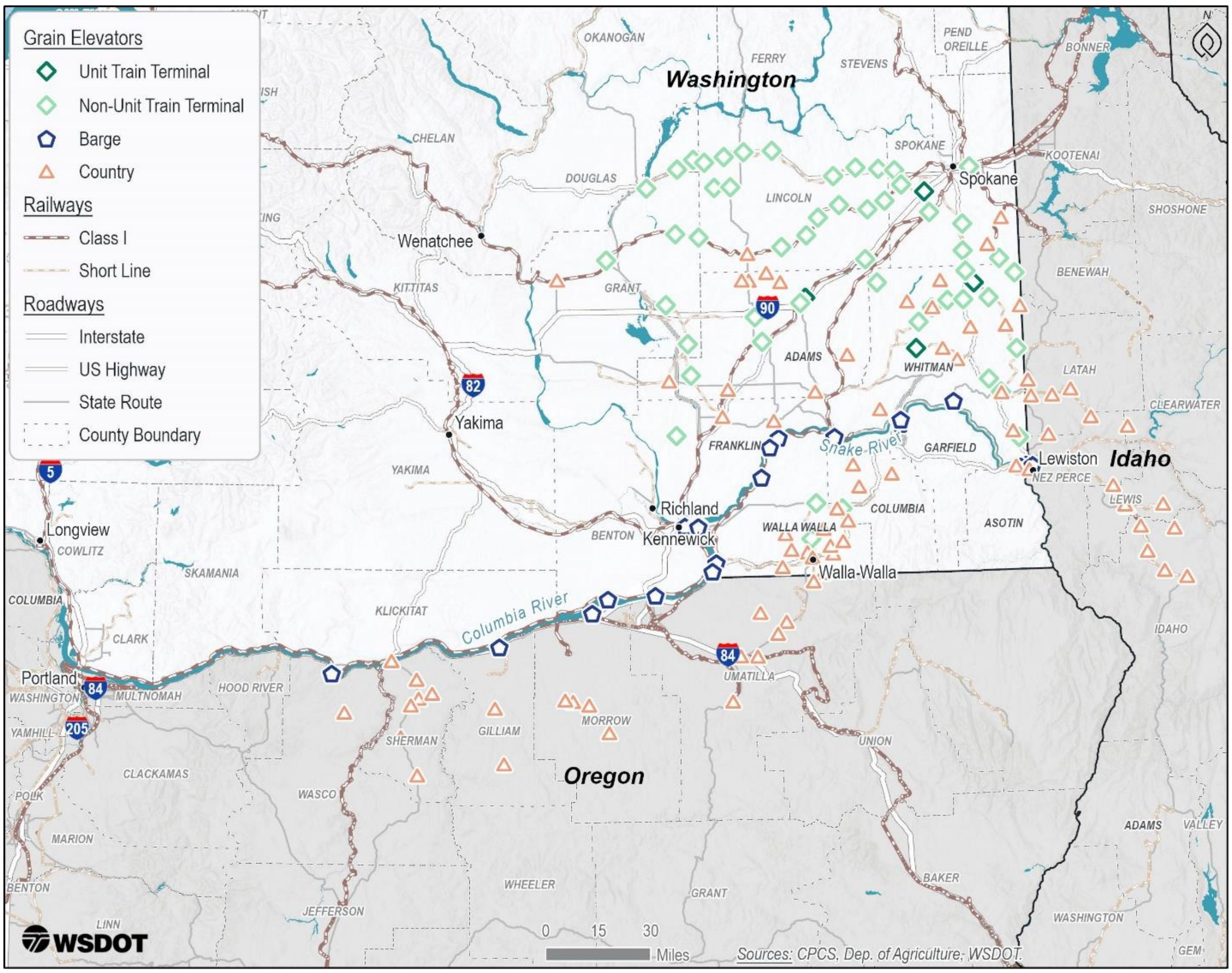
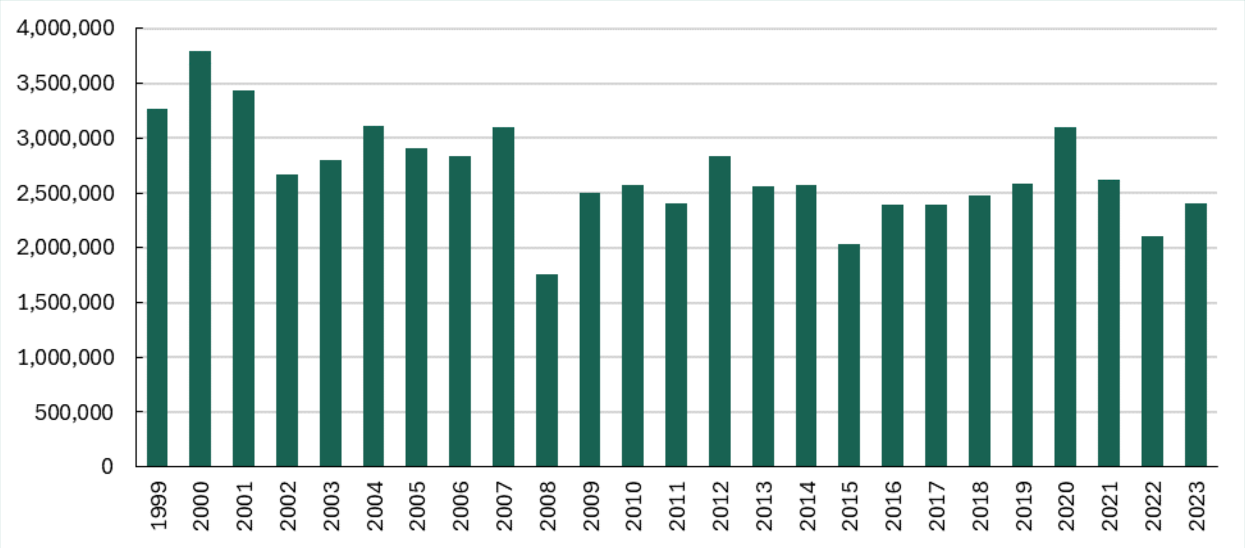


Figure 12 shows the wheat tonnage on the Snake River from 1999 to 2023. The region experienced one of the highest volumes in wheat products in 2000, with roughly 3,800,000 tons transported in the region that year.

Figure 12. Wheat Tonnage Traveling on the Snake River, 1999 to 2023



Source: USACE Waterborne Commerce Statistics Center, Powers and Waterways Webtool

The following three figures demonstrate estimated year 2020 (current) flows of wheat on barge, rail, and truck. Note that these figures are an estimate only from Fall 2024; the model is still under development as part of this study.

- Figure 13 shows the estimated current annual wheat flows on the rail and road network, including approximations of rail network flows broken out separately for select subregions in the study area. Note that there can be multiple facilities in a single circle.
- Figure 14 shows the estimated current wheat flows moving by rail network trains and barge terminals for select facilities in the study area subregion.
- Figure 15 shows the estimated current annual wheat flows on the barge and road networks and moving through select facilities in the study area subregion.

Figure 13. Estimated Current Annual Wheat Flows for Rail Unit Trains, Rail Non-Unit Trains, and Road Network

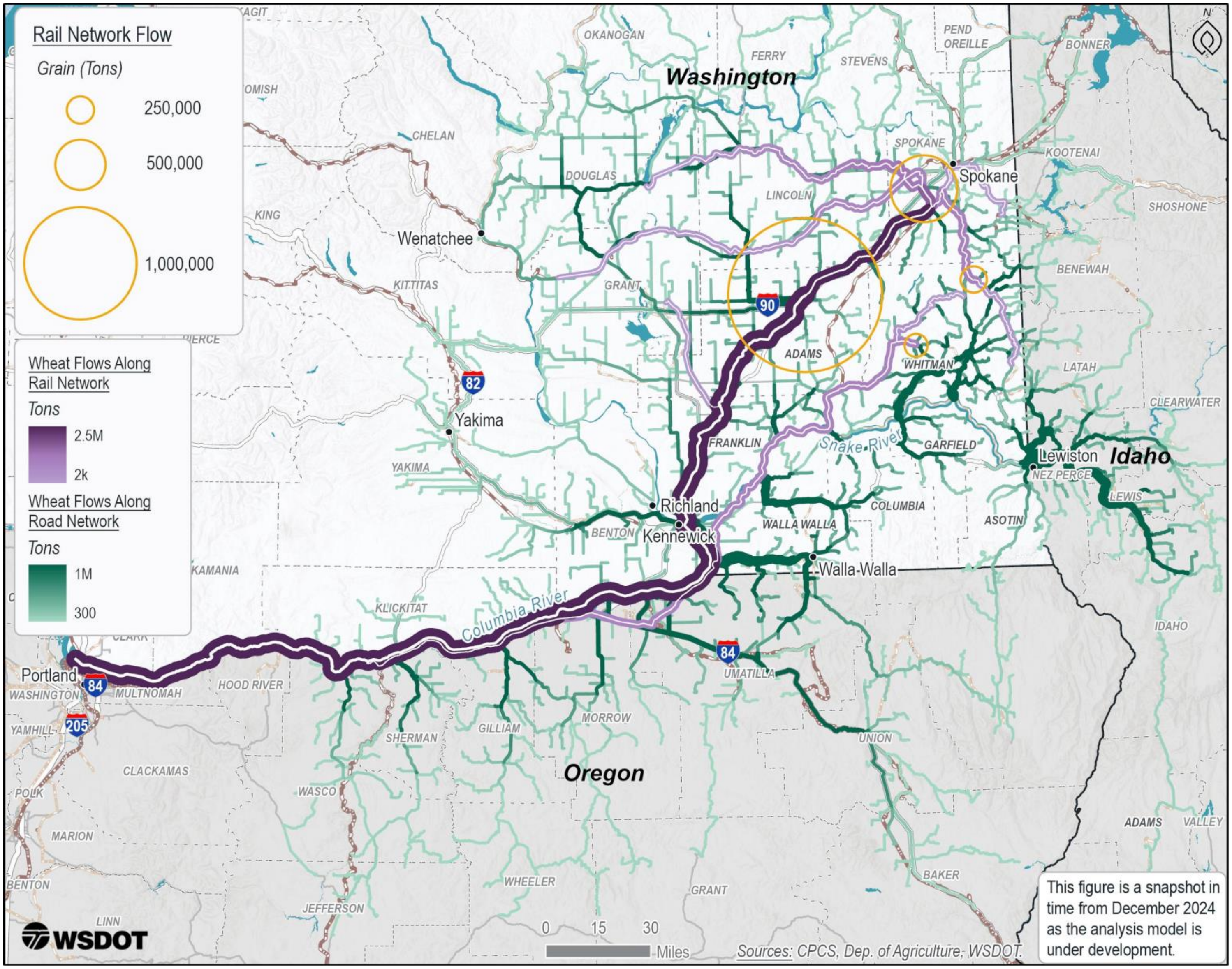


Figure 14. Estimated Current Rail Network Trains and Barge Terminal Wheat Flows

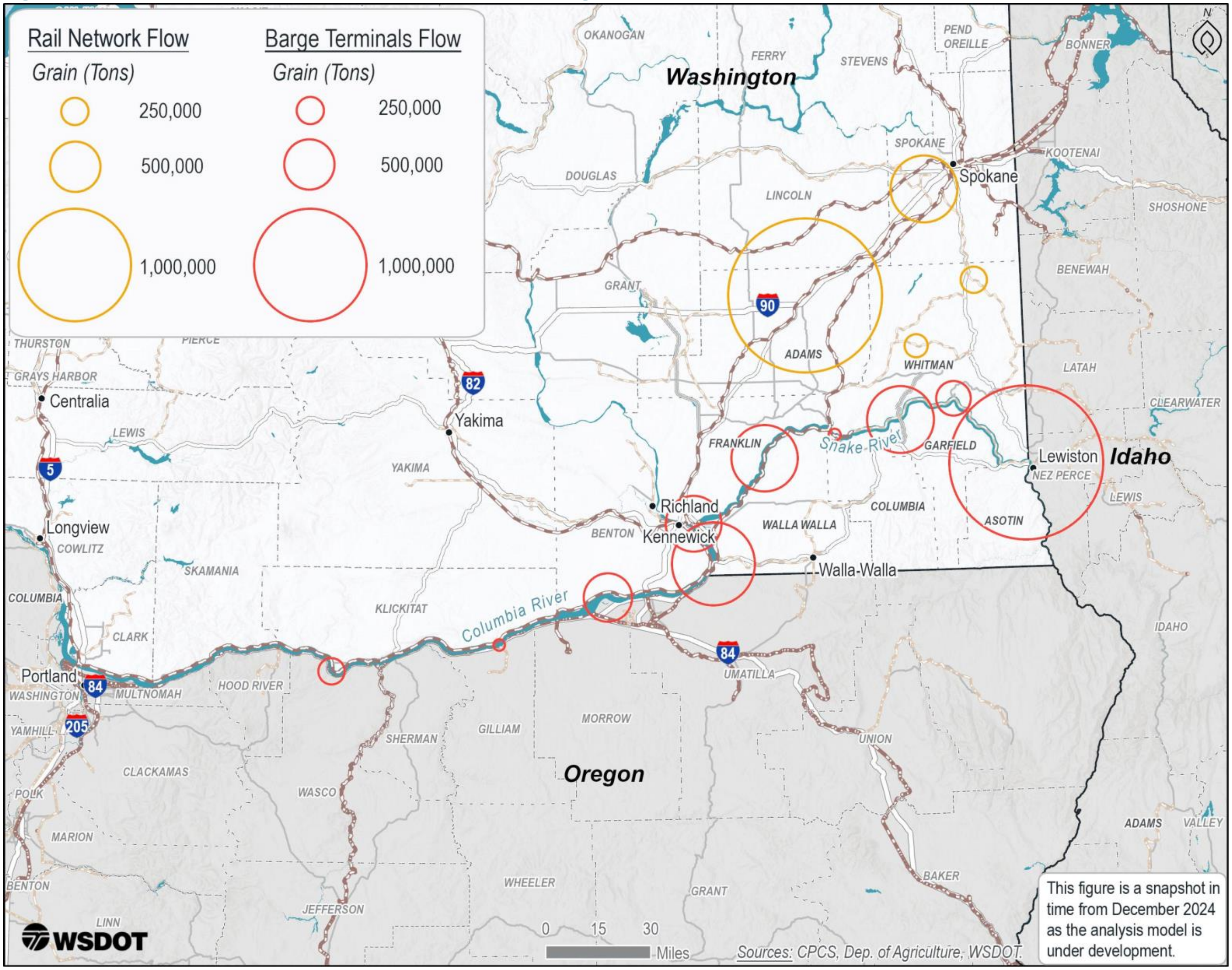
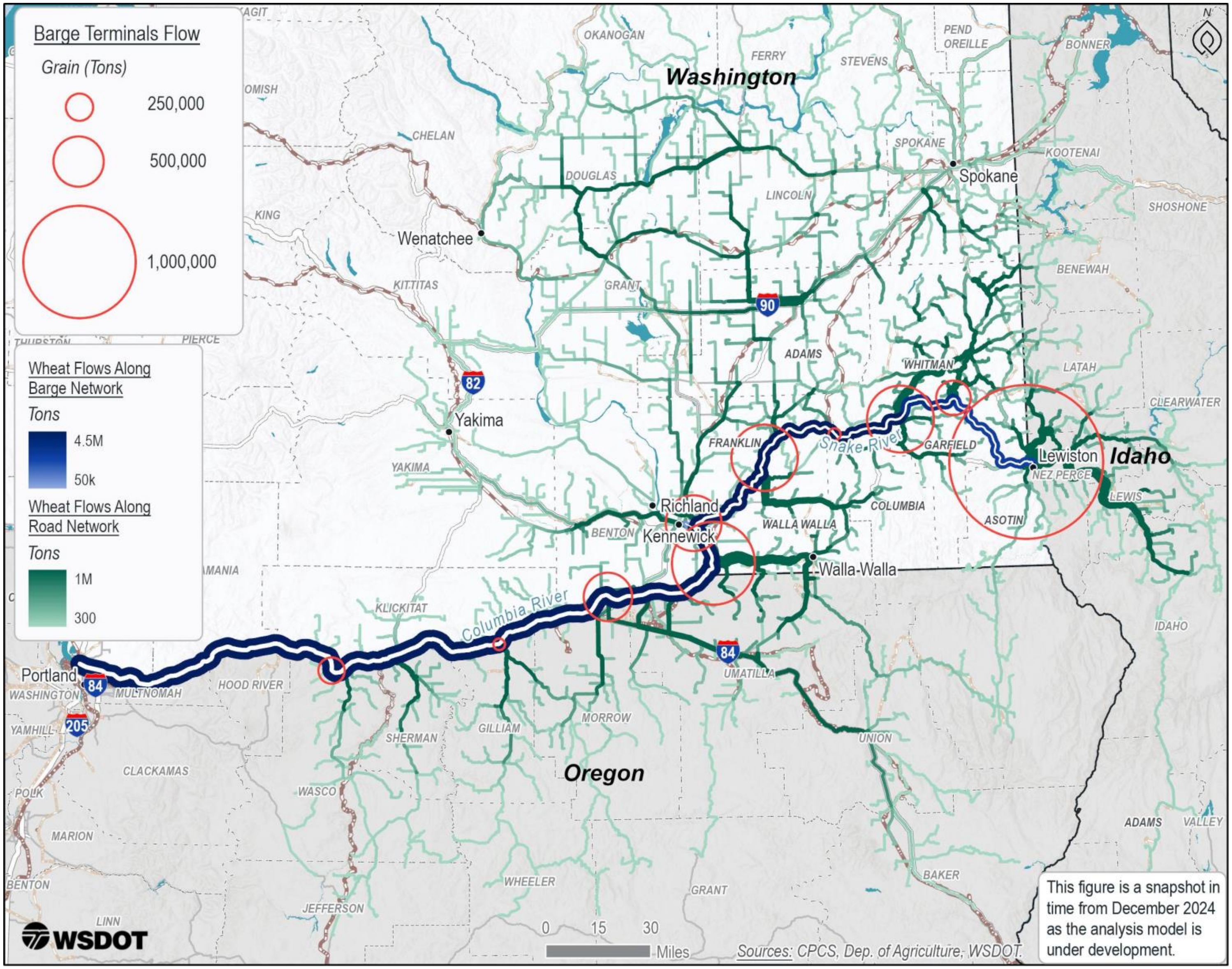


Figure 15. Estimated Current Annual Wheat Flows through Barge Terminal Flows and the Road Network



FERTILIZER

Fertilizer is a necessary input to the region's agricultural industry. Farmers rely on quality fertilizer to improve yield and increase crop resilience to adverse weather. Demand for fertilizer sharply peaks in the early spring growing months of March and April, as well as the fall growing season of September and October. Although efficient fertilizer transport is especially important during the growing seasons, liquid fertilizer travels along the Snake River and throughout the region year-round.

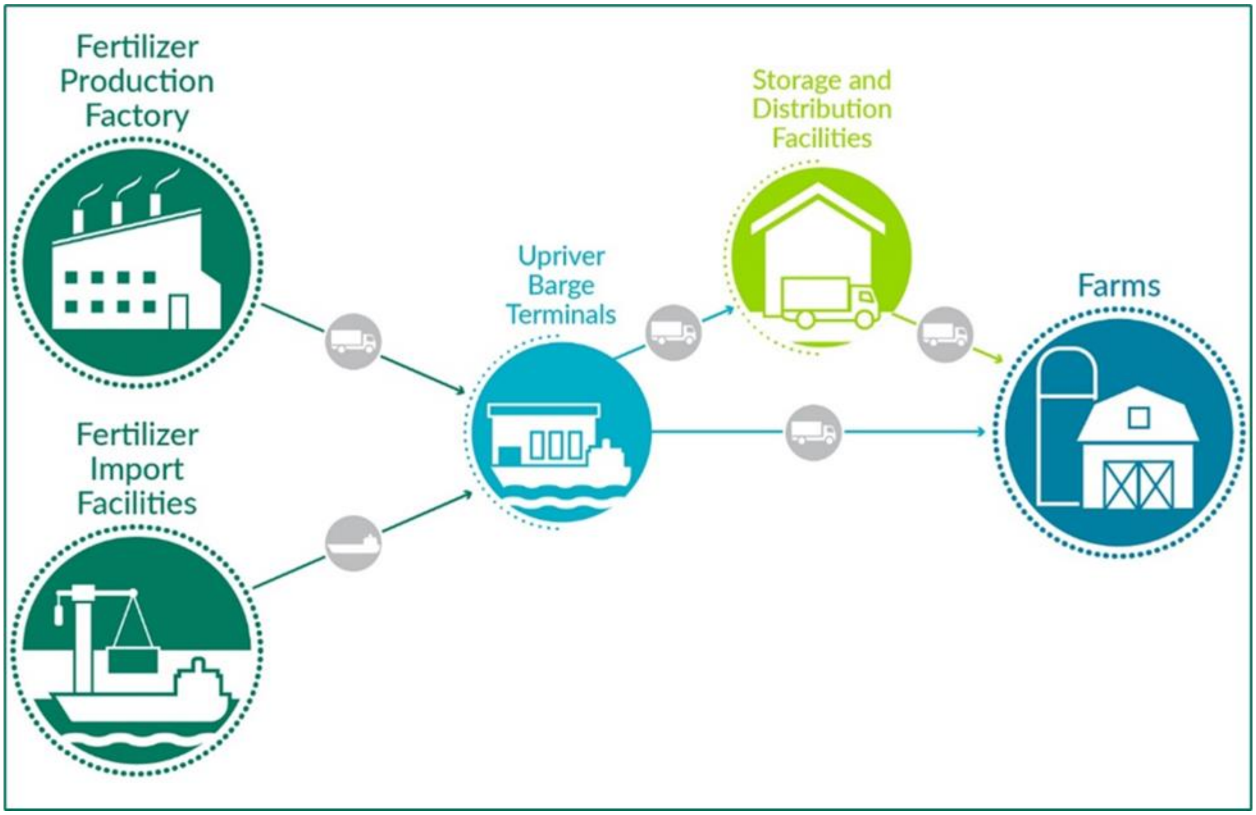
Supply Chain

Barge-supported fertilizer is transported by multiple modes from international location through the Snake River region to reach individual farms, fertilizer and grain company branches, and terminals where blending and processing takes place (Figure 16). Most of the fertilizer transported by barge on the Lower Snake River is liquid Urea Ammonium Nitrate (UAN), and UAN adoption in the region has replaced older forms of fertilizers such as anhydrous ammonia and dry fertilizers. UAN has advantages of being easier to transport and can be custom blended with other agronomic inputs to match the exact nutrient needs of specific farms. Liquid fertilizer movement on the Lower Snake River is facilitated by two barges that move fertilizer upstream to barge terminals. Fertilizer is delivered primarily by barge and is supplemented by rail.[6] UAN can also be shipped into the region by rail. However, discussions with fertilizer representatives indicated that they use their limited rail capacity for other agronomic chemicals by rail.

The peak season for fertilizer transport corresponds with harvest season in July to October each year, with fertilizer stocks being built up in advance of planting activity following harvest. Each barge can carry approximately 3,350 tons of liquid fertilizer, traveling along the river to fill terminals at the start of the season and two to three times after that. Once unloaded at river terminals, terminal facilities handle any necessary blending with other agronomic chemicals before transport to fields. Transport from river terminals direct to farms is primarily by truck; each semi-truck can carry roughly 30 tons of UAN.

[6] WSDOT field visit with McGregor Company, August 2024.

Figure 16. Fertilizer Supply Chain Diagram

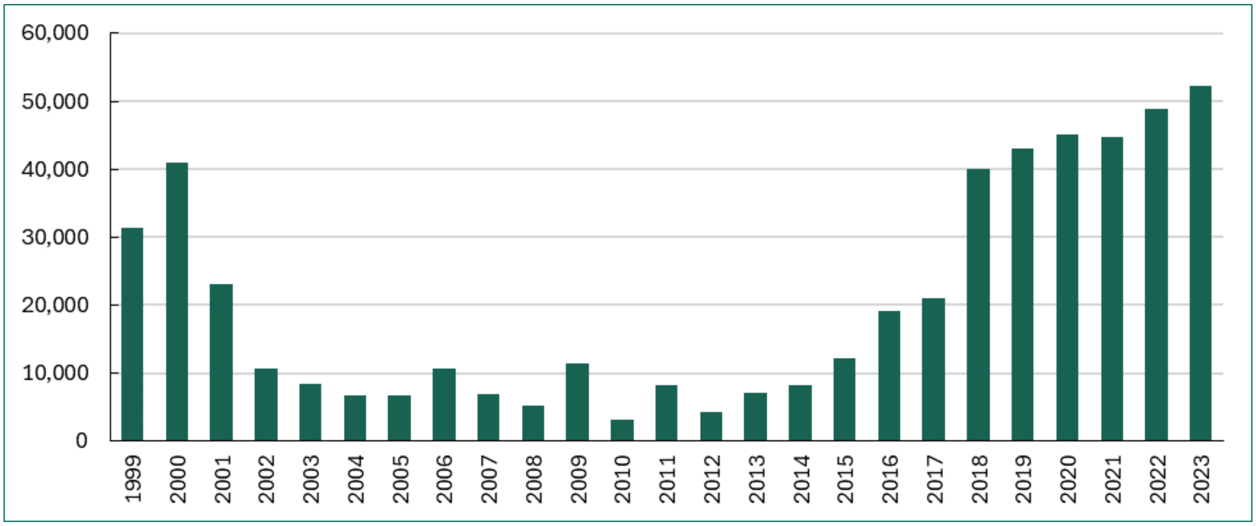


Volumes

Fertilizer volumes traveling on the Snake River witnessed a sharp rise in year 2000 with about 40,000 tons traveling in the region. Volumes consistently remained low following that but started rising in 2018. The year 2023 saw the highest volumes for fertilizers transported in the region, with about 51,000 tons traveling on the Snake River (Figure 17). The sharp rise is due to the increasing adoption of UAN and the construction of additional storage capacity at river terminals.

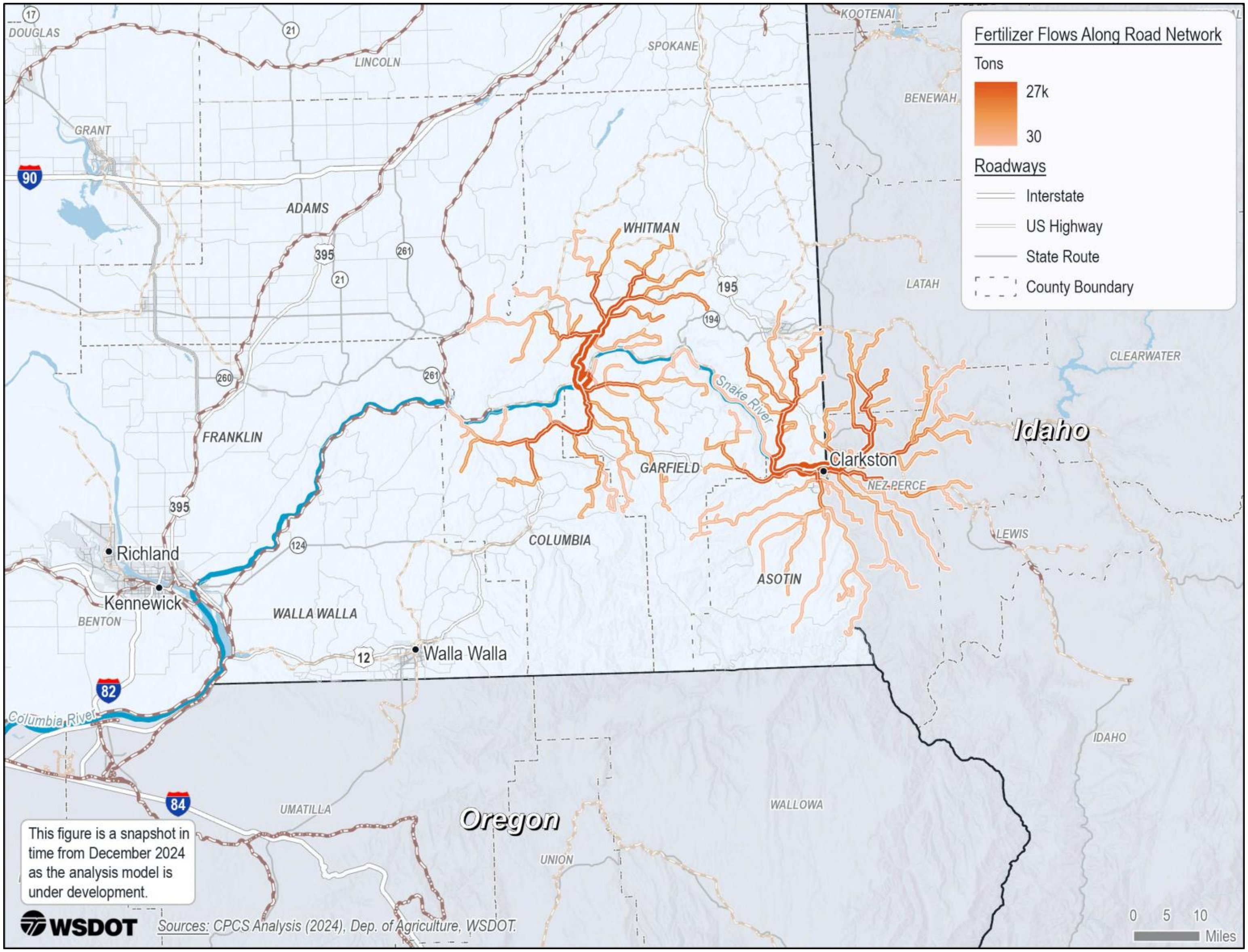
Figure 18 shows estimated routed fertilizer flows on the road network in the Lower Snake Region.

Figure 17. Fertilizer Tonnage Traveling on the Snake River, 1999 to 2023



Source: USACE Waterborne Commerce Statistics Center, Powers and Waterways Webtool

Figure 18. Estimated Current Annual Fertilizer Product Flows on Road Network



Wood Products

Wood products, including woodchips, sawdust, and logs, all play a role in Snake River goods flow. Wood products are used for a variety of purposes, including construction materials, paper, and other soft fibers. Six percent of goods flowing on the river are wood products, with two barge terminals on the Snake River able to accommodate loading of wood products.[7]

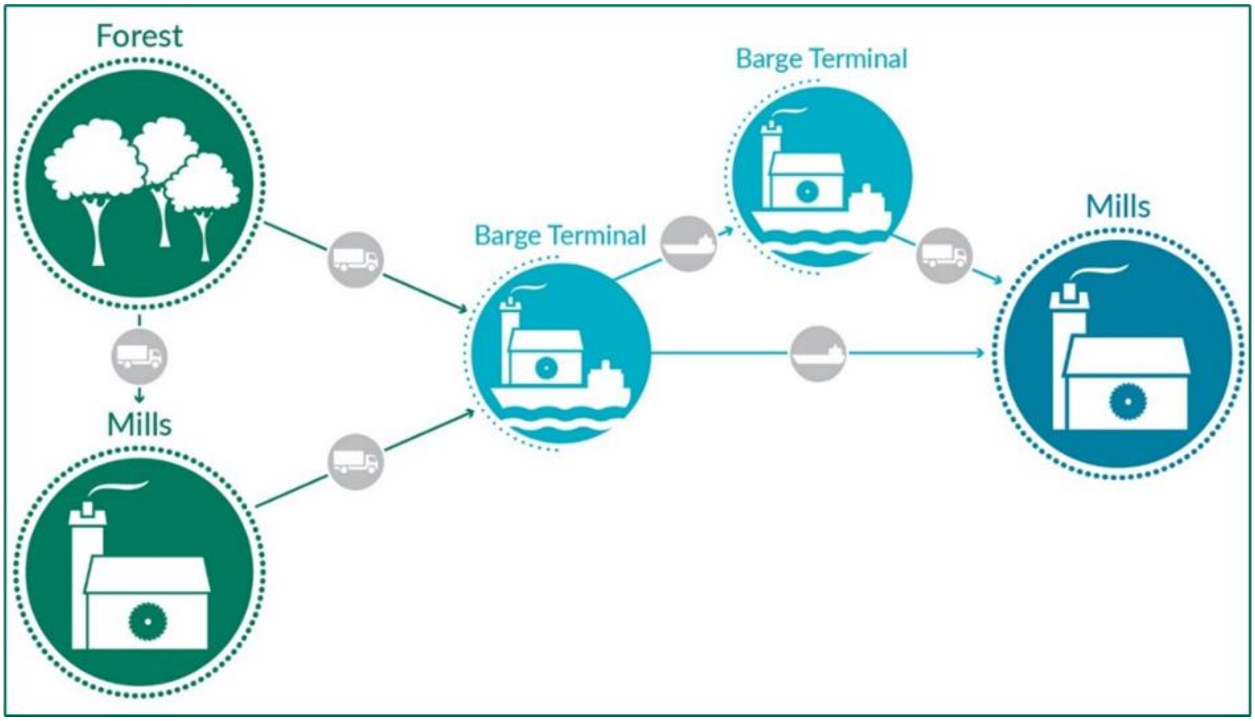
Supply Chain

Multiple commodities are categorized as wood products, and the broad supply chain varies based on location of inputs, processing facilities, and modes that can transport the goods most efficiently (Figure 19). Based on consultant team discussions with wood product stakeholders, logs and planks are primarily shipped downstream, with roughly 90 percent of supply moved by barge, then transferred onto trucks between the final port and mills. Wood companies rely on barge due to its cost-effectiveness and its greater capacity and transload capabilities. Two large barges, often traveling in tandem tows, can transport the equivalent of 100 to 110 truckloads of logs together.

Sawdust and chips by contrast, travel both up and downriver. Sawdust and wood chips are bought from mills to then be transported to fiber facilities. These chips and sawdust can then be broken down into fibers and soft materials. Since many of the sawdust and chip processors are located along the lower Columbia River (e.g. Longview, Washington), these materials are rarely transported by truck or rail, and instead remain on barge for the majority of their journey.

[7] USACE Waterborne Commerce Statistics Center, Powers and Waterways Webtool, 2024.

Figure 19. Lumber/Wood Products Supply Chain Diagram



Truck and rail are both more expensive options relative to barge on a ton-mile basis for shipping wood products. Rail is only used out of the Port of Wilma for shipping finished lumber.[8]

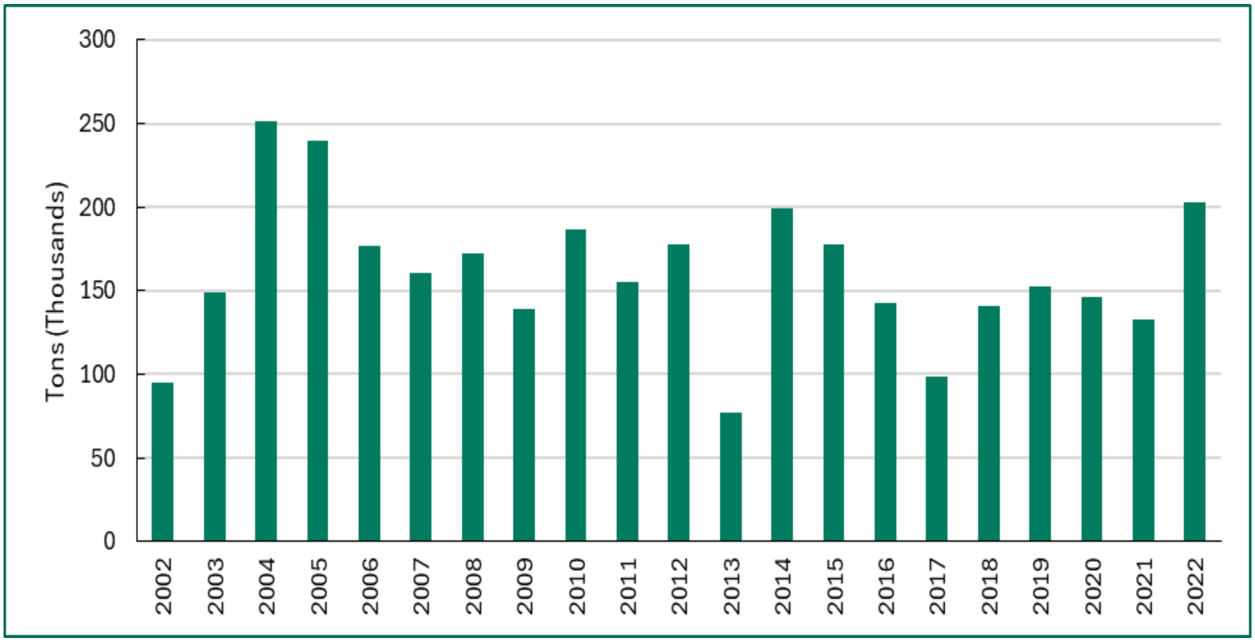
Volumes

Wood volumes travel both upriver and down river and they have remained relatively steady over the last 20 years with occasional peaks and falls. In 2022, the region experienced one of the highest volumes in wood products of the last decade, with roughly 203,000 tons transported in the region that year (Figure 20). 2022 volumes were 53 percent higher than 2021 volumes. Stakeholders have noted an increasing scarcity in supply of cedar, potentially affecting future volumes.[9]

Figure 21 shows the estimated wood tonnage flows along the Lower Snake River.

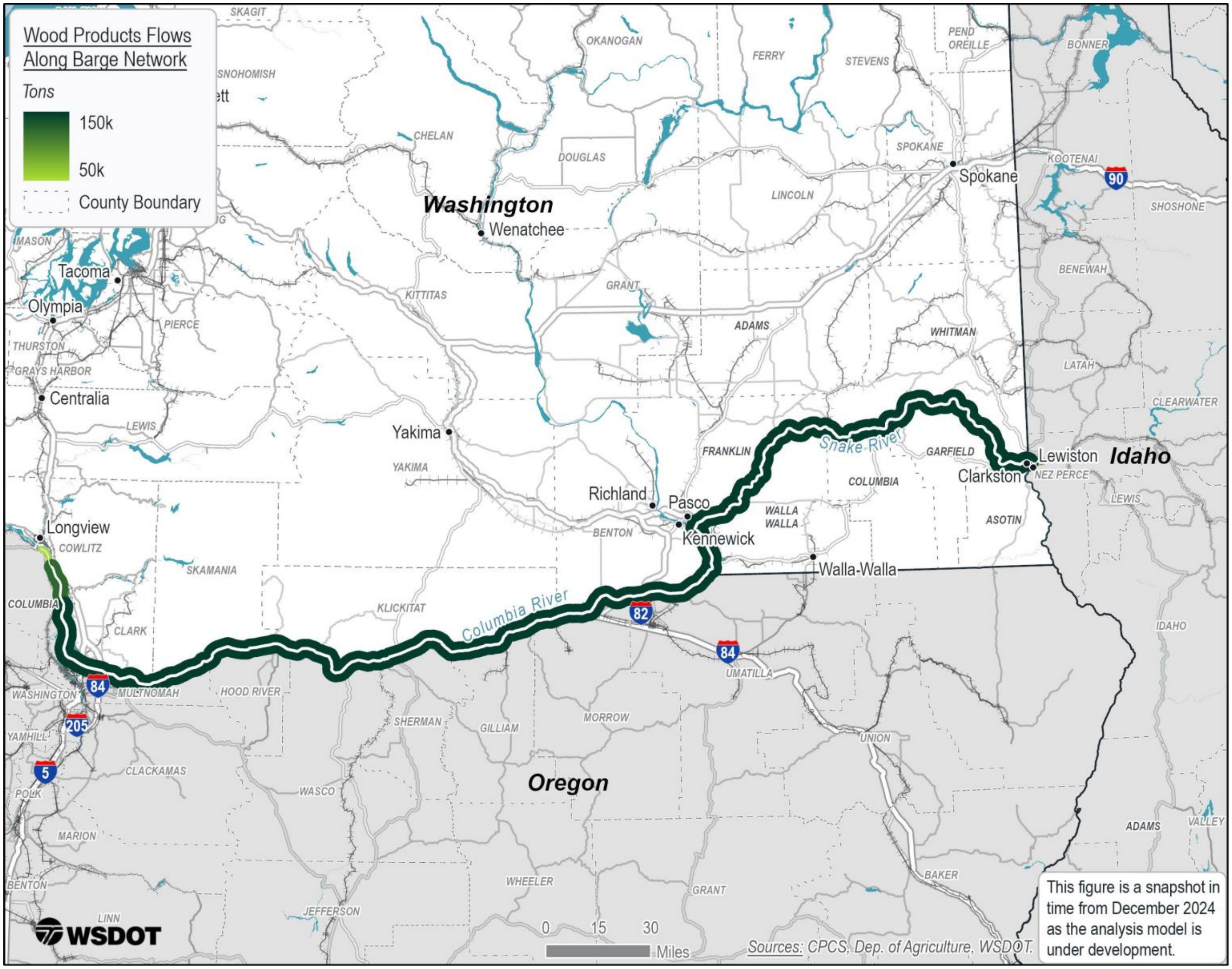
[8] Consultant Team consultations with forest products industry interested parties. 2024.
[9] Consultant team consultation with wood industry interested party, July 2024.

Figure 20. Wood Tonnage Traveling on the Snake River, 2002 to 2022



Source: USACE Waterborne Commerce Statistics Center, Powers and Waterways Webtool

Figure 21. Estimated Current Annual Wood Product Flows



IV. Existing Conditions for Rail Traffic

The Washington State rail system is part of a multimodal transportation network that moves both freight and passengers and interacts directly with highways, ports, and pipelines. This chapter describes rail system operators, right-of-way, rail services, train volumes, types of goods moved, and capacity issues in the Lower Snake River region.

Freight Rail Owners and Operators

Rail owners and rail operators can differ on a single rail line as one entity may own the rail line but lease it to a different entity to operate on. Knowing this, Figure 22 shows railroad owners within the study area and Figure 23 shows railroad operators in the study area. Freight rail operators can be divided into categories of services provided, as passenger and freight operators. This chapter focuses on freight volumes and operations as a starting point to understand the potential effects of freight modal shifts on overall system capacity and performance.

Freight rail operators are categorized based on their operating revenue by the Surface Transportation Board (STB) as follows:

- **Class I Railroads: With more than $489.9 million in annual operating revenue.** Class I railroads operate most of the freight mileage in the U.S. There are seven Class I operators in the country. Two of these operators have services in Washington, Burlington Northern Santa Fe (BNSF) and Union Pacific Railroad (UPRR). In southeastern Washington, the primary track is owned and operated by BNSF with UPRR having trackage rights that allow it to operate on BNSF track on a limited basis. UPRR owns and operates a line from Spokane to the export markets, with BNSF having trackage rights for a fee. Class I railroads operate rail networks in the thousands of miles range across and typically carry medium and long-haul goods across a broad spectrum of commodities.
- **Class II Railroads: With annual operating revenue between $39.2 million and $489.9 million.** There are no Class II operators in Washington.
- **Class III Railroads: With annual operating revenue less than $39.2 million.** Class III railroads provide connections from communities to the national rail network and are commonly referred to as short line railroads. In Washington, these railroads comprise 39% of total freight mileage, with 23 operators. The following Class III railroads operate in the study area:
  - Portland Vancouver Junction Railroad (PVJR): PVJR operates on Clark County's Chelatchie Prairie Railroad, moving a mix of aggregates, sand, rail and food products, as well as other commodities.
  - Columbia Walla Walla Railroad (CWW): This short line is owned in sections by Port of Columbia and UPRR. The section between Dayton and Walla Walla is owned by the Port, while UPRR owns Walla Walla to Wallula segment of the rail line. Due to its geography rich with agriculture productivity, the line carries vegetables and dryland grains.
  - Washington Idaho & Montana Railway (WI&M)

- Columbia Basin Railroad Company, Inc. (CBRC)
- Royal Slope Line (RS)
- Tri-City Railroad Company (TCRY)
- Central Washington Railroad Company (CWA)
- Yakima Central Railway (YCR)
- Kennewick Terminal Railroad (KET)
- Great Northwest Railroad (GRNW)

Shortline railroads typically operate over much shorter distances relative to Class I railroads and specialize in a smaller set of goods. Shortline railroads usually rely on Class I railroads to provide them with access to the broader national rail network.

Palouse River and Coulee City Rail System

The Palouse River and Coulee City (PCC) Rail System: The PCC is a state-owned shortline rail system serving five counties in eastern Washington. The 297-mile PCC rail system is the longest short-line freight rail system in Washington. It is composed of three branches: the CW branch operated by Washington Eastern Railroad; the P & L branch operated by Spokane, Spangle, and Palouse Railroad; and the PV/ Hooper Branch. The PCC system is managed by WSDOT. WSDOT contracts with the following three private railroads to operate and maintain each of the three branches:

- Washington Eastern Railroad (WER)
- Spokane, Spangle & Palouse Railway (SS&P)
- Palouse River and Coullee City Railroad.

The short-line railroad and PCC system enables farmers to transport their agriculture products from remote locations to rest of the world, by providing a rail connection to Class I railroads and barges. About 20 to 25% of wheat produced in Washington is moved on the PCC system.

Rail Infrastructure

Within Washington, there are more than 3,200 miles of rail track across the state, operated by Class I and Class III railroads. Rail track infrastructure includes main line track, branch lines, and bridges. The main rail track in the study area runs from the Spokane region southwest to the Tri-Cities area, and onto the Vancouver (WA)/Portland (OR) rail complex.

Within the study area, most of the rail corridors are single track. There are some double track sections along the Spokane to Pasco corridor, which serves to increase the rail capacity along this corridor relative to single track locations.

There are four terminals in the study area where grain is loaded onto unit trains. These terminals are located near the cities of McCoy, Endicott, Ritzville, and Four Lakes.

Figure 22. Railroad Owners within the Study Area

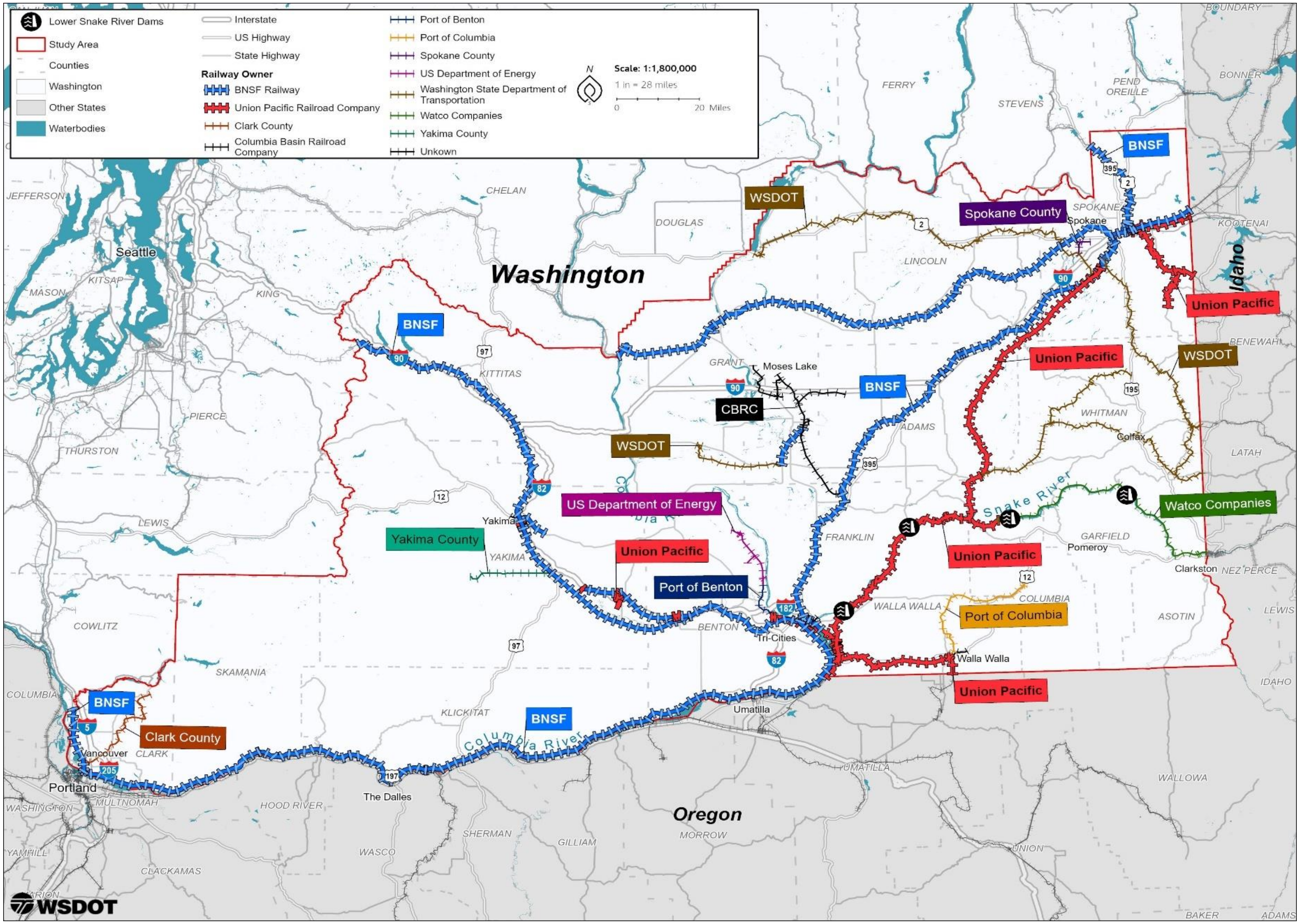
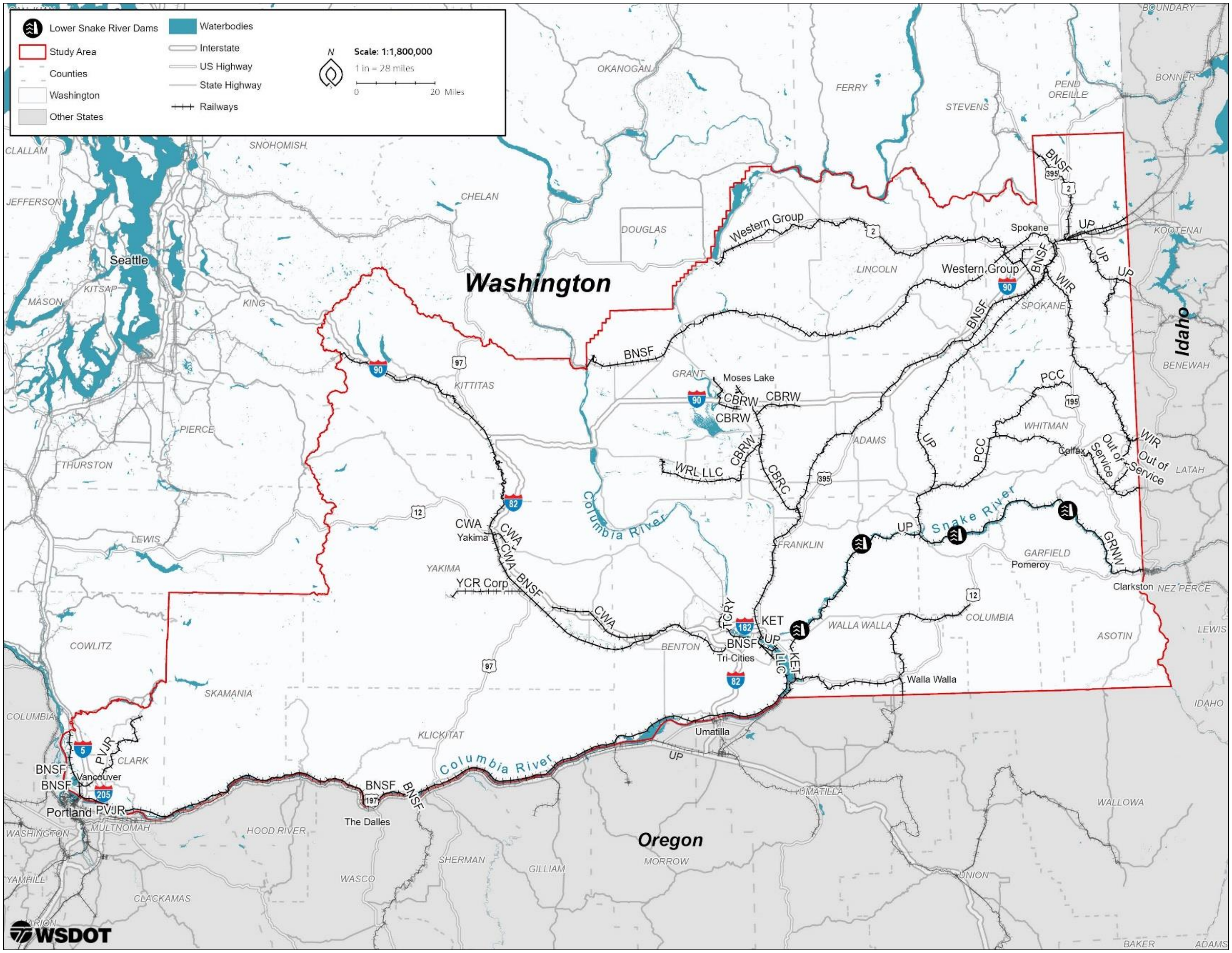


Figure 23. Railroad Operators in the Study Area



Passenger Rail Services

In Washington, passenger rail service operates predominantly on privately owned freight rail right-of-way. Amtrak operates two long-distance routes in Washington State: The Empire Builder and The Coast Starlight. Both routes operate on BNSF-owned tracks. The Coast Starlight runs along the I-5 corridor along the west coast. The Empire Builder provides service between Chicago and Seattle/Portland with one train daily in each direction, with the Portland to Spokane service portion operating on BNSF right-of-way. In the Study Area, the alignment of the Empire Builder runs along the Columbia River to Pasco, and then north to Spokane on the BNSF line. Current and future passenger rail service has the potential to restrict capacity in Washington's rail network. In turn, this can impact the efficiency of freight movement on shared track facilities.

Train Volumes

Figure 24 shows average train volumes per day for each corridor within the project area for 2022 based on data from the Federal Railroad Administration (FRA) Rail Crossing database. The train volumes in this database are self-reported by the railroads. The volumes were compared to train volume data in the 2040 Washington State Rail Plan for reasonableness. The highest-volume rail corridors running through the study area is the Vancouver to Pasco line with 32 trains per day and the Pasco to Spokane line with 39 trains per day.

Figure 24. Average Trains per Day

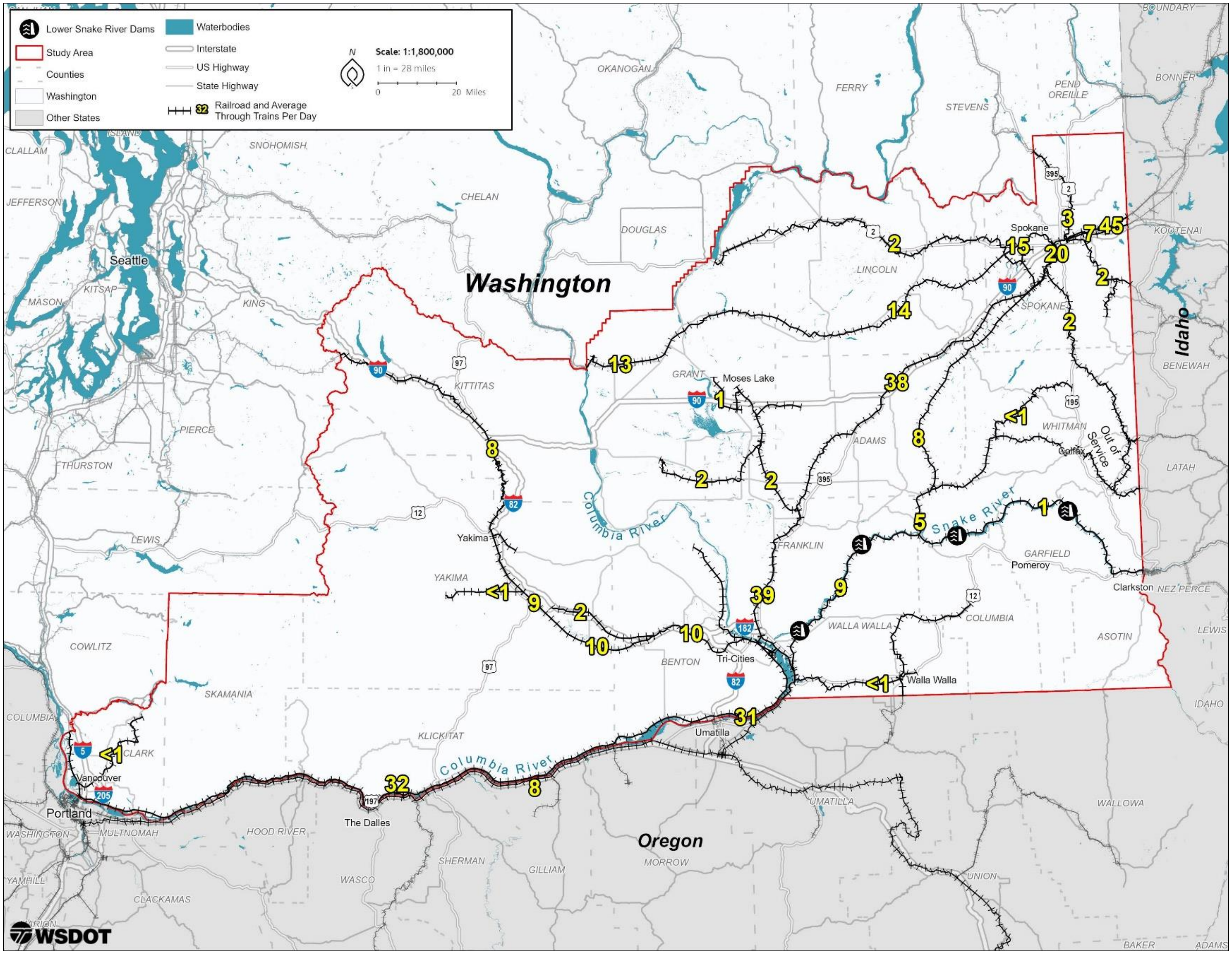
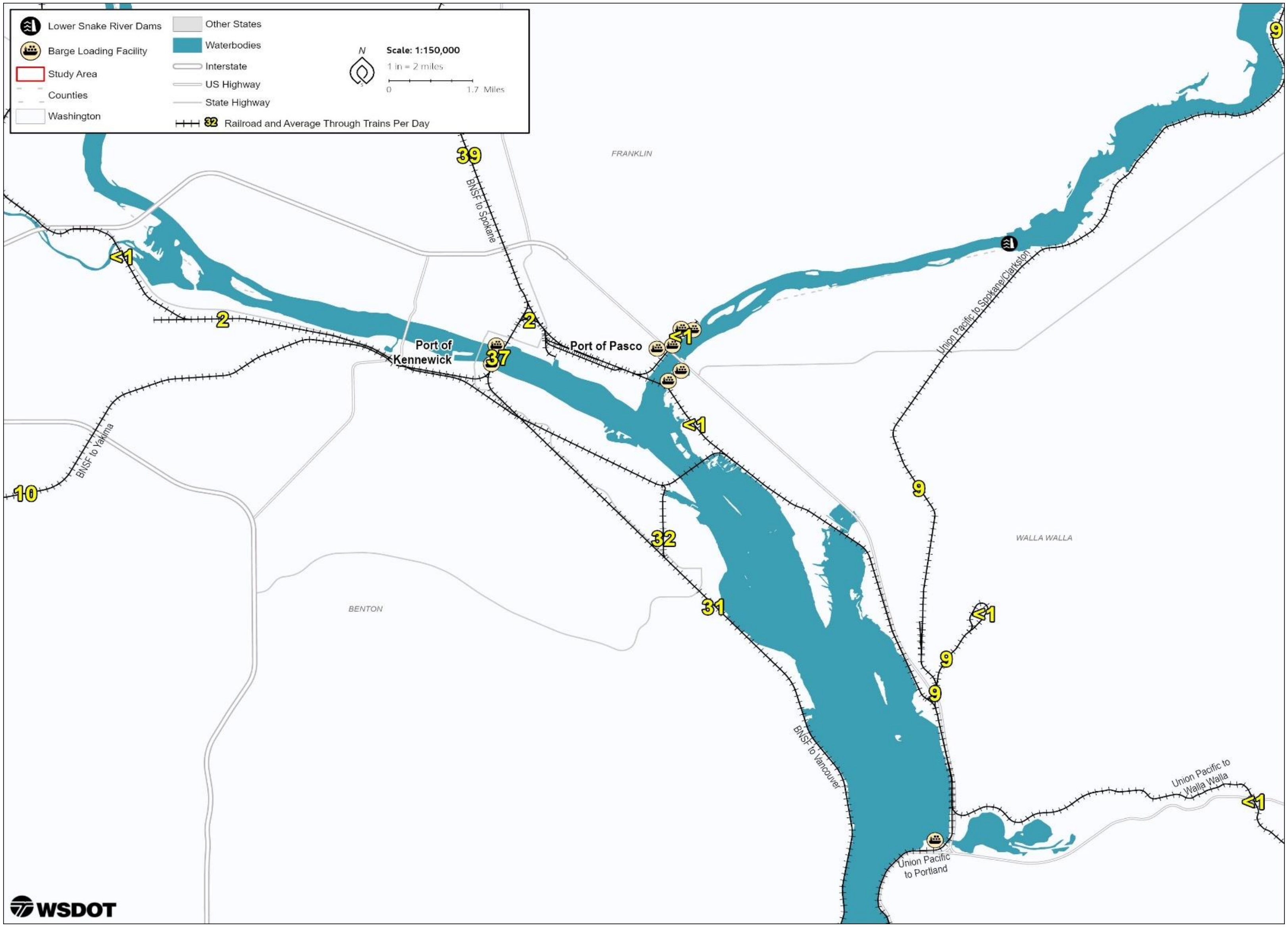


Figure 25. Average Trains per Day in Pasco Subarea



Rail Capacity

The capacity of rail track is based on a variety of factors such as the number of tracks, sidings, grades, curvature, maintenance of the track, the type of trains that are in operation, the direction that trains are running, and operations of nearby rail terminals. Rail capacity values from the WSDOT Washington State Rail Plan 2019-2040 were used in conjunction with rail volumes from the Federal Railroad Administration (FRA) to determine if there are capacity constraints on the main rail line in the Lower Snake River, the line running from Spokane to the Tri-Cities area to the Port of Vancouver area. Volume-to-Capacity ratios were calculated by comparing rail segment volume of trains with maximum capacity of the corridor.

As shown in Table 1, the volume-capacity ratios of these rail lines are estimated to be well below 1.0, indicating there is no severe congestion at these locations. Nevertheless, it is possible that rail capacity is exceeded during peak periods. Future rail traffic volumes may be higher due to growth in commodities using rail. Initial consultations with interested parties indicate that there may be congestion at transload facilities if volumes increase. Later analysis conducted during this study will include an estimate of the amount of capacity being utilized by local agricultural demand relative to agricultural demand for goods traveling through the Snake River region. Additionally, we will discuss competition for rail services and obtain additional information on constrained operating conditions for the railroads.

Table 1. Average Trains per Day and Capacity Estimates

Name	Daily Trains	Practical Capacity Max. Daily Trains	Volume-Capacity Ratio
Pasco-Cheney (BNSF)	39	62	0.61
Cheney-Spokane (BNSF & UPRR)	38	50	0.76
Vancouver-Pasco (BNSF)	32	41	0.78
Hermiston-Cheney (UPRR)	10	23	0.43
Hermiston-Portland (UPRR)	8	TBD	TBD

Source: Washington State Rail Plan 2019-2040, Consultant analysis of FRA Rail Crossing Data

V. Existing Conditions for Roadway Traffic

Washington's highway system connects freight facilities throughout the state. In the Lower Snake River region, trucks are used to move grain from farms to elevators and loading terminals. Trucks are also used to move fertilizer from distribution centers to farms and to move raw timber to mills and barge terminals. Figure 26 shows a grain truck operating in an urbanized area which can cause traffic issues if the roads are not designed for trucks. Trucks also serve several other industries that operate in the Lower Snake Region that have less frequent interaction with the rail and barge networks.

Figure 26. Grain Truck Operating in Urbanized Area

Physical Condition of Roads and Bridges

This section describes the physical condition of state roadway facilities in the Lower Snake region. Facilities currently in need of maintenance have the potential to cause truck and auto traffic to take longer routes between their origins and destinations or travel at slower speeds. For truck traffic, this can also result in decreasing the amount of goods that can be carried on each vehicle.

WSDOT estimates the physical condition of pavement on state highways on an annual basis. It estimates bridge condition every two years. Pavement and bridges in the study area that are currently in need of repair or replacement have been mapped in Figure 27. These include road segments with excessive cracking, patching, roughness, and/or rutting. It also includes bridges with substantial section loss, deterioration, cracking, spalling, and/or scour.

Figure 27. Roads and Bridges in Need of Repair or Replacement

Roadway Traffic Volumes

Total traffic volumes and truck traffic volumes are a starting point in determining where highway bottlenecks may be occurring, the severity of these bottlenecks, and the amount of capacity available in the highway network that can absorb changes in traffic volumes.

Traffic volumes on study area roadways and their functional classifications were obtained from the Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS) database for year 2022, the most currently available data at the time of this analysis. The HPMS data for Washington State are derived from WSDOT's traffic collection program using a series of permanent and temporary vehicle classification count data collection locations spread across Eastern Washington and the entire state.

Average annual daily traffic volumes of study area highways are shown on Figure 28 and Figure 29. Average annual daily truck traffic volumes are shown on Figure 30 and Figure 31. These volumes range from over 100,000 total vehicles per day or 15,000 trucks per day in the most densely urbanized areas of Vancouver and Spokane, to under 500 total vehicles per day or 100 trucks per day on rural road segments.

Figure 28. Study Area Traffic Volumes

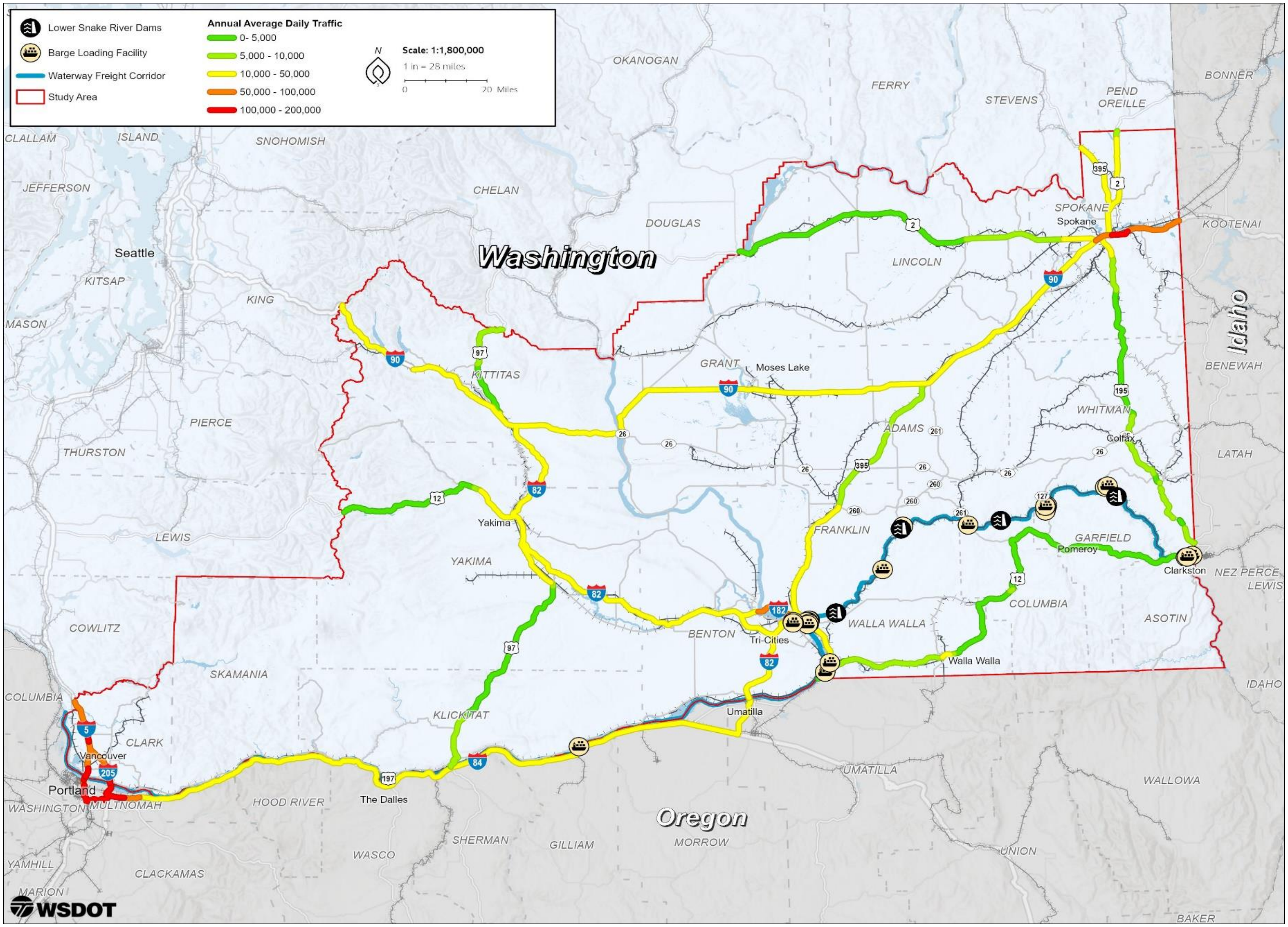


Figure 29. Traffic Volumes - Snake River Subarea

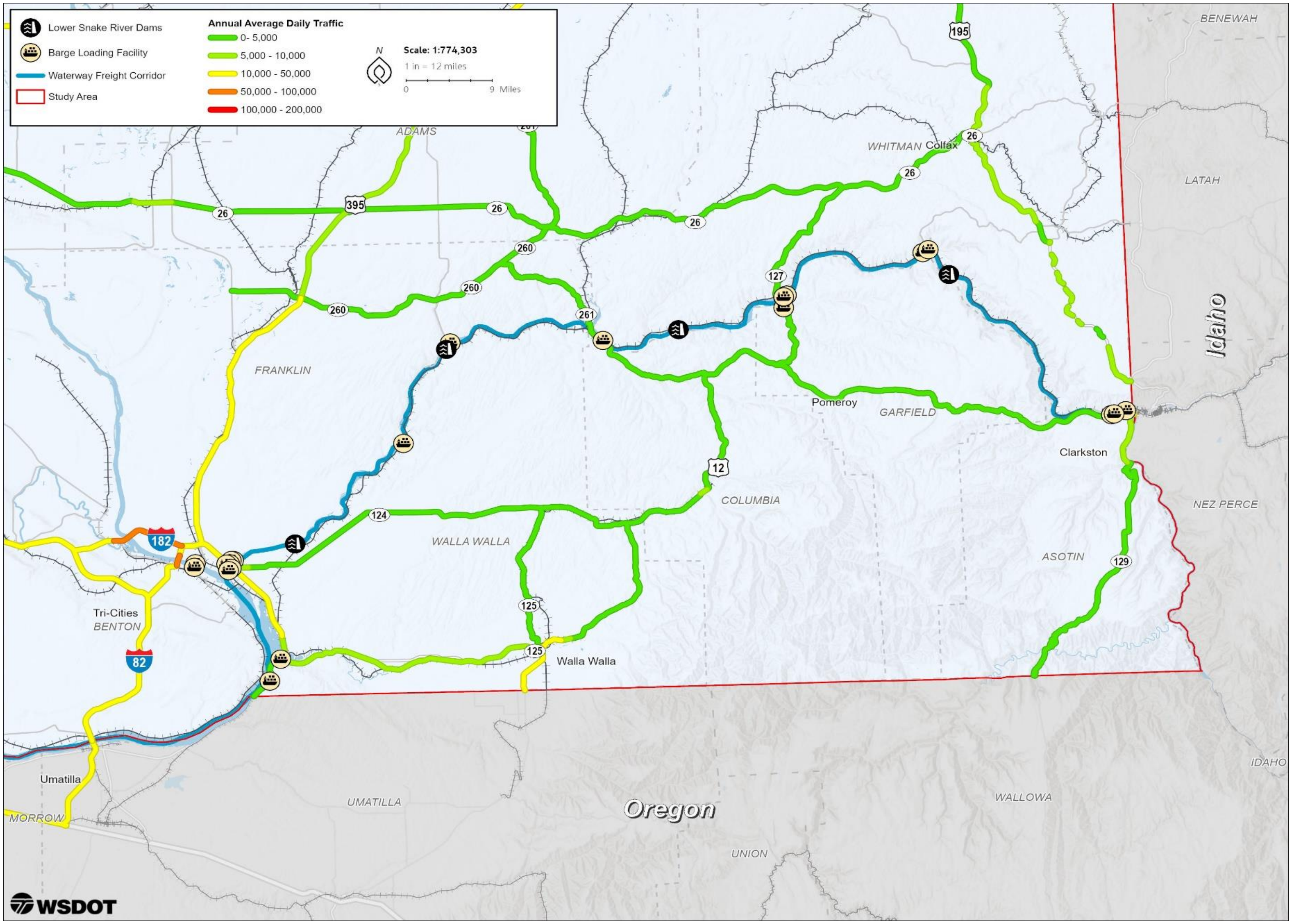


Figure 30. Study Area Truck Volumes

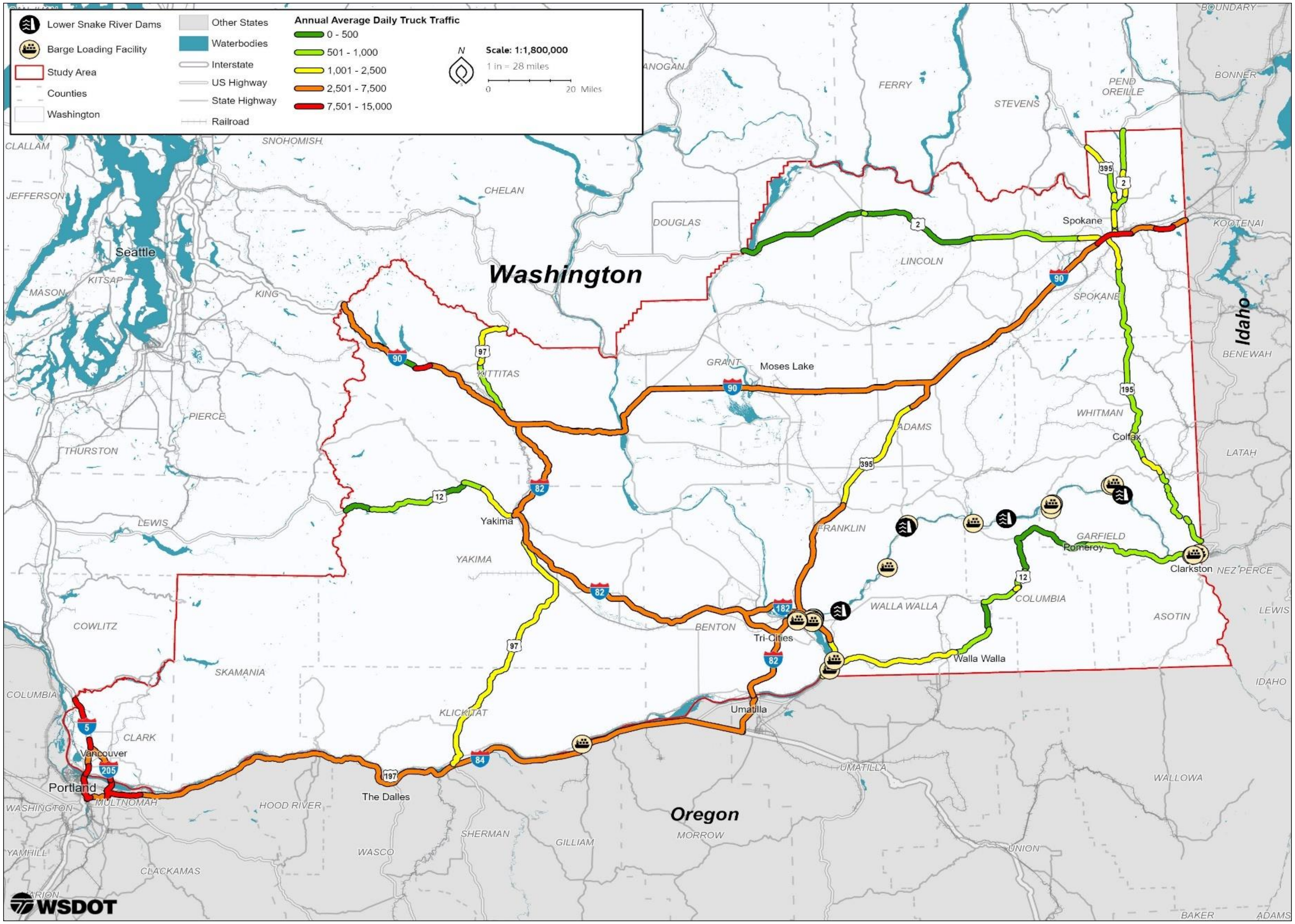
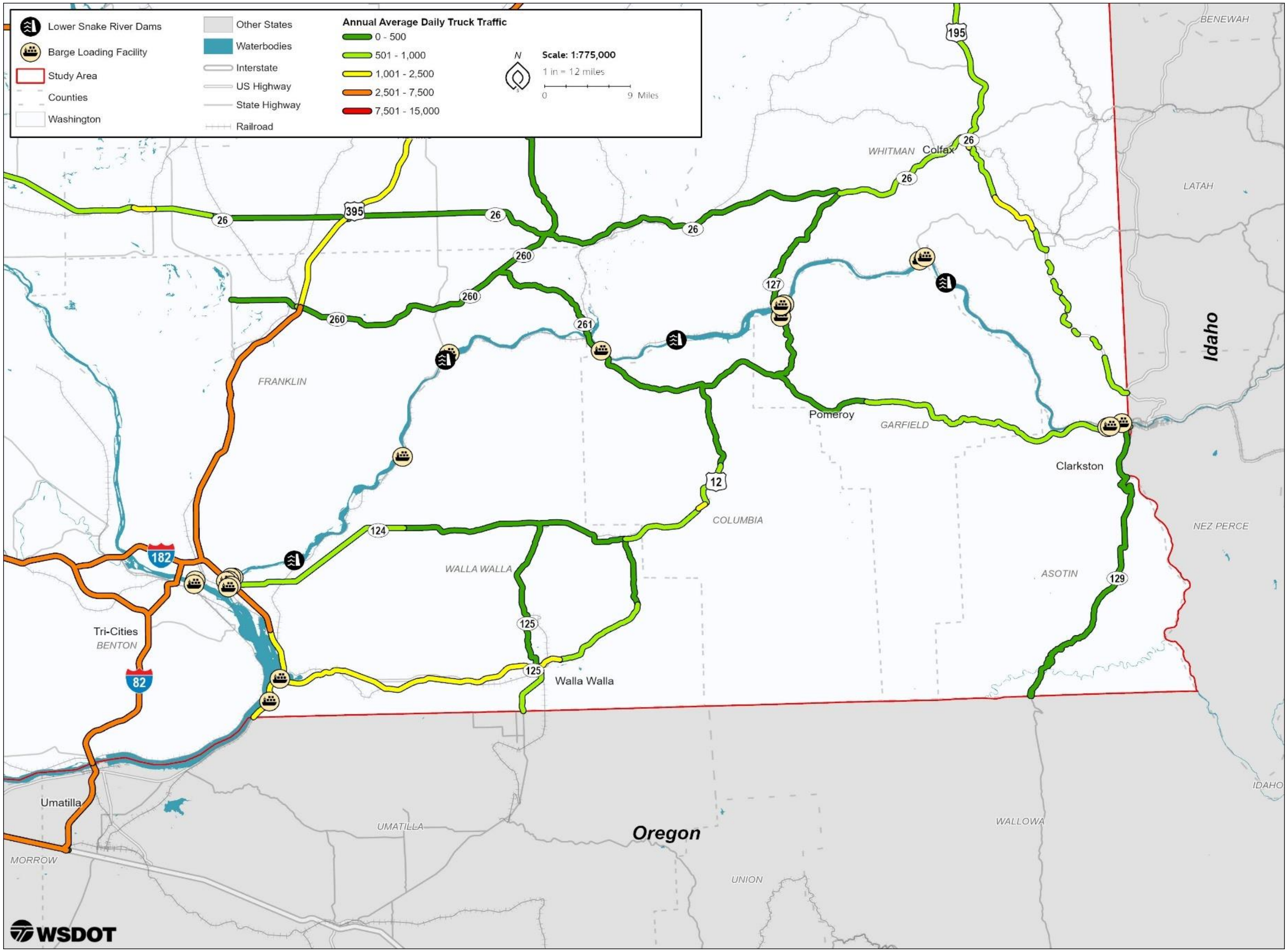


Figure 31. Truck Volumes - Snake River Subarea



Evaluation of Roadway Congestion

A key element of roadway performance is the level of congestion experienced by road users. Congestion was evaluated for several highway locations in the Lower Snake River area. Peak hour volumes were calculated using standard WSDOT and FHWA seasonal and hourly factors from the HPMS database, when available. For those roadway segments with no available seasonal and hourly factors, average factors were used from an applications guidebook developed based on the Highway Capacity Manual.[10]

The ratio of all-vehicle volume to capacity (V/C) was used to assess the performance of each roadway and adjacent highway segment. As the highway capacity varies greatly based on topography, presence of intersection control, lane widths, and many other factors, low capacities were assumed for each road type to provide a conservative assessment of congestion. These included 1,500 vehicles per hour per lane (vphpl) on interstates/freeways/ expressways, 1,200 vphpl on arterials, and 1,000 vphpl on smaller roadways. Congestion was assumed to be present when V/C > 0.80.

The Jacobs StreetLight data platform was used to estimate average vehicle speeds on roadway segments with available data during the PM peak hour. The PM peak hour was selected based on a review of historical data from three permanent traffic recorders in the study area, which showed peak traffic to occur between 4:00 PM and 6:00 PM. The average estimated vehicle speed from StreetLight was compared to the posted speed to determine whether congestion may be present. It was assumed that congestion was likely when the average speed was below 85 percent of the posted speed.

Congestion was measured on ten highways that serve barge terminals, nine highways that serve rail terminals, and 13 highways that serve grain terminals in the study area. At nearly all of these locations, either the peak hour volume was found to be less than 80 percent of capacity, the actual speed was found to be over 85 percent of the posted speed, or both. Three highway segments near affected rail/barge terminals currently have average speeds less than 85 percent of the posted speed: SR 124 near port facilities in Burbank, SR 397 near and along the Ed Hendler Bridge in Pasco/Kennewick, and SR 240 in Richland between SR 224 and Stevens Drive. However, these segments all have V/C ratios below 0.80 based on HPMS data. The project team will reach out to local jurisdictions to confirm problem areas and will focus on these areas in future analyses. Volumes and performance for these highways within one mile of the connection point (with either the facility driveway or a connector road) are shown in Table 2 for barge and rail terminals. As shown, all highways in the vicinity of the studied barge terminals currently operate without congestion during the peak hour. There was not sufficient volume information on the local connector roads to determine if there was any congestion, but from the daily volume levels, it appears that travel occurs at free flow speeds.

[10] Planning and Preliminary Engineering Applications Guide to the Highway Capacity Manual, National Cooperative Highway Research Program, Report 825.

Table 2. Highway Connectors to Barge and Rail Facilities

Highway	Highway Connectors	Mileposts From	Mileposts To	Port/ Community Name	Facility Served	Peak Hour Peak Direction Volume All Vehicles	Peak Hour Peak Direction Volume Trucks	Posted Speed	Congestion Evaluation[1]	Over Capacity?
US 12	At Port Terminals	432.0	433.5	Clarkston	Lewis-Clark Grain Terminal, Columbia Grain Terminal, Guy Bennet Lumber Products LLC, CHS Terminal, McGregor	230 to 435	25 to 30	30 to 60	Speed, V/C < 0.8	**No**
US 12	At Port Terminals	293.4	296.9	Pasco, Port of Walla Walla	Tidewater Terminal Company Snake River Terminal, Tri-Cities Grain Terminal, Burbank Grain Terminal, Scoular Grain Terminal, Schnitzer Steel Terminal	1,150 to 1,565	225 to 290	60	Speed, V/C < 0.8	**No**
US 730	At Port Terminals	2.1	6.1	Port Wallula/ Port Kelley Docks	Walla Walla Grain Growers: Port Kelley Dock & Port Wallula Dock	275	145	60	Speed, V/C < 0.8	**No**
SR 124	At Port Terminals	0.0	1.2	Burbank	Burbank Grain Terminal, Scoular Grain Terminal, Schnitzer Steel Terminal	365 to 460	55	40	Speed, V/C < 0.8	**Yes**[2]

Highway	Highway Connectors	Mileposts From	Mileposts To	Port/ Community Name	Facility Served	Peak Hour Peak Direction Volume All Vehicles	Peak Hour Peak Direction Volume Trucks	Posted Speed	Congestion Evaluation[1]	Over Capacity?
SR-124	At Port Terminals	20.1	22.1	Sheffler	Northwest Grain Growers Sheffler Terminal	130	35	65	Speed, V/C < 0.8	**No**
SR 127	At Port Terminals	8.0	11.2	Central Ferry	Central Ferry Terminal, Columbia Grain Terminal, Pomeroy Grain Growers Terminal/ McCoy Grain Terminal LLC	65 to 70	10	55	Speed	**No**
SR 128	At Port Terminals	0.0	2.2	Port of Wilma	Lewis-Clark Grain Terminal, Columbia Grain Terminal, Guy Bennet Lumber Products LLC, CHS Terminal, McGregor	354 to 401	65 to 75	35 to 55	Speed V/C < 0.8	**No**
SR 193	At Port Terminals	0.6	2.4	Port of Wilma	Lewis-Clark Grain Terminal, Columbia Grain Terminal, Guy Bennet Lumber Products LLC, CHS Terminal, McGregor	205	55	55	V/C < 0.8	**No**
SR 194	At Port Terminals	0.0	1.0	Almota	Pacific Northwest Farmers Coop	35	10	40	V/C < 0.8	**No**

Highway	Highway Connectors	Mileposts From	Mileposts To	Port/ Community Name	Facility Served	Peak Hour Peak Direction Volume All Vehicles	Peak Hour Peak Direction Volume Trucks	Posted Speed	Congestion Evaluation[1]	Over Capacity?
					Snake River Terminal					
SR 261	At Port Terminals	11.7	14.2	Lyons Ferry	Northwest Grain Growers Terminal	40	10	50	Speed, V/C < 0.8	**No**
SR 263	At Port Terminals	2.9	5.0	Port of Kahlotus	Prescott Grain Terminal	20	10	50	V/C < 0.8	**No**
SR 397	At Port Terminals	16.9	19.2	Pasco, Kennewick	Continental Grain Co. - Pasco Marine-Terminal Wharf, Harvest States Cooperatives - Kennewick Grain-Elevator Dock	600 to 1,270	70 to 85	35 to 40	Speed, V/C < 0.8	**Yes**[2]
I-90	At Unit Train Terminals	218.6	227.8	Ritzville	Templin Terminal	810 to 1,635	185 to 215	70	Speed, V/C < 0.8	**No**
I-90	At Unit Train Terminals	269.3	274.1	Airway Heights	HighLine Unit Train Loading Facility	1,755 to 2,520	160 to 200	70	Speed, V/C < 0.8	**No**
I-82	At Unit Train Terminals	130.1	132.6	Plymouth	Grain Handling LLC Grain Receiving Terminal	1,445 to 1,655	155 to 315	65 to 70	Speed, V/C < 0.8	**Yes**[2]
US 195	At Unit Train Terminals	61.3	64.0	McCoy	McCoy Unit Train Loading Facility	315	35	60	Speed, V/C < 0.8	**No**
US 395	At Unit Train Terminals	93.9	94.9	Ritzville	Templin Terminal	945	190	70	Speed	**No**

Highway	Highway Connectors	Mileposts From	Mileposts To	Port/ Community Name	Facility Served	Peak Hour Peak Direction Volume All Vehicles	Peak Hour Peak Direction Volume Trucks	Posted Speed	Congestion Evaluation[1]	Over Capacity?
SR 14	At Unit Train Terminals	177.9	179.9	Plymouth	Grain Handling LLC Grain Receiving Terminal	245	95	55 to 65	Speed, V/C < 0.8	**No**
SR 240	At Unit Train Terminals	25.9	28.8	Richland	CWCP Unit Facility at the Port of Benton	360 to 990	120 to 135	55	V/C < 0.8	**No**
SR-240	At Unit Train Terminals	30.7	31.7	Richland	CWCP Unit Facility at the Port of Benton	1,720	130	55	V/C < 0.8	**No**
SR 261	At Unit Train Terminals	61.7	62.8	Ritzville	Templin Terminal	50 to 435	15 to 165	35 to 55	Speed, V/C < 0.8	**No**
SR 271	At Unit Train Terminals	4.8	6.8	McCoy	McCoy Unit Train Loading Facility	90	15	55	V/C < 0.8	**No**
SR 904	At Unit Train Terminals	15.5	17.0	Airway Heights	HighLine Unit Train Loading Facility	1,395	130	40 to 55	Speed, V/C < 0.8	**Yes**[2]

[1] V/C was used to assess performance. When available, estimated speed data from StreetLight was also used to assess congestion.

[2] The average speeds along these segments do show the potential for congestion, but have V/C < 0.80. The project team will reach out to local jurisdictions to confirm problem areas and will focus on these areas in future analyses

VI. Summary of Engagement Activities

The study team is undertaking a comprehensive approach to engagement to ensure ongoing interactions with interested parties with whom information sharing and dialogue is essential. Initial engagement for Phase 1 was organized around a Community Engagement Plan and included the following activities:

- Convening a Technical Advisory Committee
- Convening a Community Advisory Committee
- Convening a Total Logistics Cost (TLC) Modal Diversion Model Group[11]
- Development of project materials
- Ad hoc briefings of transportation planning organizations
- Conducting an Online Open House on information related to existing and future conditions for roadway and rail traffic, the development of a Total Logistics Cost (TLC) freight diversion model and soliciting input on needs and priorities for the study.

Community Engagement Plan

The study team, in coordination with WSDOT, developed a Community Engagement Plan (CEP) for the study outlining the purpose of the project, study area, equity approach for reaching historically underrepresented communities, media analysis, community engagement tactics, and key messages. It is a "living" document that will be updated throughout the project.

[11] The TLC Modal Diversion model is the analytical tool used to estimate the amount of freight that diverts between barge, rail, and truck based on different operating conditions in the study area. Chapter 6 provides additional information on this model.

TECHNICAL ADVISORY COMMITTEE

The study team convened a Technical Advisory Committee (TAC) to review study elements and represent various organization and agency interests. This committee's role is to ensure the study is using the most up-to-date, local, regional, and state data. The TAC will keep agency partners informed about technical policy work and help the study team understand local, regional, state, and tribal needs. The TAC comprises representatives from various organizations; federal, state, and local representatives; and businesses. Consultation Letters were sent by WSDOT inviting them to join the TAC. To date, we have not received any responses. The committee advises on key elements of the study, including existing conditions, potential impacts, and proposed mitigations.

TAC Participants

The following is a list of agencies/organizations who received the invite for the TAC meetings. The agencies/ organizations in **bold** with * attended at least one meeting in 2024.

- **Washington Grain Commission***
- **United Grain***
- **Garfield County***
- **Washington Association of Wheat Growers***
- **Port of Whitman County***
- The American Waterways Operators
- **Pacific Northwest Waterways Association***
- **Benton Franklin Council of Governments***
- **Washington State University***
- U.S. Army Corps of Engineers
- **Walla Walla Valley Sub-Regional Transportation Planning Organization (RTPO)***
- **JTC***
- **Washington Public Ports Association***
- **Palouse RTPO***
- **Walla Walla County***
- Shaver Transportation
- **Washington Trucking Association***
- **Idaho Transportation Department***
- **Columbia County***
- UPRR
- **Port of Garfield***
- **Adams County***
- BNSF
- Omaha Truck
- **Franklin County***
- **PNW Farmers Cooperative***
- **Port of Lewiston***
- **Fast Way Freight System***
- **Highline Grain Growers***
- Port of Pasco
- **Tidewater Transportation and Terminals***

TAC MEETING

The TAC is committed to meeting every other month for the duration of the study through 2026. The TAC's first meeting occurred in summer 2024 and was the first of three meetings held to-date. Meetings were held virtually for one hour.

Meeting #1 - July 30, 2024. Committee members were introduced to the study and purpose, discussed roles and responsibilities for the TAC, and provided an overview on the total logistics cost model.

Meeting #2 September 25, 2024. Committee participants reviewed existing conditions and discussed upcoming engagement activities.

Meeting #3 November 21, 2024. Committee participants reviewed the draft interim report, discussed feedback received from previous briefings, and outlined next steps for Phase 2 of the study.

Community Advisory Committee

The Community Advisory Committee (CAC) represents organizational and governmental interests and will review community engagement approaches within the study. The role of the CAC is to ensure that the study considers the direction of current local policy and maintains strong community engagement and outreach. It Is comprised of local agencies, interest groups, associations, and non-profits. Consultation Letters were sent by WSDOT inviting them to join the CAC. To date, we have not received any responses. This includes keeping local organizational stakeholders and government offices informed about the study and engagement opportunities, as well as helping the study team understand local, regional, state, and tribal needs.

CAC Participants

The following is a list of agencies/organizations who received the invite for the CAC meetings. The agencies/organizations in **bold** with * attended at least one meeting in 2024.

- Ben Franklin Transit
- Pasco Chamber of Commerce
- **Franklin County***
- Walla Walla County Farm Bureau
- **Walla Walla Valley Chamber of Commerce***
- **Columbia County***
- Walla Walla County Cattlemen's Association
- American Rivers
- Walla Walla County
- Friends of Mid-Columbia River Wildlife Refuges
- Earth Justice
- Whitman County
- Washington Farm Labor Association
- **Solutionary Rail***
- **Pacific Northwest Grain & Feed Association***
- Washington Winegrowers Association
- **Washington Farm Bureau***
- Tilth Alliance
- **Blue Spruce Consulting***
- Franklin County Farm Bureau
- Washington Young Farmers Coalition
- **Asotin County***
- Columbia-Snake River Irrigators Association
- City of Pasco
- City of Waitsburg
- Live Pomeroy
- City of Kennewick
- City of Dayton
- Sustainable Tri-Cities
- **City of Richland***
- **Idaho Conservation League***
- **Lewis Clark Valley Chamber of Commerce***
- City of Clarkston
- Confederated Tribes of the Umatilla Indian Reservation
- Colfax Chamber of Commerce
- City of Pomeroy

CAC Meetings

The CAC is committed to meeting every other month for the duration of the study through 2026. The CAC's first meeting occurred in the summer of 2024 and was the first of two meetings held to-date.

Meeting #1 – September 5, 2024
Committee members were introduced to the study and its purpose, discussed roles and responsibilities for the CAC, and were presented with the first phase's communication approach.

Meeting #2 - December 16, 2024
Committee members were given an overview of the results of the draft interim report, discussed feedback received from phase one's outreach activities, and reviewed next steps for phase two.

Total Logistics Cost (TLC) Modal Diversion Model Engagement

The TLC modal diversion model incorporated several elements of engagement into the model development process. Outreach has included one-on-one meetings with individual interested parties to provide information on the general context for model development, provide specific data for development, and validation of the model. There were also meetings with state and federal transportation agencies to ensure model consistency with previous analytical tools developed related to the Snake River. Additionally, there were multiple industry outreach meetings to ensure that model structure and initial results approximate on the-ground conditions for moving goods.

One-on-One Meeting Participants

The consultant team conducted one-on-one meetings with individual interested parties to provide information on the foundational context for model development and provide specific data for development and validation of the model. Organizations included in the consultation meetings are shown in the following list. Key findings from these meetings are summarized in Appendix A. There were a few consultees that did not respond to meeting requests or declined to participate.

- Industry Associations
  - Pacific Northwest Waterways Association
  - Washington Public Ports Association
- Barge Operators
  - Shaver Transportation
  - Tidewater
- Railroads
  - Omaha Track
  - Columbia Rail
- Port Authorities
  - Port of Whitman County
  - Port of Lewiston
  - Port of Columbia
  - Port of Garfield
  - Port of Pasco
  - Port of Umatilla
  - Port of Benton
- Grain Companies
  - PNW Farmers Coop
  - Columbia Grain
  - CHS Primeland
  - CHS Sun Basin
  - Northwest Grain Growers
  - Pomeroy Grain Growers
  - Tri Cities Grain
  - Highline Grain Growers
  - Lewis-Clark Terminal
  - Temco
  - United Grain
- Fertilizer Companies
  - McGregor
  - Helena Chemical
  - Nutrien
- Forest Products Companies
  - Alta Forest Products
  - Bennett Lumber Company
  - Clearwater Paper

Tribal Outreach

Tribal consultation requests have been sent to five tribes that are in the study area: Nez Perce, Spokane, Umatilla, Warm Springs, and Yakama. The letters asked for tribal engagement in the TAC and CAC and also for engagement in other forms the tribe deems necessary. As of the time of this report, several presentations have been made at meetings with the tribes in attendance; the Nez Perce have assigned a representative to keep up on the study and its progress; and a joint reoccurring monthly meeting will begin with the Nez Perce, Umatilla, Warm Springs, and Yakama in December 2024 to keep them informed.

Key takeaways from the tribal engagement are a desire for the study to progress faster and for "no regrets" projects that can be recommended to be built today if the dams were breached in the future. The WSDOT has chosen to not supply a "no regrets" project list instead wanting this study to be the tool to generate a project list. The remainder of the questions have been related to clarity on the scope and schedule of the study.

The study teams will continue to engage with the tribes by attending meetings they are invited to and providing study updates as requested.

Briefings

The study team conducted briefings in 2024 to interested parties to provide a general overview of the project. The briefings provided an opportunity for direct, face-to-face conversations with community organizations and local agencies within the project area.

The study team conducted briefings with the following organizations:

- Palouse Regional Transportation Planning Organization (RTPO)
- Metropolitan Planning Organization (MPO)/RTPO/WSDOT Coordinating Committee
- Pacific Northwest Waterways Association
- Tri-Cities Intermodal
- Bennett Lumber
- McGregor
- Columbia Grain Growers
- CHC Primeland
- Palouse Economic Development Council
- Blue Spruce
- Idaho Conversations
- Earthjustice
- Nez Perce Tribe
- Six Sovereigns
- InfraDay 2024 American Rivers
- High Country News
- Solutionary Rail
- Northwest Grain Growers
- Pacific Northwest Farmers Cooperative
- Omaha Track
- Joint Transportation Committee

During the briefings, attendees thanked the team for sharing information about the study and asked questions related to timeline, community engagement, and details about the existing and future conditions.

Project Materials

Website

The study team created a study page on WSDOT's website that provides the public with information on the study, the purpose for the study, and contact information for community members to provide feedback.

The main project page provides planning study news, study purpose, and upcoming engagement opportunities, which includes a PDF calendar of events. Additionally, there are five tabs that provide:

1. Background: Includes information about recent studies conducted by other agencies surrounding the removal of the Lower Snake River dams. The current study will generate volume estimates and evaluate scenarios for changes in infrastructure and operations that would be necessary to address additional volumes from removing the dams.
2. Timeline: Includes the project milestones and outlines when each phase will begin, with the final report being published at the end of 2026.
3. Funding: Includes a link to the legislative proviso for the study.
4. Outcomes: Includes links to quarterly reports summarizing current progress, along with links to the project fact sheet and frequently asked questions (also translated into Spanish).
5. Contact: Includes a link to the GovDelivery site to receive updates on the study and contact information for the study lead.

Fact sheet

The study team developed a fact sheet for the study to share with the public when attending events, meetings, and open houses. The fact sheet provides background information on the study, purpose, the current timeline, and ways for community members to stay informed and provide feedback.

The fact sheet is available in English and Spanish and the online version is 508 compliant for those who are visually impaired.

FAQs

The study team developed a Frequently Asked Questions (FAQs) document for the study. The document includes common questions that may come up or have been asked previously by organizations or community members. The document provides clear and consistent responses to avoid confusion and enhances transparency by clarifying details to help build trust and manage expectations.

The FAQs is available on the project website and is translated in Spanish.

Online Open House

The study team launched an online open house on November 16, 2024. Hosted by WSDOT, it was open to the public for 3 weeks and closed on December 6, 2024.

The goals for the online open house were as follows:

- Engage the public across counties in the study area.
- Inform the public about the general study, its objectives, and the overall process.
- Gather feedback on community priorities and general comments and questions.
- Hear from diverse community voices, including from people who use languages other than English.

The online open house was accessible through a WordPress site. The content was available in English and Spanish. The following is a high-level overview of the content:

- Project Overview
  - Welcome and purpose
  - Lower Snake River dams background
  - Timeline
- Progress
  - Existing conditions
  - Status Report findings
- Next Steps

Notifications

- Online open house news release distributed through the WSDOT website and media contacts. WSDOT manages the news release and serves as the media contact.
- Facebook post and X post from WSDOT accounts when the site went live. This included boosted posts geotargeted to the study area.
- Ethnic media advertising to reach targeted audiences who use Spanish.
- Community-based organization email toolkit to ease sharing out the online open house link and project information.
- Project committee email notification (e.g., TAC, CAC) with a link to the online open house and draft social media/email text.

- Listserv email to subscribers on GovDelivery announcing the online open house and ways to provide feedback.

Future Community Engagement

Technical Advisory Committee

The TAC will continue to meet throughout the study. Meetings will take place every other month. The study team will provide an open invitation to new participants to join the TAC meetings if the organization or agency has been identified as a key interested party.

Community Advisory Committee

The CAC will convene at the project milestones outlined in the project schedule. The study team will provide an open invitation to new participants wishing to attend the CAC meetings.

Briefings

The study team will continue to lead briefings to interested parties.

Existing In-Person Events

The study team will attend events, such as fairs and festivals, in the community spring/summer 2025.

Open houses/online open houses

The study team will develop and execute virtual and in-person open houses throughout spring/summer 2025.

Project materials

Project materials will be updated at each milestone or as necessary.

VII. Total Logistics Cost Model

Purpose of the Model

The Total Logistics Cost (TLC) model was constructed to represent shippers' decision-making processes in choosing different supply chain modes and routings. The TLC model can evaluate transportation modes and routings based on costs, transportation network capacity, and transportation network access to origin and destination points. The model is designed to estimate flows across all modes of key commodities that are carried by barges on the Lower Snake River, serving a broad market area that includes portions of Washington, Oregon, and Idaho.

The model's outputs for commodity flow routings and transportation costs provide insight into how the Lower Snake River's shipping system is utilized, the scope of the regions it serves, and the costs of transportation services for different routings. In later stages of the Lower Snake River Transportation Impact Study, the model will also be used to examine how changes in the availability of river transportation may change commodity flow routings and transportation costs in the region. In turn, these outputs will inform assessments of transportation impacts and the impact of development of new infrastructure.

The model will be used for subsequent phases of the study (primarily Phase 3, see Figure 1). As we progress through the remaining phases, the model may be updated or changed to reflect new information. As such, any figures shown in this report (see Figure 13 though Figure 15) are a snapshot in time of where the model was at the time the figures were created.

Commodities Selected for Analysis

The TLC model consists of three separate models representing the transportation costs and routings of the top three commodities currently moving on the Lower Snake River system above the Ice Harbor Dam. These three commodities account for more than 95% of the tonnage handled by the Lower Snake River system above the Ice Harbor Dam.

- **Wheat**. Wheat accounts for 85% or more of the tonnage moving on the Lower Snake River above the Ice Harbor Dam. Wheat is moved downstream from barge terminals on the Lower Snake River to export terminals on the lower Columbia River where agricultural products are loaded on ocean-going ships for export. Wheat from the Pacific Northwest also moves to these export terminals via Washington and Oregon's railroad network.
- **Fertilizer.** Liquid fertilizer is moved upstream on the Lower Snake River to barge terminals and is distributed from barge terminals directly to farms, or through intermediate distribution facilities. This supply of fertilizer is important for a range of crops produced in the region, primarily wheat, canola, and pulses.
- **Wood products**. Wood products, such as wood chips and logs move in both directions on the Lower Snake River, with logs moving downstream, and wood chips moving both upstream and

downstream. These wood products are used as inputs to other manufacturing processes such as papermaking.

It is important to note that other goods move on the Lower Snake River but are not reflected in the model. These include:

- **High, wide, and heavy cargo**. The Lower Snake River is an important corridor for movement of goods that are too large or heavy to easily move by truck or rail, such as wind turbine components or large industrial machinery. These movements are not modeled because they do not have regular shipping patterns and account for a small share of the total tonnage of cargo moving on the Lower Snake River.
- **Petroleum and metals**. These materials are handled by terminals on the Lower Snake River in the Tri Cities area, but these terminals are located downstream of the Ice Harbor Dam, which is the last dam on the Lower Snake River system. The US Army Corps of Engineers (USACE) has provided guidance that navigation on this small portion of Lower Snake River would remain open following dam removal with adequate dredging.[12] Therefore, the modeling effort assumes that the terminals handling these commodities would remain open if the dams were removed, and the commodities that they handle are not included in the model.
- **Cruise tourism activity.** Cruise demand has steadily increased over the last ten years and represents a growing market in the region. The cruise season lasts April to November, and passenger counts during these cruise seasons have consistently increased since 2010, due in part to passenger capacity on each ship increasing and requiring fewer vessels to meet demand. In 2019 the Port of Clarkston reported roughly 19,000 passengers arriving from cruise lines, nearly 8,000 more than were recorded in 2010. Cruise industry passenger capacity is projected to grow an additional 80% between 2021 and 2027 through additional vessels and a lengthened season.[13] With many passengers choosing to stay overnight in the destination of their ship's port call, total spending associated with the cruise industry in the region (including spending by passengers, crew members, and cruise lines) is estimated at $3.5 million.

  Coordination between WSDOT and the Recreation Conservation office (RCO) in August of 2024 determined that the RCO will study cruise line impacts of Snake River dam removal, as there is not a transportation option to divert cruise trips to another mode of transportation. The study will be completed in June 2025 and lend further insight into the role of the cruise industry on the Snake River.

Geographic Areas of Analysis

The TLC models described here includes a geographic scope that is greater than only southeast Washington, and it is important to note that results for commodity flows and costs reflect movements in portions of central Washington, as well as portions of Oregon and Idaho.
The geographic scope of each commodity's model varies based on the network being studied.

[12] Consultant team consultation and email guidance from US Army Corps of Engineers, June 2024.
[13] Port of Clarkston, Riverboats in the Lewis Clark Valley

The TLC model for wheat includes consideration of townships in Oregon, Idaho, and Washington that produce more than 1,000 bushels of wheat. This includes a region that was modeled because barge shipping handles a large share of the region's wheat transported to export facilities, and potential closure of the Lower Snake River would impact shipping pathways and costs for wheat producers over a wide region.

The TLC model for fertilizer distribution and consumption is focused solely on southeast Washington and represents the range of areas served by fertilizer distributed from barge terminals.

The TLC model for forest products reflects the movements of forest products sourced from forests or mills in Washington, Oregon, and Idaho to terminals or mills located in Washington and Idaho.

Constructing the Model

Multiple inputs and data for validation were required to model the current flow of goods utilizing the Lower Snake River's waterborne navigation system (also referred to here as the *status quo*). The following broad steps informed creation of the model, with detail on the specific inputs, assumptions, and unique decision-making factors for each of the three commodities.

Consultation and outreach to industry interested parties, including barge operators, railroads, grain companies, fertilizer producers and distributors, forest products companies, and port authorities provided foundational context for model development, and specific data for development and validation of the model. Details on consultation and outreach efforts are described in Chapter VI of this report.

Construction of a multimodal transportation network that utilizes a multi-modal transportation network including rivers, railroads, and highways to route commodity flows between specific origins and destinations. These major network elements were created using state, national, and international data sources. Additionally, multimodal facilities that support the movement of cargo between modes of transportation such as grain elevators were included in the model based on feedback from interested parties and state and national datasets.

Commodity production and consumption estimation that reflects that demand for transportation services is an induced demand driven by the production and consumption of commodities. Information on commodity production and consumption was collected and used to understand commodity origins and destinations, as well as trends in the types of commodities moving on the Lower Snake River over the past 20+ years. Information on the estimation process for commodity production or consumption is provided in the following chapters detailing the operation of each model.

Existing commodity flow analysis utilizing data on existing commodity flows and transportation patterns collected from a variety of sources, such as the USACE Waterborne Commerce Statistics reports, and stakeholder consultations. This information was used to describe current flows of goods on the river and was also used for validation of model outputs.

Defining costs and constraints that are essential for determining the pathways for commodities to flow through the network. Transportation costs, and constraints on throughput of transportation links and individual freight facilities were established based on consultations, shipper data, and public data.

Model generation of transportation routings that, based on the inputs outlined in the previously listed areas, generates estimates of transportation cost between origins and destinations utilizing varying combinations of routes, factors in multimodal infrastructure capacity where relevant, and determines the lowest-cost routing between origins and destinations. Outputs for transportation routings are profiled in the following chapters.

Iterative review and validation of inputs and results: model outputs were reviewed against real-world data and with industry parties. Based on feedback from interested groups and comparison against real-world data, the models described in the following chapters underwent multiple rounds of iterative editing to improve their fidelity to real-world operations.

Given the different characteristics of the three commodities evaluated in the TLC model, many of the data inputs and assumptions discussed in the previous text were different for each model – specifics for each commodity flow model are discussed in the following sections.

Shared Data and Inputs Used Across All Commodities

The following data and inputs were used to develop the model that represents current-day status quo of Lower Snake River Dams in operation, and commercial navigation operating normally on the Lower Snake River.

- **Road network**: The road network for the model used OpenStreetMap's 2024 road network as it allowed for the model to include major roads and arterials as well as local connector streets and county roads. This allowed for the highest level of accuracy in terms of what roads are available for transport of commodities from all origins.

Annual Timeframe Represented in Outputs

For all model outputs shown below, tonnages and values reflect a full year's worth of commodity movements. Varied years for commodity production or consumption were used for each element of the TLC model.

- Wheat flows reflect wheat harvest volumes for 2020, analysis of wheat yields and industry interested parties indicated that this was the most recent "normal" year for wheat production in the region in line with long-term yield and production trends.
- Fertilizer flows reflect the volume of fertilizer supplied by barge in 2023. This year was chosen because continued adoption of UAN fertilizer has increased fertilizer tonnage moving on the river, and additional fertilizer capacity has been added to barge facilities since 2020. 2023 is the most recent complete calendar year of data at time of writing.
- Forest products flows reflect industry interested parties-provided information on the most recent shipping volumes for 2023 and 2024.

- **Rail network**: The model's rail network was assembled using the Federal Railroad Administration's North American Rail Network Lines dataset updated in September 2024 showing rail lines by operator and class.
- **River network**: The river network was developed using USACE's 2024 Navigable Waterways Network files, providing a detailed view of not only the Snake River but also its accompanying barge terminals and facilities.
- **Barge terminals**: The barge terminal was assembled using a combination of federal data sets, company websites and stakeholder input. A barge terminal inventory was first assembled using the most recent Washington State Freight Plan, then updated based on input from terminal owners and operators on the status, location, and capacity of facilities. Terminals were also added based on USACE's navigation facility data.

Further information on transportation system attributes, such as system capacity for grain elevators, multimodal facilities, and barge terminals were gathered using input from regional interested parties and facility operators as well as public federal and state datasets.

VIII. Next Steps

This Existing Conditions Report describes existing conditions for barge, rail, and truck traffic in the Lower Snake River Dam area. It also describes the methodology for developing the Total Logistics Cost (TLC) modal diversion model and the results of the initial existing conditions scenario for the model.

Figure 1 shows the four phases of the study. The next step for the study is to utilize the model to see what improvements need to be made to the existing transportation system if barges can no longer be used on the lower Snake River. Based on the changes in barge, rail, and truck traffic, the estimated impacts on safety, air quality, and greenhouse gas will be quantified.

There has been extensive involvement from a wide range of interested parties in this study thus far. Future work will also be done to incorporate input from interested parties that have not yet participated in the study. Additional advisory committee meetings, individual consultations, briefings, open houses, and website updates will occur over the remainder of the study to ensure that information is being disseminated to interested parties and feedback is received by WSDOT regarding the technical elements of the study.

Appendix A
Key Findings from Private Sector Engagement

Appendix A - Key Findings from Private Sector Engagement

Through the various touchpoints with the private sector, several key findings were documented. These are summarized in the following text for key commodities (wheat, fertilizer, and forest products) along with each of the major freight modes (barge, rail, trucking). Engagement from the public sector and the general public will be summarized later in the engagement process.

Wheat Industry Feedback

- **Cost is the driving factor for wheat routing decision making.** Farmers are price-takers, they have to accept a global market price for grain, as well as market prices for inputs like seed and fertilizer. The cost of transportation to export is one item that farmers can exert some control. Therefore, the general goal is to minimize the overall transportation cost for delivery to export terminals.
- **Country elevators are key first-mile destinations, and forward stored wheat on to multimodal facilities.** When compared to other major agricultural areas in the United States, the farms in the Pacific Northwest have very little on-farm storage. Therefore, local country grain elevators are key first-mile stops in the wheat export chain for many farmers.
- **Storage practices are evolving.** The Pacific Northwest has seen significant construction of ground pile storage facilities for wheat. These ground piles offer significant cost savings over the creation of new elevators and are important because construction of new elevator space is extremely expensive.
- **Wheat yields are slowly increasing.** A common comment across wheat producers was that wheat yields are slowly increasing over time with improved plant breeding. In general, a relatively consistent amount of land is cultivated for wheat from year-to-year, but the slow increase in yields has resulted in increases in total wheat production.
- **Trucking and railroad labor availability and equipment availability is an increasing concern.** Many wheat producers and merchandisers indicate that there is limited availability of truck drivers and trucks in the region. Therefore, farmers often must keep their first-mile moves from farm fields to local elevators relatively short, so that limited truck availability can keep up with the pace of harvest. In looking towards potential scenarios where barge shipping would not be available, wheat producers are highly-concerned about how the lack of truck drivers and equipment may affect their operations and cost if truck trip distances must increase.
  Wheat producers expressed similar concerns about the capacity of the railroad network, which is detailed in the rail service feedback summary.
- **Export elevators may be bottlenecked for rail shipping.** Some export elevator consultees and grain merchandising consultees noted that export terminals on the Columbia River are approaching the maximum throughput of their rail handling capacity, further emphasizing the importance of barge for supplying export terminals.

Fertilizer Industry Feedback

- **Nitrogen fertilizer use has changed.** Historically, farmers used anhydrous ammonia to supply their crops with nitrogen, but anhydrous ammonia is harder to handle due to its hazardous qualities. By comparison, liquid nitrogen fertilizer like Urea Ammonium Nitrate is easier and safer to handle. As a result, anhydrous ammonia and dry fertilizers have been replaced by liquid compounds in many areas. Liquid fertilizers can also be custom blended with other crop inputs at distribution facilities, with tailored blends being produced for specific farms or regions.
- **Fertilizer demand has two seasonal peaks and is extremely time-sensitive.** There are spring and fall application seasons, and each of these seasons have very limited application windows based on temperature and weather conditions. Therefore, the high carrying capacity of barge transportation is crucial for ensuring that fertilizer stocks are adequately maintained during tightly defined seasonal application periods.
- **Liquid fertilizer demand is driven by select crops.** Fertilizer consultees indicate that demand for fertilizer is heavily influenced on the market price of wheat, crop coverage of wheat, hops, and canola, and market price of fertilizer itself. In years when wheat prices are low and/or fertilizer prices are high, demand for fertilizer may be reduced.
- **Barge shipping is critical for liquid nitrogen fertilizers.** Liquid nitrogen fertilizers are moved in two liquid tank barges on the river system, and other modes of transportation cannot support this movement of bulk liquid.
- **Other modes of transportation (trucking and rail) are important for handling other types of fertilizer.** Consultees indicated that their available trucking and rail capacity was dedicated to receipt of other types of fertilizer.

Forest Products Industry Feedback

- **The role of barge for forest products.** For the companies currently moving forest products on the Lower Snake River, barge transportation moves most of their cargo. Forest products consultees indicated that trucking or rail transportation cannot replace barge transportation for their shipments because of the limited capacity of these alternative modes, the fact that some of their shipment origins and destinations lack rail service, and because of the increased cost of these alternative modes.
- **Forest products have relatively longer supply chains.** The TLC model represents water-borne flows of forest products, but the full supply chains are dispersed across a wider area. For example, logs moving down the river from barge terminals in the Lewiston area are sourced from a wide range of locations in Idaho. Similarly, chips are sourced from a range of mills across Idaho, Oregon, and Washington, consolidated at a barge terminal, and shipped downstream. These dispersed first-mile movements are not depicted because they are variable across the year and are consistently consolidated at the specific barge terminals shown in the model.

Barge Service Feedback

Much of the feedback on barge service was provided in comparison to other modes of transportation, such as rail and trucking. Broadly speaking, consultees indicated that barge transportation has several favorable qualities compared to other modes, such as lower transportation cost, higher transportation capacity, and better travel time reliability.

- **Barge service is more cost-effective than rail and trucking.** The most-common point of feedback across all types of consultees (and finding in prior studies) is that barge transportation is more cost-effective on a long-distance basis than rail shipping or trucking. These cost benefits are important for the industries that utilize barge shipping because their commodity values per ton are relatively low, and therefore highly sensitive to transportation costs. Consultees, including barge operators, indicated that barge shipping rate increases are generally gradual and steady, compared to other modes of transportation.
- **Higher capacity compared to other modes**: a single barge can carry the equivalent volume of cargo as multiple railcars or trucks. The high carrying capacity of the barge network is a fundamental asset for shippers in the region that need to move large volumes of cargo.
- **Barge shipping provides flexibility**. Consultees across all industries noted that barge shipping is important because it provides flexibility in accommodating swings in shipping demand. Wheat industry consultees indicated that it is easy to order additional barges to accommodate changes in shipping volumes or meet rush orders.
- **Travel time reliability of barge is higher than rail**. While barges move more slowly than trains, complete travel time from the study area to points downstream on the Columbia River is often faster with barge rather than rail. Additionally, consultees indicate that the barge network has a high degree of travel time reliability, with consistent travel times up and down the river, and a high degree of certainty about the days and times that barges will arrive. By comparison consultees indicate that rail service in the region did not have a similar degree of travel time reliability.
- **Expansion potential for barge facilities is limited**. Consultees across all industries indicated that one weakness of the barge network is limited geographic space for further expansion of barge facilities, particularly on the Lower Snake River. These space limitations are due to the fact that many existing terminals are located in narrow river valleys and lack much space for future expansion.

Rail Service Feedback

- **Relatively higher cost.** Consultees indicated that relative to barge shipping, Class I and shortline rail transportation costs more on a ton-mile basis. This was the most-frequently mentioned concern when consultees discussed the potential impact of removing dams on the Lower Snake River, as increased transportation costs would have a significant negative impact on industries that rely on the river for transportation.
- **Increase in rail rates following dam removal.** Given the concerns related to existing rail shipping costs, consultees from multiple industries also expressed concern that the closure of

barge shipping would spur an increase in both Class I and shortline rail rates, as barge shipping's current availability provides a competitive cap on how high rail rates may rise. If barge shipping on the Lower Snake were no longer an option, this competitive pressure on rail rates would be reduced.

- **Lower travel time reliability.** While barge shipping is reliable within hours of an expected arrival or delivery time, consultees indicated that Class I and shortline rail service is less reliable, with the potential for weeks of variation in delivery times.
- **Limited capacity for additional growth**. Given the existing concern about travel time reliability and shipping costs, industry consultees consistently expressed strong concern that Class I and shortline rail transportation would not be able to absorb the volume of new shipments that would be generated if river shipping was no longer available. These concerns include issues related to rail crew labor availability, rail equipment availability, and the ability of grain export terminals to handle further rail traffic.
- **Rail service quality**. Based on the points in the previous bullets, consultees expressed general concerns about the quality of both Class I and shortline rail services, such as its limited flexibility in accommodating new flows, volatile pricing, and unreliable travel times.

Trucking Service Feedback

Compared to the discussion about barge and rail service, consultees had relatively limited feedback on trucking. This lower degree of feedback reflects the fact that trucking is an important first/final mile mode of transportation for many companies, but it is not reasonable for long-haul movement of materials moving on the rail and barge networks.

- **Trucking is relatively higher cost compared to rail and barge shipping.** Of all three modes of transportation explored in this study, trucking costs are the highest on a per-mile and per-ton basis.
- **Trucking capacity is constrained**. Similar to broader state and national concerns, shippers in the study area indicated that there is a shortage of truck drivers and trucks, and the trucking network cannot absorb much more new cargo.
- **Trucking is not a substitute for rail and barge shipping**. Because of the limited capacity of trucking and its high cost relative to other modes, river users indicated that trucking is not a substitute for long-distance movements on barge and rail. For example, grain consultees unanimously indicated that long-haul trucking wheat to export terminals is infeasible.