Freight Policy Transportation Insitute

Industry Preparations for the Columbia-Snake River Extended Lock Outage, July – December 2010

Washington State University

FPTI

Industry Preparations for the Columbia-Snake River Extended Lock Outage, July – December 2010

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Transportation and Environmental Assessment of the Impact of Extended Lock Outages: the Columbia-Snake River System
Interim Report #2

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FPTI Research Reports:
Background and Purpose

This is the second of a series of reports prepared by the Freight Policy Transportation Institute (FPTI). The reports prepared as part of this Institute provide information to help advance knowledge and analytics in the area of transportation policy. This specific analysis in this second report was partially funded by Transportation Northwest (TransNow).

FPTI is funded by the United States Department of Transportation (USDOT). Dr. Ken Casavant of Washington State University is Director of the Institute. A Technical Advisory Committee (TAC) comprised of Federal, State and local representatives has been assembled in order to identify relevant and pressing issues for analysis, apply rigorous theoretical and analytical techniques and evaluate results and reports. The TAC includes Jerry Lenzi (WSDOT) as Chair, Ed Strocko (USDOT), Carol Swerdloff (USDOT), Bruce Blanton (USDA), Timothy Lynch (American Trucking Association), Rand Rogers (MARAD), John Gray (AAR) and Daniel Mathis (FHWA – Washington State). The following are key goals and objectives for the Freight Policy Transportation Institute:

- Improve understanding of the importance of efficient and effective freight transportation to both the regional and national economy

- Address the need for improved intermodal freight transportation, as well as policies and actions that can be implemented to lower operating costs, increase safety and lower environmental impacts of freight transportation nationwide

- Improve freight transportation performance to specific industries and sectors of the economy

For additional information about the Freight Policy Transportation Institute or this report, please contact Ken Casavant at the following address:

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DISCLAIMER

The contents of this report reflect the views of the various authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the United States Department of Transportation. This report does not constitute and standard, specification or regulation.

FPTI PREVIOUS REPORTS NOW AVAILABLE

1. Simmons, Sara and Ken Casavant. FPTI Research Report #1. "Historical Waterborne Commerce on the Columbia-Snake River System: Commodity Movements Up and Down River, 1991-2010." November 2010.

ACKNOWLEDGEMENTS

This study was partially funded by a grant from Transportation Northwest.

Background and Purpose of Overall Study

The Columbia-Snake River System in the Pacific Northwest will soon undergo a massive and sustained lock outage, eliminating barge transportation on much of the upper Columbia River and all of the Snake River. The impact of this loss of a major mode of transportation may be substantial and the impact on demands of other modes of transportation dramatic.

The goal of the outage is to make necessary major maintenance repairs for continued operation in the future. Such extended lock closures are not normal but this river system, as many facilities throughout the nation, requires massive investments to maintain the integrity of the system and to continue to generate the acknowledged long term benefits of the navigation system.

The economic value of this transportation link is apparent from the commerce that flows up and down the system. This river system is the #1 U.S. wheat export gateway, #1 U.S. barley export gateway, #1 West Coast paper and forest products gateway, #1 in West Coast mineral bulk exports and #1 in West Coast auto imports. This inland system supports 10 million tons of cargo and is connected to the deep draft channel and ocean shipping which supports over 40 million tons of cargo.

The closure of these locks, scheduled from December 2010 to March 2011, will have impacts on shippers, river carriers, roads, alternative modes, ports, communities, economic development decisions, energy and the environment as these entities react to the temporary loss of this transportation alternative. The actual extent and form of these impacts is uncertain and unclear.

This is the second of four interim reports by the Freight Policy Transportation Institute (FPTI) for the Transportation and Environmental Assessment of the Impact of Extended Lock Outages: the Columbia-Snake River System.

The overall scope of this study includes the following objectives:

- Empirically determine current use of the transportation system surrounding and including the inland navigation mode in typical periods of time, by inventorying and describing the shippers, carriers, ports, cities/counties, etc. and attendant river flows by timing, commodity and location on the river
- In months leading up to actual lock closure on the Columbia-Snake River System, determine changes and impacts of changes in the usage of the river navigation mode and attendant modes/functions
- During actual lock closure, collect and analyze rates and modal costs to determine incidence and magnitude of increased marketing costs
- Following the lock closure, evaluate the timing and volume of shipments and impacts as the river traffic returns to its pre-lock closure condition

- Determine the impacts on the environment in the form of road damage, energy consumption and emissions production during the three major phases of the study
- Develop and describe the methodology useful for evaluating and understanding the dynamic nature of disruptions, industry reactions and responses
- Identify the value of the river option

The four specific work phases identified for this study are:

- Phase 1 – Historical Documentation of River Movements Prior to the Closure
- Phase 2 – Documentation, Modeling and Interviews Prior to the Closure
- Phase 3 – Documentation, Modeling and Interviews During the Closure
- Phase 4 – Documentation, Modeling and Interviews After the Closure

For additional information about the FPTI or this report, please contact Ken Casavant at the following address:

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The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the United States Department of Transportation, Transportation Northwest or individual commodity shippers and carriers. This report does not constitute a standard, specification or regulation.

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This study was partially funded by Transportation Northwest (TransNow). We would like to thank the United States Army Corps of Engineers for providing data used in this study. In addition, we would like to thank those who provided information in regards to industries and organizations affected by the upcoming lock outage.

Industry Preparations for the Columbia-Snake River Extended Lock Outage, July – December 2010

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Industry Preparations for the Columbia-Snake River Extended Lock Outage, July – December 2010

Executive Summary

The Columbia-Snake River System in the Pacific Northwest will soon undergo a massive and sustained lock outage, eliminating barge transportation on much of the upper Columbia River and all of the Snake River. The impact of this loss of a major mode of transportation may be substantial and the impact on demands of other modes of transportation dramatic.

The overall purpose of this report is to capture the preparations of shippers, river carriers, government entities, ports and communities prior to the extended lock outage. Part of these individuals' preparations includes increased commodity movements along the Columbia-Snake River. The report's secondary objective is to describe the general characteristics of transportation movements up and downriver during the six month period between July and December 2010, in comparison with past data and to draw inferences regarding future trends.

The specific research objectives and methodology are first reviewed in Section 1. An evaluation of monthly tonnage for major commodities shipped up and downriver from July 2010 to December 2010 follows in Section 2. The end of Section 2 specifically compares these monthly movements to corresponding movements from the past three years. Section 3 looks at the preparations of the Pacific Northwest wheat industry, including the results of a survey conducted of participants of the wheat industry in Washington, Oregon and Idaho. A copy of the survey is included in Appendix A. Industry preparations for other major commodities are discussed in Section 4. The final segment, Section 5, describes the preparations and activities of governments and institutions involved in the extended lock outage.

Information provided in this report regarding commodity movements on the Columbia-Snake River is based on data available from the U.S. Army Corps of Engineers Waterborne Commerce Statistics Center. Data are collected as part of the Lock Performance Monitoring System (LPMS) for the locks owned or operated by the U.S. Army Corps. Information regarding plans and preparations were provided by shippers, river carriers, government divisions, industry personnel, ports and community leaders. Information was drawn through interviews, a survey of the wheat industry in the Pacific Northwest, transportation conferences, meetings and government and industry websites. A list of those interviewed and surveyed is available in Appendix B.

The most notable characteristic of waterborne movements between July 2010 and December 2010 is that on the Columbia-Snake River about three times more tonnage travels downriver than upriver. Moreover, the monthly total tonnage traveling upriver remained quite stable between July and November 2010 at an average of 198,000 tons, whereas the total tonnage of downriver shipments ranged from a high of 690,000 in August to a low of around 415,000 tons in July.

A total of 3.3 million tons were shipped downriver between July and December 2010. The commodities with the largest volume of downriver shipments over the six month period have been wheat; forest products; sand, gravel and stone products; iron ore products; and vegetable products. During this time period, wheat comprised more than 75 percent, or 2.5 million tons of the total 3.3 million tons.

Around one million tons were shipped upriver between July and December 2010. The commodities with the largest volume of upriver shipments over the six month span have been distillate, residual and other fuel oils; gasoline products; waste materials; sand, gravel and stone products; and manufactured equipment and machinery. The highest proportion of total upriver shipments, 48 percent of the total one million tons, was distillate, residual and other fuel oils. The second highest proportion of total upriver shipments was gasoline, jet fuel and kerosene products, comprising about 31 percent of the total upriver tonnage for July through December 2010.

Major commodities in general moved in large and above average quantities on the Columbia-Snake River during the month of July through December 2010 in order to prepare for the extended lock outage. Those major commodities moving downriver from July to December 2010 that rose above average levels for at least two months include forest products; iron ore products; wheat; vegetable products; animal feed, grain mill products, flour and other processed grains; and other agricultural products. Those major commodities moving upriver from July to December 2010 that rose above average levels for at least two months include distillate, residual and other fuel oils and fertilizer.

These large shipments in the months leading up to the December 2010 reveals that commodity industries were preparing for the extended lock outage by shipping more products prior to the closure date. Sending shipments early allowed industries to fill orders prior to the outage rather than completely forgoing commerce and avoid increased costs of alternate modes of transportation while barge transportation is curtailed.

The Pacific Northwest Wheat Case Study survey allowed the authors to set up a benchmark for rate structures, seasonality and modal choices for wheat elevators in the Pacific Northwest. After the extended lock closure occurs and barge transportation returns to the Columbia-Snake River, these survey results can be compared to what actually occurs to understand how the outage impacts wheat shipments and sales in the Pacific Northwest.

Southern Washington, including the county of Whitman, ships the highest percentage of wheat in the Pacific Northwest. However, in general, Washington wheat elevators move 70 percent of all shipments from the three states.

Wheat firms in the Pacific Northwest move most of their product, about 61 percent, by truck-barge, due to the low cost and convenience of barge transportation (see references). In contrast, Northern Washington firms transport about 71 percent of their wheat by rail.

All regions of the Pacific Northwest (among survey respondents) ship over 30 percent of their wheat from December to March, the period in which the extended lock outage will occur. This means that 1.7 million tons of wheat could have to move by a different mode of transportation other than barge from December 2010 through March 2011, the time in which the extended lock outage will occur.

Barge lines prepared for over a year in anticipation of this unprecedented lock outage. Due to the fact that barge transportation will cease for the four months of the extended lock outage, some barge lines implemented a "business interruption surcharge" of about seven percent. This add-on to current tariffs was designed to allow barge lines to recover some of the revenue loss from the interruption in waterborne commerce.

Along with preparing for monetary impacts, barge lines have also prepared customers and employees to weather the downturn in business. The barging industry in the Pacific Northwest briefed customers, employees and suppliers on the necessity of the extended lock outage, looked for ways to continue benefit packages for employees during the extended lock outage and aided customers in finding alternative transportation methods from December 2010 to March 2011.

In contrast to barge companies, which will lose substantial business for the entirety of the lock outage, rail lines have been preparing for an increase in cargo loads. Rail lines stepped forward to aid customers, producers and industries in continuing shipments through the extended lock outage. Such preparation included advertising, identifying inland markets, reaching out to shippers and industries that may need transportation during the outage, partnering with local ports to aid in the movement of products and predicting expected shipment volumes.

According to the Washington State Department of Commerce, "petroleum companies are evaluating all fuel supply points and distribution options throughout the region to ensure adequate supply and timely fuel deliveries to Eastern Oregon and Washington communities throughout the duration of the outage." On average, 1.47 million gallons per day of gasoline and diesel fuel move upriver for distribution as stated by WSDC. This department and petroleum companies have suggested three alternatives to barging 1.47 million gallons of fuel per day during the outage: use excess terminal and barge storage, use excess capacity on pipelines from Montana and Salt Lake City and increase use of tanker trucks and tanker rail cars.

The forestry industry increased movements prior to December 2010 to build up inventories. From July to December, forest product shipment volumes moving downriver were consistently 30,000 tons above 2007-2009 averages. The forestry industry suggested that it took this route of action in order to satisfy customers' orders and inventories prior to the lock outage instead of foregoing all commerce that would usually ship from December to March.

The primary issue that U.S. Wheat Associates and wheat commissions tackled was to notify customers and producers of the unprecedented lock outage and how it could affect business.

Pacific Northwest international and domestic wheat customers were advised by various entities that the restoration of the Columbia-Snake River locks is an opportunity to augment the reliability, efficiency and safety of barge transportation for wheat. Customers overseas were also given options for alternative delivery dates for wheat; shippers could barge prior to or after the lock outage occurred. Rail and truck transportation were suggested and contacts given to customers as alternatives as well.

Pacific Northwest Waterways Association's preparations included accurately and promptly notifying its members of the extended lock outage via email, website, phone calls and public announcements; conducting conferences for its members justifying the importance of the lock outage; and suggesting alternative means of transportation to its members

U.S. Army Corps of Engineers' preparations included performing a risk analysis of the current lock navigation system to determine necessary replacements and repairs; planning the extended lock outage around salmon runs and heavy cargo months; and accelerating prep work for the three locks that will be receiving new gates so that repairs and replacements can stay on or ahead of schedule.

Introduction

Waterborne movement is one of the more economical and cost-efficient methods of transport among all modes of transportation, and undoubtedly comprises a key component of the Pacific Northwest multimodal transportation system. More than 35 various types of commodities travel up and down the Columbia-Snake River daily. These commodity shipments move through eight separate locks and dams, including the Snake River dams: Lower Granite, Little Goose, Lower Monumental and Ice Harbor; followed downriver by the Columbia River dams: McNary, John Day, The Dalles and Bonneville.

This report's main objective is to capture the preparations of shippers, river carriers, government entities, ports and communities prior to the extended lock outage. Part of these individuals' preparations includes increased commodity movements along the Columbia-Snake River. The report's secondary objective is to describe the general characteristics of transportation movements up and downriver during the six month period between July and December 2010, in comparison with past data and to draw inferences regarding future trends.

The specific research objectives and methodology are first reviewed in Section 1. An evaluation of monthly tonnage for major commodities shipped up and downriver from July 2010 to December 2010 follows in Section 2. The end of Section 2 specifically compares these monthly movements to corresponding monthly movements from the past three years. Section 3 looks at the preparations of the Pacific Northwest wheat industry, including the results of a survey conducted of participants of the wheat community in Washington, Oregon and Idaho. A copy of the survey is included in Appendix A. Industry preparations for other major commodities are discussed in Section 4. The final segment, Section 5, describes the preparations and activities of governments and institutions involved in the extended lock outage.

Note: the monthly commodity movements provided in all sections are based on upriver and downriver waterborne transportation reports collected at the Bonneville Lock and Dam because it is the lowest lock on the river system. All upriver shipments first pass through Bonneville and, likewise, all downriver shipments leave the river system through this lock. Thus, to avoid double counting the same shipment across multiple locks, the research team has analyzed data based on Bonneville collections.

1. Research Objectives and Analysis Approach

The primary objectives of interim report #2 are as follows:

- To identify the general preparations of individuals for the upcoming extended lock outage, including those of governments, industries, carriers and private entities
- To describe in detail the major commodity movements along the Columbia-Snake River for the six month period prior to the extended lock outage (July – December 2010)

Information provided in this report regarding commodity movements on the Columbia-Snake River is based on data available from the U.S. Army Corps of Engineers Waterborne Commerce Statistics Center. Data are collected as part of the Lock Performance Monitoring System (LPMS) for the locks owned or operated by the U.S. Army Corps. The eight locks on the Columbia-Snake River are under the U.S. Army Corps monitoring system. This report focuses only on the data collected for the months July through December of 2010 as these are the months leading up to the extended lock outage. For an evaluation of commodity movements on the Columbia-Snake River prior to July 2010, please refer to the FPTI Research Report #1 at http://www.fpti.wsu.edu/reports.htm.

Information regarding plans and preparations were provided by shippers, river carriers, government divisions, industry personnel, ports and community leaders. Information was drawn through interviews, a survey of the wheat industry in the Pacific Northwest, transportation conferences, meetings and government and industry websites. A list of those interviewed and surveyed is available in Appendix B.

The data analyzed in this report capture 37 different types of commodities shipped over the Columbia-Snake River and include detailed information by month, year, direction, total commodity tonnage and total number of barges transported during each month. This interim report focuses on fourteen major commodity types discussed below. These commodities were selected as they were the highest volume movements over the last twenty years. Some of these commodity volumes have decreased in the months July through December 2010. Despite this fact, historically, these fourteen major commodities mentioned are consistently included in the largest volume movements and therefore received the authors' attention. For previous major commodity shipment volumes and other related data, refer to FPTI Research Report #1.

1.1. Data Coding

As each barge passes through each lock, the content of the barge is reported to the lock operator for LPMS coding. The content of each barge is recorded according to the North American Industry Classification System (NAICS). On that note, this dataset contains information on both the code and the description of the particular commodity in question. The coding scheme reports general category codes of the commodity (such as 10, 20, 30, etc.) as

well as a range of sub-code classifications describing particular types and varieties of commodities *within* that particular group or category (such as 31, 32, 33, etc. for the general category coded as 30). The commodities are first coded into sub-codes. If no sub-code exists for a particular commodity, an appropriate category code is assigned. Both the category code and the sub-code are expressed in a two-digit coding format (see Table 1.1 for commodity codes).

If neither a category code nor a sub-code exists for a particular commodity, then the commodity is coded as "Commodity Unknown" and is assigned a code of 99.

Data Not Reported or 'Missing': For a wide range of commodities recorded in the dataset, there are no data reported on a monthly or even annual basis. This lacking data, otherwise defined as either "missing" or "not reported," does not fit a specific pattern of commodity type, direction, shipment, month, year and lock. One can assume that (a) there has not been any shipment of these commodities during the particular month, year and direction for a particular lock; (b) the absence of data is a result of a lock operator coding error (the commodity has been coded under a different code or not coded at all); or (c) there has been an error generated at the data entry stage.

As stated above, the dataset used for this report contains 444 observations of Bonneville Lock and Dam on the Columbia-Snake Rivers between July and December of 2010.

For more detailed information on data coding, refer to FPTI Research Report #1 at http://www.fpti.wsu.edu/reports.htm.

Table 1.1 Major Commodity Groups and Commodity Codes for Goods Transported along the Columbia-Snake River System

01	Empty Barges
10	Coal, Lignite and Coke
20	Petroleum and Petroleum Products
21	Crude Petroleum
22	Gasoline, Jet Fuel and Kerosene
23	Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases
24	Petroleum Pitches, Asphalt, Naphtha and Solvents
30	Chemicals and Related Products
31	Fertilizer – Nitrogenous, Potassic, Phosphatic and Others
32	Organic and Inorganic Industrial Chemicals and Synthetic Materials
40	Crude Materials, Inedible, except Fuels
41	Forest Products, Lumber, Logs and Woodchips
42	Pulp and Waste Products
43	Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock
44	Iron Ore, Iron Steel Waste and Scrap
45	Marine Shells (Unmanufactured)
46	Non-Ferrous Metallic Ores, Waste and Scrap
47	Dry and Liquid Sulfur, Clay and Salt
50	Primary Manufactured Goods
51	Paper and Allied Products
52	Building Cement, Concrete, Lime and Glass
53	Primary Iron and Steel Products (Including Ingots, Tubes, Pipes, Bars and Plates)
54	Primary Non-Ferrous Metallic Products and Fabricated Metal Products
55	Primary Wood Products, Veneer and Plywood
60	Food and Farm Products
61	Fresh Fish and Other Marine Products
62	Wheat
63	Corn
64	Rye, Barley, Rice, Sorghum and Oats
65	Oilseeds – Soybean, Flaxseed and Others
66	Vegetable Products
67	Animal Feed, Grain Mill Products, Flour and Other Processed Grains
68	Other Agricultural Products (Including Food and Kindred Products)
6003	Barged Juvenile Salmonid (Salmon and Steelhead Fin)
70	All Manufactured Equipment and Machinery
80	Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water
99	Commodity is Unknown or cannot be located on this list

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

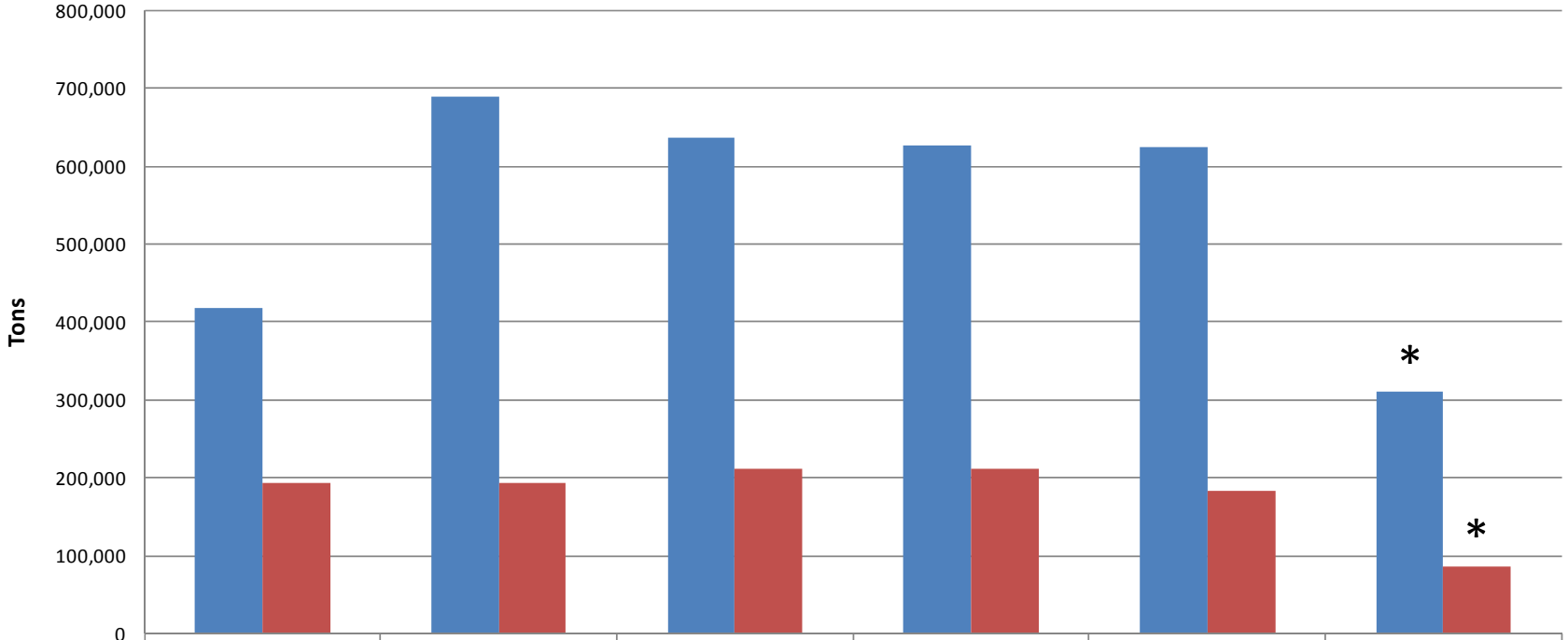
2. Preparing for Lock Closure: Commodity Movements, July – December 2010

Commodity movements from the months July through December 2010 were selected for discussion in this report as this period's data captures commodity movements just prior to the beginning of the extended lock outage in December. The commodity movements in the months leading up to the extended lock outage allow the researchers and readers to determine how shippers and carriers are preparing for this interruption in transportation since one option for shippers and carriers to prepare for the extended lock outage is to increase barge shipments prior to December 2010; these preparations are evident in the following data.

It should be noted that December 2010 data only includes the first nine days of the month. This is due to the fact that the extended lock outage begins on December 10, 2010, thereby closing all locks from navigation on the Columbia-Snake River. No commodity movements could occur after this date until the locks open again in March 2011. Therefore, all December 2010 commodity movements discussed below represent only about one third of the month. If the locks on the Columbia-Snake River had been open the whole of December 2010, simple arithmetic suggests that commodity movements, if maintained at current levels, would be about three times the amount of tonnage shown in the following graphs. A more likely alternative is that shippers and industry representatives moved their entire load normally allocated to December in the first nine days since they knew the lock outage would begin on December 10 and barge transportation would be curtailed. Thus far, the authors have not been able to determine which the actual situation is. In either case, it is important to recognize that December 2010 data only consists of nine days.

The most notable characteristic of waterborne movements between July 2010 and December 2010 is that on the Columbia-Snake River about three times more tonnage travels downriver than upriver. Previous analyses (see references) of Columbia-Snake River transportation suggest that this trend has been consistent for the last 30 years. Figure 2.1 confirms that this trend has not changed from July through December 2010. Moreover, the monthly total tonnage traveling upriver remained quite stable between July and November 2010 at an average of 198,000 tons, whereas the total tonnage of downriver shipments ranged from a high of 695,000 in August to a low of around 319,000 tons in December. The monthly downriver high in August for this six month period is likely due to the start of the wheat harvest as wheat makes up about 70 percent of all downbound shipments on the Columbia-Snake River.

Fig. 2.1 Monthly Total Downbound and Upbound Tonnage of All Commodities from July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	417,596	689,611	635,894	627,164	623,601	310,749
Upbound	192,492	192,634	210,873	212,338	183,683	86,459

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

* December 2010 data only includes the first nine days of the month.

Downriver Movements: A total of 3.3 million tons were shipped downriver between July and December 2010. The commodities with the largest volume of downriver shipments over the six month period have been (in *descending* order of tonnage):

- Wheat
- Forest products, lumber, logs and woodchips
- Sand, gravel and stone; limestone flux and calcareous stone; phosphate rock
- Iron ore, iron steel waste and scrap
- Vegetable products

Between July and December 2010 the total downriver tonnage of each of these commodities exceeded 48,000 tons (Table 2.1). During this time period, wheat comprised more than 75 percent, or 2.5 million tons of the total 3.3 million tons. The second highest commodity by total tonnage was forest products at 419,000 tons or 13 percent of the six month period's volume. Sand, gravel and other stone products accounted for more than 145,000 tons of total downriver movements, while the total downriver shipment of iron ore, iron steel waste and scrap measured around 56,000 tons. The total tonnage of vegetable products was about 49,000 tons for the six month period (Table 2.1).

Other commodities had a total tonnage of less than 20,000 tons with primary wood products, veneer and plywood having the lowest total tonnage (79 tons) for the time period.

Table 2.1 Monthly Tonnage Shipped Downriver on the Columbia-Snake River, July - December 2010							
Commodity by Ton	**Month**						
	Jul	Aug	Sep	Oct	Nov	Dec*	Total
Empty	0	0	0	0	0	0	**0**
Coal, Lignite, and Coke	0	0	0	0	0	0	**0**
Petroleum Products (General)	0	0	2,183	0	0	0	**2,183**
Crude Petroleum	0	0	0	0	0	0	**0**
Gasoline, Jet Fuel, and Kerosene	6,615	2,912	1,595	1,412	6,151	0	**18,685**
Distillate, Residual and Other Fuel Oils	0	1,423	1,432	4,411	1,636	1,657	**10,559**
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	**0**
Chemicals and Related Products (General)	0	0	0	0	0	0	**0**
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	0	0	0	0	**0**
Organic Industrial Chemicals	0	1,973	2,335	0	0	0	**4,308**
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	**0**
Forest Products (Lumber, Logs, Woodchips)	78,810	74,741	74,250	91,916	63,078	36,200	**418,995**
Pulp and Waste Products	0	0	0	0	0	0	**0**
Sand, Gravel, Stone and Crushed Rock	43,009	16,000	16,300	16,000	35,729	18,950	**145,988**
Iron Ore, Iron Steel Waste and Scrap	12,173	13,000	12,000	9,400	5,800	3,538	**55,911**
Marine Shells (Unmanufactured)	0	0	0	0	0	0	**0**
Non-Ferrous Metallic Ores	0	2,500	1,400	0	0	0	**3,900**
Sulfur (Liquid and Dry), Clay and Salt	0	0	0	0	0	0	**0**
Primary Manufactured Goods	0	0	0	0	0	0	**0**
Paper and Allied Products	1,178	336	1,486	672	701	718	**5,091**
Building Cement, Concrete, Lime and Glass	0	0	0	0	0	0	**0**
Primary Iron and Steel Products	0	0	0	0	0	0	**0**
Primary Non-Ferrous Metal Products	3,516	2,380	2,717	2,740	2,685	994	**15,032**
Primary Wood Products, Veneer and Plywood	0	0	0	0	79	0	**79**
Food and Farm Products (General)	2,623	2,440	2,453	1,484	2,541	1,800	**13,341**
Fresh Fish and Other Marine Products	0	0	0	0	0	0	**0**
Wheat	258,900	566,300	498,162	482,300	491,955	238,436	**2,536,053**
Corn	0	0	0	0	2,500	3,000	**5,500**
Rye, Barley, Rice, Sorghum and Oats	0	0	2,000	0	0	0	**2,000**
Oilseeds (Soybean, Flaxseed, and Others)	0	364	0	0	0	0	**364**
Vegetable Products	3,499	3,603	14,261	13,920	9,609	4,011	**48,903**
Animal Feed, Grain Mill Products and Flour	1,426	364	1,910	1,185	633	930	**6,448**
Other Agricultural Products, Including Food	5,161	1,266	1,410	1,484	0	0	**9,321**
Barged Fish	86	9	0	0	0	0	**95**
All Manufactured Equipment and Machinery	600	0	0	240	504	515	**1,859**
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	**0**
Commodity Unknown	0	0	0	0	0	0	**0**
Total	**417,596**	**689,611**	**635,894**	**627,164**	**623,601**	**310,749**	**3,304,615**

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
*December 2010 data only includes the first nine days of the month.

Up River Movements: As mentioned above, about three times less tonnage travels upriver than downriver. Around one million tons were shipped upriver between July and December 2010. The commodities with the largest volume of upriver shipments over the six month span have been (in *descending* order of tonnage):

- Distillate, residual and other fuel oils; lubricating oils and greases
- Gasoline, jet fuel and kerosene
- Waste material; garbage, landfill, sewage sludge and waste water
- Sand, gravel and stone; limestone flux and calcareous stone; phosphate rock
- All manufactured equipment and machinery

Between July and December 2010 the total upriver tonnage of each of these commodities exceeded 26,000 tons (Table 2.2). The highest proportion of total upriver shipments, 48 percent or 519,000 tons of the total one million tons, was distillate, residual and other fuel oils. The second highest proportion of total upriver shipments was gasoline, jet fuel and kerosene products, comprising 332,000 tons (about 31 percent) of the total upriver tonnage for July through December 2010. Over 114,000 tons of waste materials, 27,000 tons of sand, gravel and stone and 26,000 tons of manufactured equipment and machinery were transported upriver during the period.

The upriver commodities manufactured equipment and machinery and sand, gravel and stone products were shipped in mass quantity from July to December 2010. This surge in upriver shipments for these commodities is most likely due to the preparations of the U.S. Army Corps of Engineers for the construction and assembly of lock gates and repairs. Through the months of November and December, barges of crane equipment, lock doors and other construction equipment were shipped upriver in anticipation and preparation for the extended lock outage.

Table 2.2 Monthly Tonnage Shipped Upriver on the Columbia-Snake River, July - December 2010							
Commodity by Ton	**Month**						
	Jul	Aug	Sep	Oct	Nov	Dec*	Total
Empty	0	0	0	0	0	0	**0**
Coal, Lignite, and Coke	0	0	0	0	0	0	**0**
Petroleum Products (General)	0	0	0	0	0	0	**0**
Crude Petroleum	0	0	0	6,200	0	0	**6,200**
Gasoline, Jet Fuel, and Kerosene	75,760	82,886	79,346	47,098	26,176	20,993	**332,259**
Distillate, Residual and Other Fuel Oils	86,920	74,371	84,963	107,639	111,805	53,599	**519,297**
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	**0**
Chemicals and Related Products (General)	0	0	0	0	0	0	**0**
Fertilizer (Nitrogenous, Potassic, Phosphoric)	5,859	3,488	3,493	3,494	3,491	0	**19,825**
Organic Industrial Chemicals	0	0	0	0	0	0	**0**
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	**0**
Forest Products (Lumber, Logs, Woodchips)	0	5,600	0	654	0	0	**6,254**
Pulp and Waste Products	0	0	0	0	0	0	**0**
Sand, Gravel, Stone and Crushed Rock	0	0	7,800	12,700	6,400	0	**26,900**
Iron Ore, Iron Steel Waste and Scrap	0	0	0	0	0	0	**0**
Marine Shells (Unmanufactured)	0	0	0	0	0	0	**0**
Non-Ferrous Metallic Ores	0	0	0	0	0	0	**0**
Sulfur (Liquid and Dry), Clay and Salt	0	0	0	0	0	0	**0**
Primary Manufactured Goods	0	0	0	0	0	0	**0**
Paper and Allied Products	0	0	0	0	0	0	**0**
Building Cement, Concrete, Lime and Glass	0	0	0	0	0	0	**0**
Primary Iron and Steel Products	0	0	0	0	0	0	**0**
Primary Non-Ferrous Metal Products	1,247	3,381	2,980	2,616	2,346	1,060	**13,630**
Primary Wood Products, Veneer and Plywood	0	0	0	0	0	0	**0**
Food and Farm Products (General)	0	0	0	0	0	0	**0**
Fresh Fish and Other Marine Products	0	0	0	0	0	0	**0**
Wheat	0	0	11,000	0	3,000	0	**14,000**
Corn	0	0	0	0	0	0	**0**
Rye, Barley, Rice, Sorghum and Oats	0	0	0	0	0	0	**0**
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	**0**
Vegetable Products	0	0	0	0	0	0	**0**
Animal Feed, Grain Mill Products and Flour	0	0	0	0	0	0	**0**
Other Agricultural Products, Including Food	0	0	0	0	0	0	**0**
Barged Fish	0	0	0	0	0	0	**0**
All Manufactured Equipment and Machinery	20	878	240	11,789	9,860	3,215	**26,002**
Waste Material (Garbage, Landfill, Sewage)	22,686	22,030	21,051	20,148	20,605	7,592	**114,112**
Commodity Unknown	0	0	0	0	0	0	**0**
Total	**192,492**	**192,634**	**210,873**	**212,338**	**183,683**	**86,459**	**1,078,479**

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
*December 2010 data only includes the first nine days of the month.

2.1 General Trends in Major Commodity Movements

To capture any trends in major commodity shipments barged upriver and downriver, comparative analyses are provided for each major commodity for the six month period from July to December 2010. The graphs presented in this section represent only those commodities that consistently reported the highest volume shipments out of all commodities *either* upriver or downriver from Bonneville between 1991 and 2010 (see references for 1991 – June 2010 data). Please note that the commodities discussed in this section appear in the order of their corresponding commodity code. These commodities are not listed according to volume of shipments.

It should be noted that the graphs below each have different vertical axes. All graphs in this section use the same unit of measure (U.S. tons) on the vertical axis, but consist of different quantities. For example, Figure 2.2 uses increments of 10,000 tons on its vertical axis to a maximum of 90,000 tons, but Figure 2.4 uses increments of 1,000 tons to a maximum of 7,000 tons.

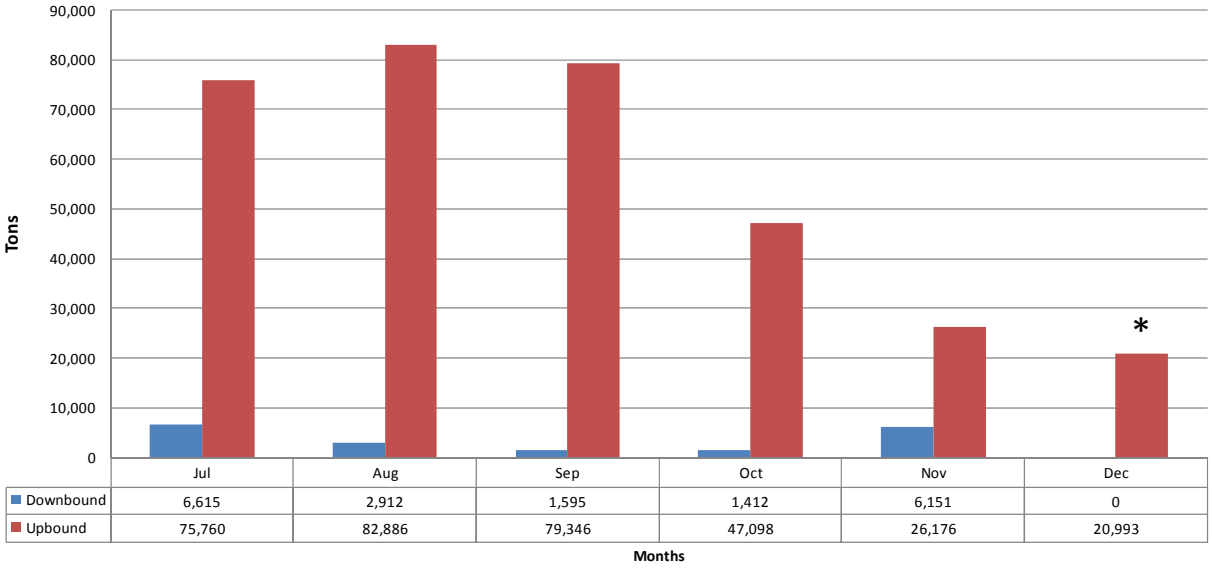
Note: in the following graphs, blue bars represent downriver tonnage and red bars represent upriver tonnage. Downriver volumes are always on the left side and upriver volumes are always on the right side of each monthly column.

Gasoline, Jet Fuel and Kerosene

Monthly upriver movements of gasoline, jet fuel and kerosene from July to December 2010 were highest in August, reaching a volume of almost 83,000 tons (Figure 2.2). July and September volumes were also extremely high with a tonnage of 76,000 and 79,000, respectively. These high tonnage months were followed by the lowest estimates of upriver movements during this six month period; in November and December 2010, volumes dropped to about 26,000 tons and 21,000 tons, respectively (Figure 2.2). However, December 2010 data only consisted of nine days, so tonnage could have hypothetically been about three times 21,000 tons or 63,000 tons. Upriver shipment volumes in October were also low (when compared to movements from July to September) at 47,000 tons.

Compared to upriver shipments, downriver movements of gasoline were negligible. The highest estimate occurred in July at a tonnage of 6,500 (Figure 2.2). Shipments then dropped to around 3,000 tons in August and continued to decrease to about 1,500 tons in September and October. November shipments were significantly larger than the previous three months at a tonnage of over 6,000. No downriver shipments of gasoline, jet fuel and kerosene occurred during the first nine days of December.

Fig. 2.2 Monthly Tonnage of Gasoline, Jet Fuel and Kerosene Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	6,615	2,912	1,595	1,412	6,151	0
Upbound	75,760	82,886	79,346	47,098	26,176	20,993

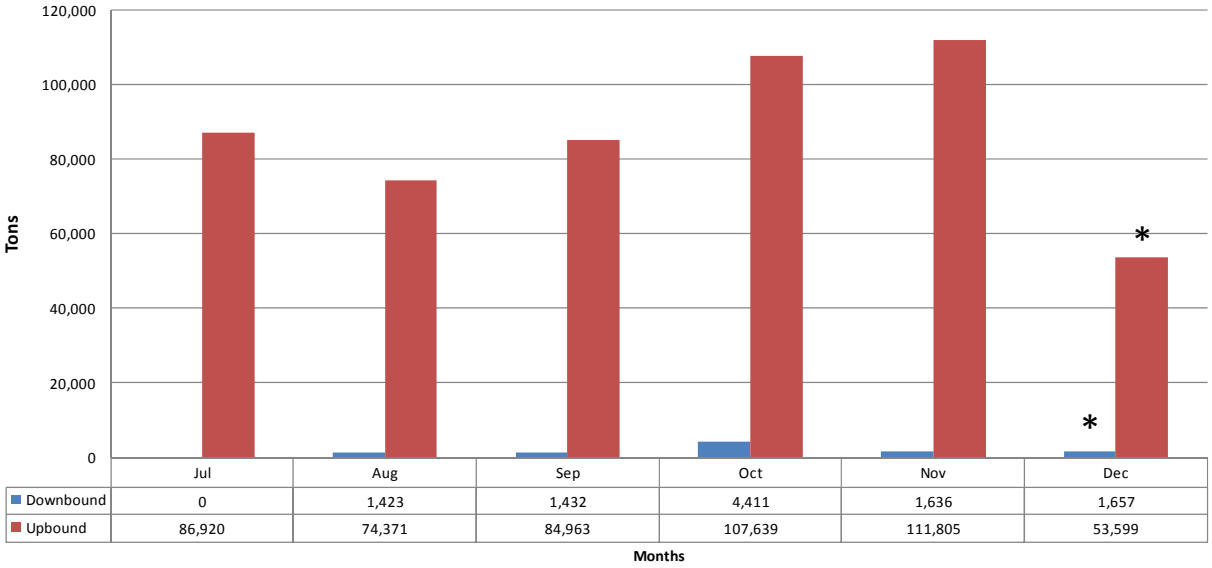
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Distillate, Residual and Other Fuel Oils, Lubricating Oils and Grease

Upriver movements of distillate, residual and other fuel oils (including diesel) over the six month period revealed an increase in tonnage from the months of August to November (Figure 2.3). Upriver shipments of distillate oils started out at 87,000 tons in July, decreased to 74,000 tons in August and begin to rise from then on, with the exception of December. From August to September, upriver movements of distillate oils rose to 85,000 tons. The highest shipment during the period occurred in November with a tonnage of 112,000. This monthly movement was preceded by October upriver shipments of over 107,500 tons (Figure 2.3). December shipments for the first nine days were the lowest in volume for the six month period at about 53,500 tons.

Downriver shipments of distillate, residual and other fuel oils from July to December 2010 were insignificant as were downriver movements of gasoline, jet fuel and kerosene during this time period. Movements never rose above 1,600 tons with the exception of October shipments which reached 4,500 tons (Figure 2.3). No downriver shipments of distillate fuels occurred in July.

Fig. 2.3 Monthly Tonnage of Distillate, Residual and Other Fuel Oils; Lubricating Oils; and Greases Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	0	1,423	1,432	4,411	1,636	1,657
Upbound	86,920	74,371	84,963	107,639	111,805	53,599

Months

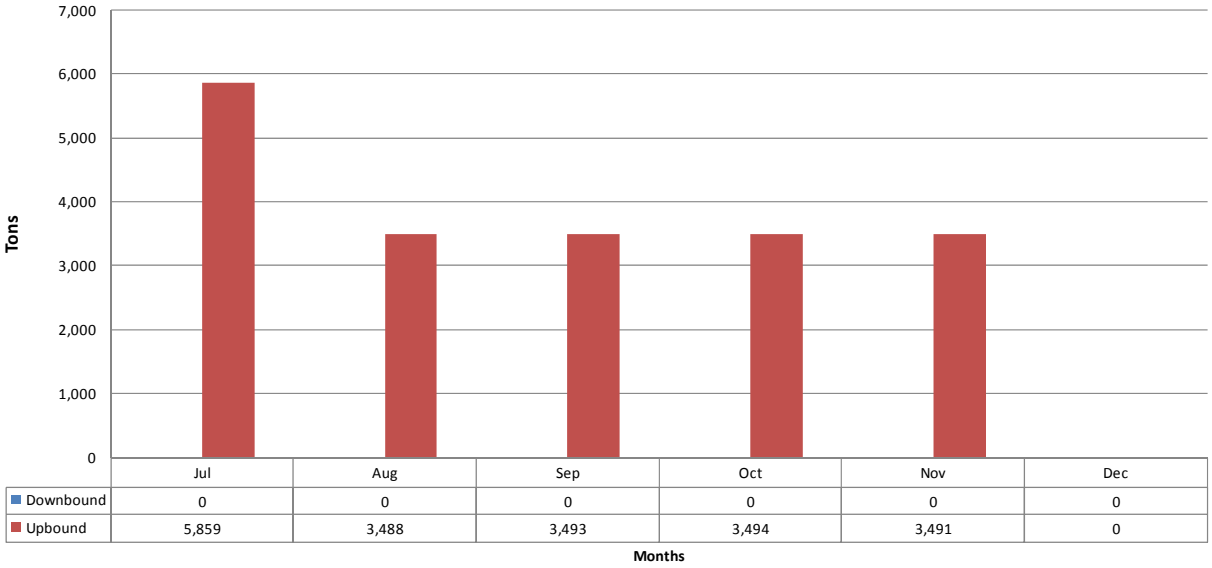
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Fertilizer – Nitrogenous, Potassic, Phosphatic and Others

Monthly upriver movements of fertilizers from July to December 2010 were much smaller in volume than the previous two petroleum commodities, but were significant when compared to other commodities moving upriver. July upriver movements of fertilizers were the highest for the six month period at about 6,000 tons (Figure 2.4). After July, upriver shipments of fertilizers remained constant at 3,500 tons from August to November. No upriver shipments of fertilizer occurred in December.

During the six month period from July to December 2010, no downriver shipments of fertilizer occurred (Figure 2.4).

Fig. 2.4 Monthly Tonnage of Fertilizer (Nitrogenous, Potassic, Phosphatic and Others) Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	0	0	0	0	0	0
Upbound	5,859	3,488	3,493	3,494	3,491	0

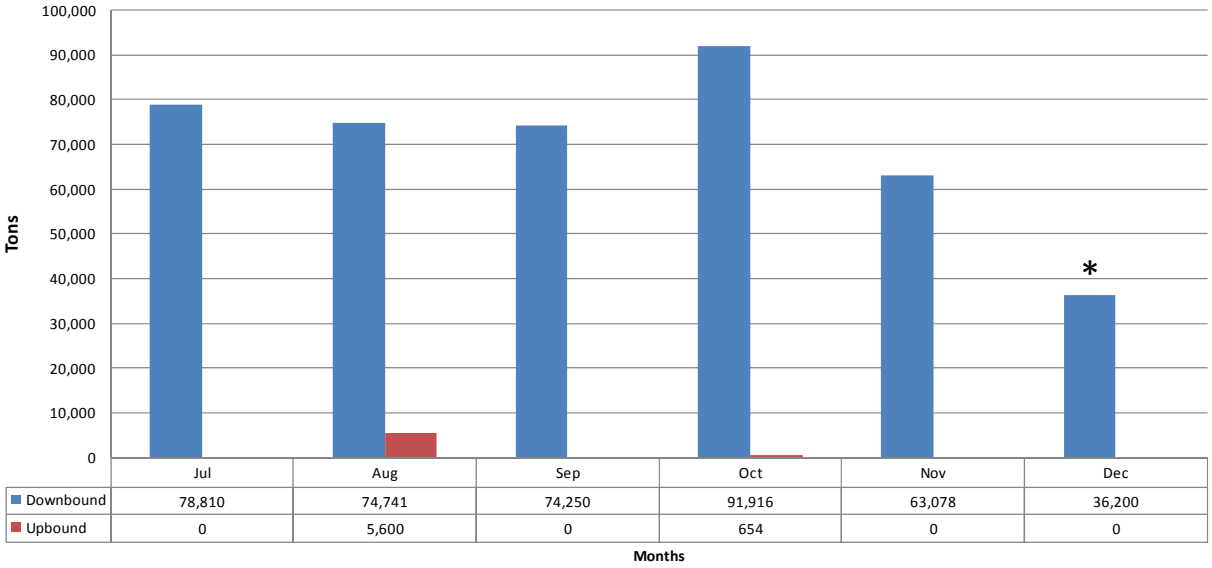
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Forest Products, Lumber, Logs and Woodchips

Most forest products, lumber, logs and woodchips (including rubber and fuel wood) moved downriver (when compared to upriver) from July to December 2010, as this commodity has for the last 30 years (see references). Downriver shipments of forest products reached their peak in October, 92,000 tons (Figure 2.5). Prior to October, shipments moving downriver remained fairly stable at 79,000 tons in July and 75,000 tons in August and September. After the high volume shipments in October, downriver movements dropped to 63,000 tons in November and 36,000 tons in December (Figure 2.5), again with the caveat that December data only consists of the first nine days.

Upriver shipments of forest products during the six month period from July to December 2010 were few and far between. August upriver movements were highest, 5,500 tons. No shipments were moved the previous or following months of July and September. The only other upriver shipment of forest products occurred in October at a tonnage of a little over 600 (Figure 2.5). No shipments were reported in November or December.

Fig. 2.5 Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	78,810	74,741	74,250	91,916	63,078	36,200
Upbound	0	5,600	0	654	0	0

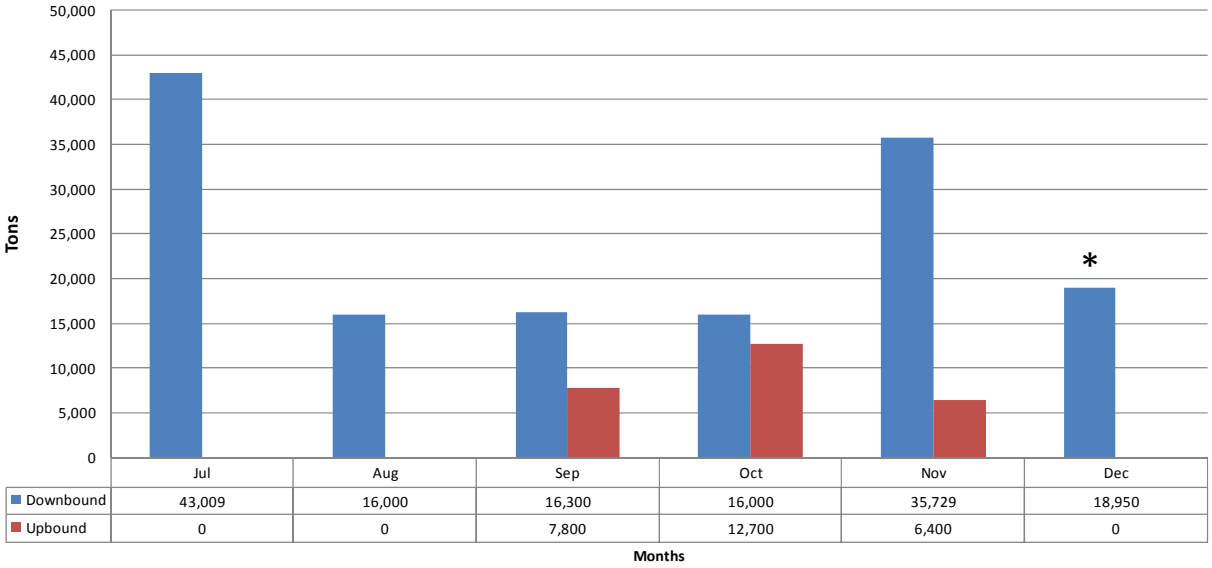
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock

For the six month period from July to December 2010, shipments of sand, gravel and stone (including building stone, dredged material, soil and fill dirt) largely moved downriver. The highest downriver shipment of sand, gravel and stone occurred in July at a tonnage of 43,000 (Figure 2.6). Shipments moving downriver quickly dropped to 16,000 tons for the months August through October. After these consistent monthly shipments, November movements increased to about 36,000 tons, more than twice the volume of sand, gravel and stone moved in the previous month (Figure 2.6). Downriver shipment volumes decreased from November to December but remained relatively high at 19,000 tons.

Upriver shipments of sand, gravel and stone were more variable than downriver shipments from July to December 2010. No sand, gravel or stone was shipped upriver in July, August or December (Figure 2.6). The first shipment moving upriver for the six month period occurred in September with a tonnage of 8,000. Shipments upriver were the highest for the period in October at almost 13,000 tons. October shipments were followed by a small upriver shipment in November of 6,500 tons, the lowest upriver volume for the six month period (Figure 2.6).

Fig. 2.6 Monthly Tonnage of Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock Barged Up and Down River for July - December 2010



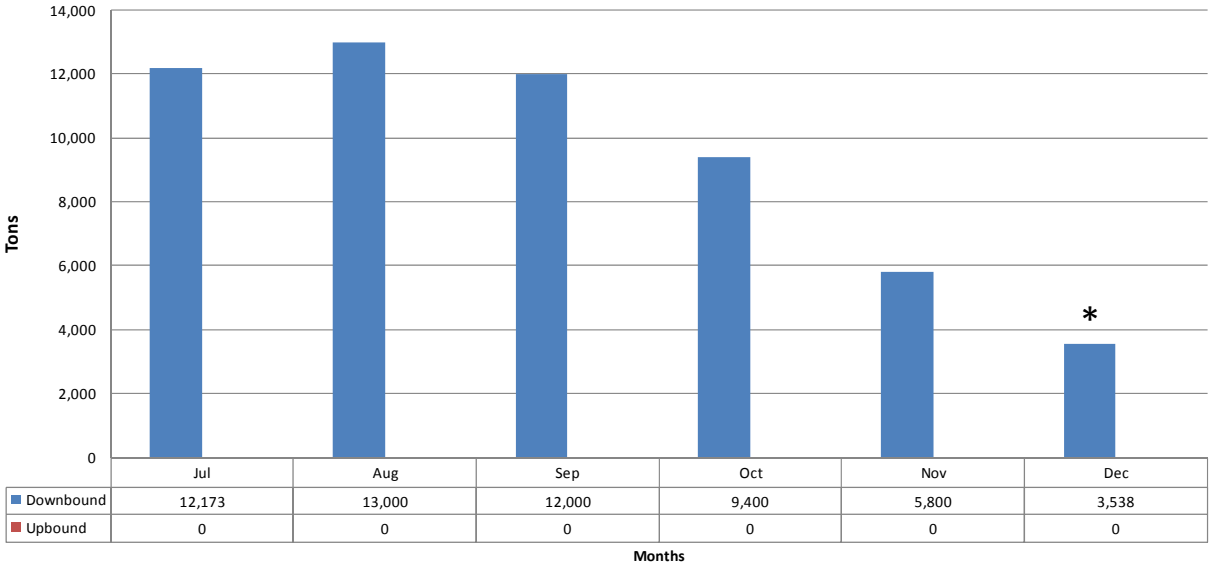
	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	43,009	16,000	16,300	16,000	35,729	18,950
Upbound	0	0	7,800	12,700	6,400	0

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Iron Ore, Iron Steel Waste and Scrap

Shipments of iron ore, iron steel waste and scrap only moved downriver from July to December 2010. Downriver movements from July to September were fairly consistent at about 12,500 tons (Figure 2.7). This three month increment included the highest volume shipment month; August downriver movements totaled 13,000 tons. After August, shipments of iron ore, iron steel waste and scrap steadily declined. October downriver movements only amounted to 9,500 tons followed by November shipments of less than 6,000 tons (Figure 2.7). During the first nine days of December, about 3,500 tons of iron ore products were shipped downriver.

Fig. 2.7 Monthly Tonnage of Iron Ore, Iron Steel Waste and Scrap Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	12,173	13,000	12,000	9,400	5,800	3,538
Upbound	0	0	0	0	0	0

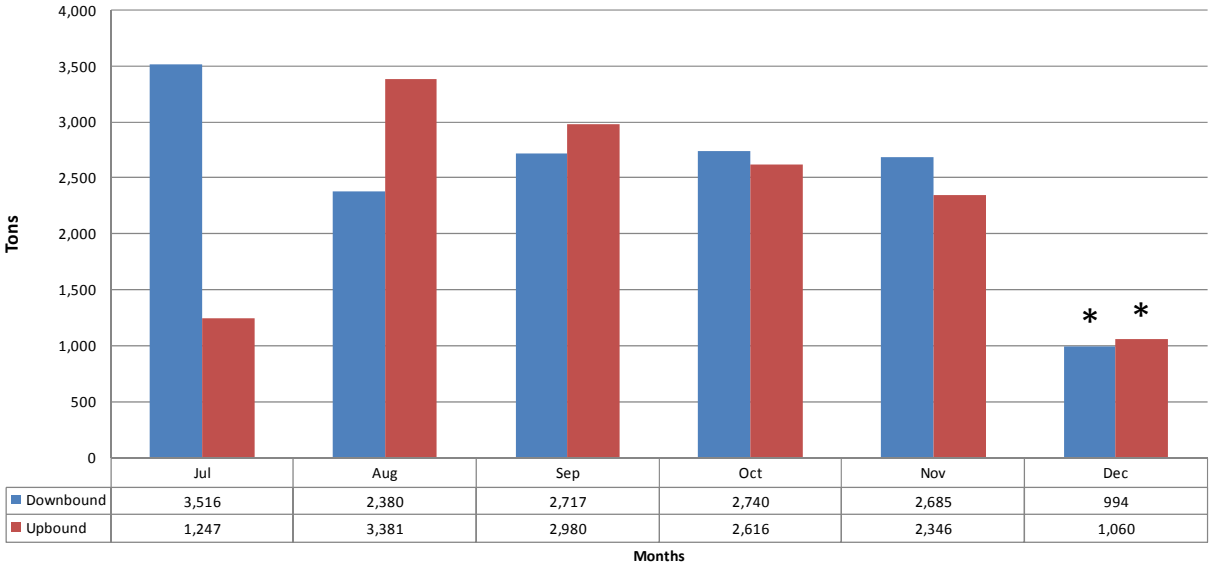
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Primary Non-Ferrous Metallic Products and Fabricated Metal Products

Primary non-ferrous metallic and fabricated metal products (including copper, aluminum and smelted products) were the only commodities that moved consistently upriver and downriver from July to December 2010. Downriver shipments totaled 15,000 tons for the six month period whereas upriver shipments totaled 13,500 tons (Tables 2.1 and 2.2). Primary non-ferrous metallic and fabricated metal products shipped downriver were highest in July at 3,500 tons (Figure 2.8). Shipments dropped to 2,500 tons in September. From September to November, shipments rose to and stayed steady at 2,700 tons (Figure 2.8). Shipments downriver then dropped again to 1,000 tons in December (the first nine days only), the lowest in volume for downriver shipments during the six month period.

Upriver shipments were slightly smaller in tonnage than downriver shipments of primary non-ferrous metallic and fabricated metal products. The six month period from July to December 2010 began with the lowest upriver shipment volume, less than 1,500 tons (Figure 2.8). Upriver shipments quickly more than doubled in volume from July to August, up to its highest of 3,500 tons. After August, upriver shipments of primary non-ferrous metallic products decreased to 3,000 tons in September, to 2,500 tons in October and November and to 1,000 tons during the first nine days of December (Figure 2.8).

Fig. 2.8 Monthly Tonnage of Primary Non-Ferrous Metallic and Fabricated Metal Products Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	3,516	2,380	2,717	2,740	2,685	994
Upbound	1,247	3,381	2,980	2,616	2,346	1,060

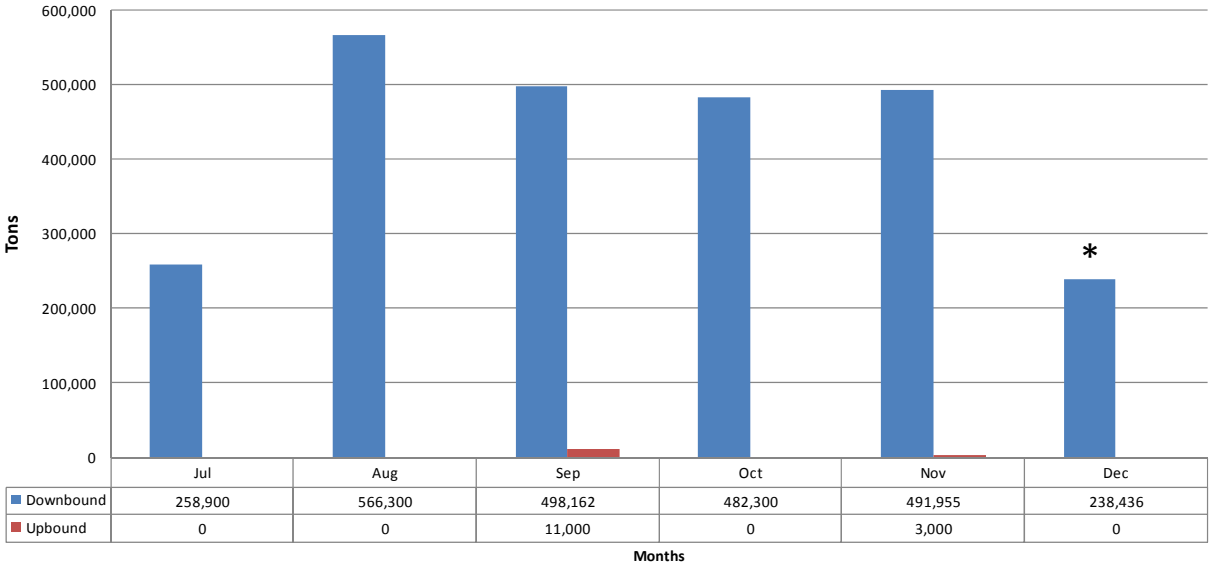
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Wheat

Wheat shipments made up more than 75 percent of the total tonnage moved downriver from July to December 2010. Therefore, monthly downriver shipments of wheat far surpassed any other commodity in volume for this time period. July downriver movements of wheat were the lowest in volume at 259,000 tons (Figure 2.9). The lowest volume month was followed by the highest volume month; August downriver shipments were over 566,000 tons. By August, wheat harvest was in full swing, hence the large downriver shipments during this month. After August, downriver shipments remained fairly stable from September to November at about 491,000 tons (Figure 2.9). December downriver shipments of wheat, from the first of the month through the ninth, dropped from the steady tonnage of September through November to 238,500 tons.

Over the six month period from July to December 2010, upriver movements totaled only 14,000 tons (Table 2.2). No upriver shipments occurred in July, August, October or December. The highest volume shipment moving upriver happened in September with a movement of 11,000 tons (Figure 2.9). After a month of no shipments, November upriver movements of wheat were 3,000 tons, the lowest for the six month period.

Fig. 2.9 Monthly Tonnage of Wheat Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	258,900	566,300	498,162	482,300	491,955	238,436
Upbound	0	0	11,000	0	3,000	0

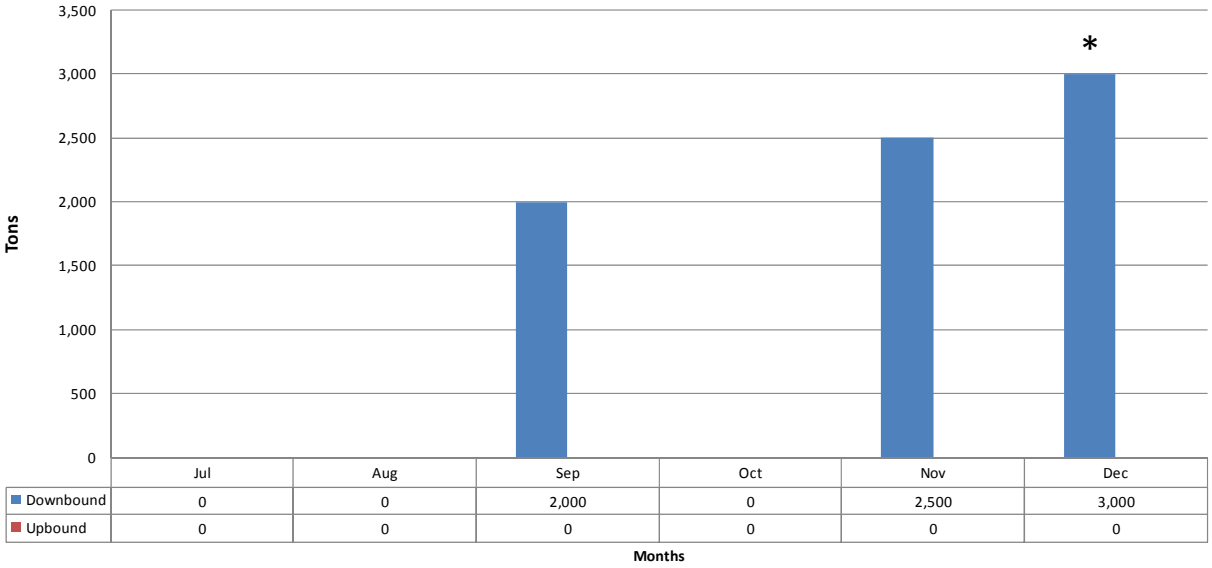
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Corn, Rye, Barley, Rice, Sorghum and Oats

Corn, rye, barley, rice, sorghum and oats only moved downriver from July to December 2010. No downriver shipments occurred in July, August or October. The lowest volume shipment happened in September at a tonnage of 2,000 tons downriver (Figure 2.10). After a month of no shipments, volumes of corn, rye, barley, rice, sorghum and oats increased to 2,500 tons in November. December claimed the highest volume tonnage moving downriver at 3,000 tons for the first nine days of the month.

Note: the commodities corn and rye, barley, rice, sorghum and oats have been combined into one commodity for Figure 2.10.

Fig. 2.10 Monthly Tonnage of Corn and Rye, Barley, Rice, Sorghum and Oats Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	0	0	2,000	0	2,500	3,000
Upbound	0	0	0	0	0	0

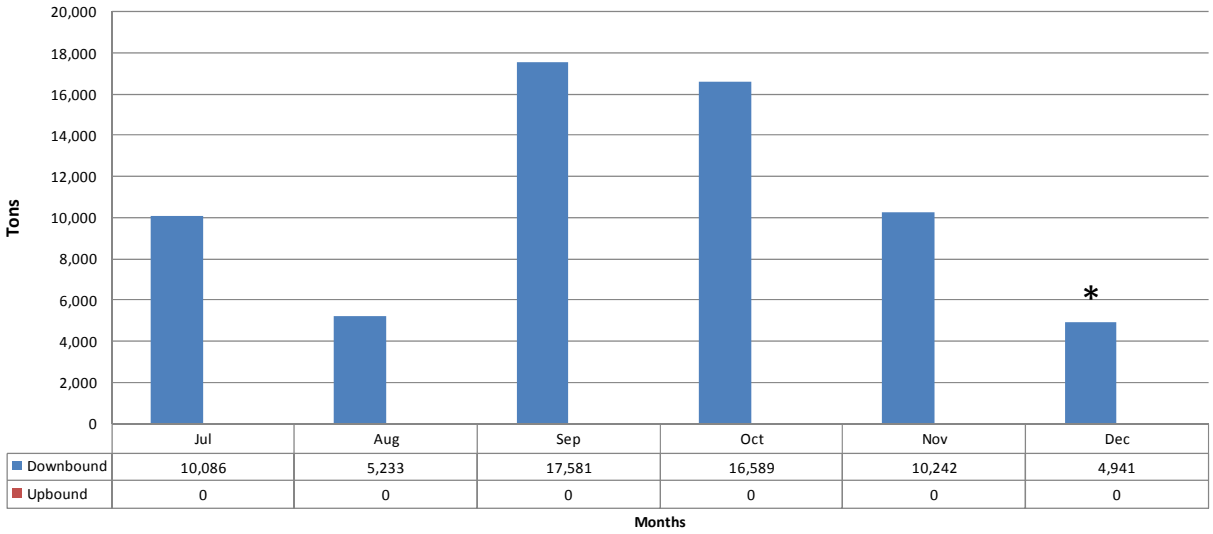
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grains and Other Agricultural Products

The commodities vegetable products (including vegetable oils); animal feed, grain mill products, flour and other processed grains (including wheat flour, hay and fodder); and other agricultural products (including dairy products, sugar, coffee, alcoholic beverages and tobacco) only moved downriver from July to December 2010. July downriver shipments of these products totaled more than 10,000 tons (Figure 2.11). August movements were almost half the volume of July shipments, a little more than 5,000 tons. August was the lowest volume month for the six month period. September experienced the highest downriver tonnage at over 17,500 tons. After September, shipments slowly decreased to 17,000 tons in October, 10,000 tons in November and 5,000 tons in the first nine days of December (Figure 2.11).

Note: the commodities vegetable products; animal feed, grain mill products, flour and other processing grains; and other agricultural products have been combined into one commodity for Figure 2.11.

Fig. 2.11 Monthly Tonnage of Vegetable Products; Animal Feed, Grain Mill Products, Flour and Other Processed Grains; and Other Agricultural Products Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	10,086	5,233	17,581	16,589	10,242	4,941
Upbound	0	0	0	0	0	0

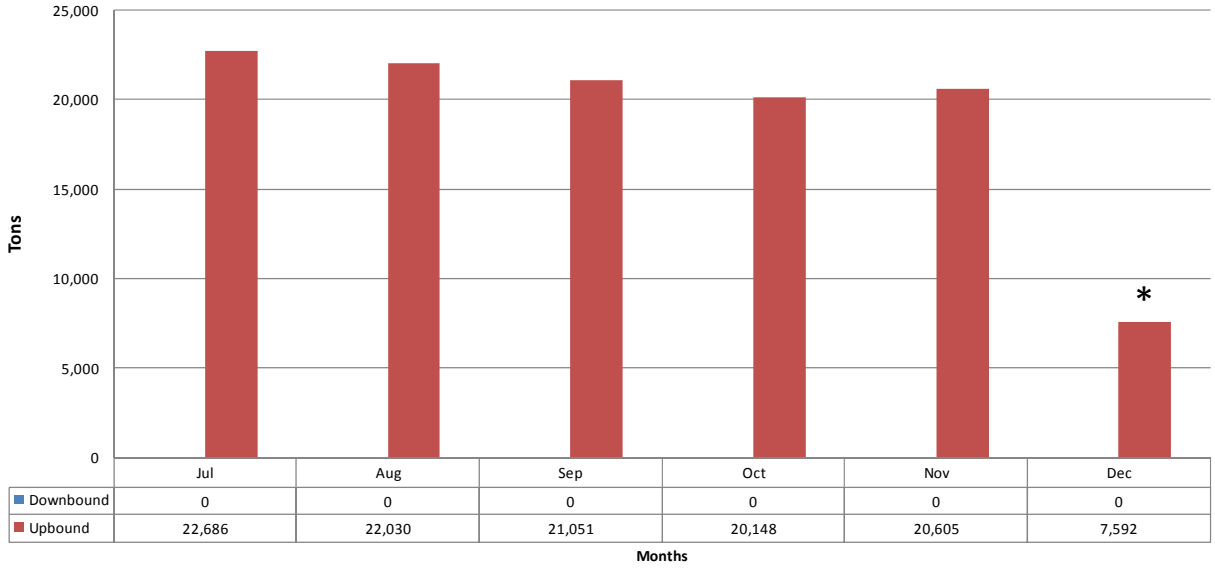
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water

Waste material, garbage, landfill, sewage sludge and waste water only moved upriver from July to December 2010. Shipments over the six month period remained fairly stable at around 21,500 tons, with the exception of December shipments (Figure 2.12). July upriver tonnage was the highest in volume at more than 22,500 tons. August upriver shipments were a close second with 22,000 tons. September shipments moving upriver decreased from the previous two months to 21,000 tons. Upriver movements dropped by 1,000 tons from September to 20,000 tons in October. Upriver shipments then rose in November to about 20,500 tons before dropping in December to 7,500 tons. December was the lowest volume for the six month period (Figure 2.12). However, had December data consisted of all 31 days instead of nine, upriver shipments of waste material could theoretically have reached 22,500 tons.

Again, no shipments of waste material were moved downriver from July to December 2010.

Fig. 2.12 Monthly Tonnage of Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water Barged Up and Down River for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound	0	0	0	0	0	0
Upbound	22,686	22,030	21,051	20,148	20,605	7,592

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

2.2 How Did Commodity Movements Change? Comparative Analysis of Major Commodity Movements, July-December 2010

The following section provides a comparison of the major commodity movements (both upriver and downriver) of July through December 2010 to corresponding average movements from past three years. Data from the previous section (Section 2.1 General Trends in Major Commodity Movements) is compared to the corresponding volume average for the years 2007, 2008 and 2009. This allowed the authors to evaluate if July through December 2010 shipments were on par with average movements or showed signs of abnormal barging behavior. This section also allowed the authors to assess changes in commodity movements prior to the extended lock outage and to determine how shippers and carriers prepared for the outage. For example, a surge in commodity movements prior to the extended lock outage would be an indication that industries were trying to make up for a lack of barge transportation during the outage. Many industries did in fact increase commodity movements by barge from July to December 2010 as evident in the following evaluations. These preparations will be further discussed in Section 4.

The information presented in this section represents only those commodities that consistently reported the highest volume shipments out of all commodities *either* upriver or downriver from Bonneville between 1991 and 2010.

Major commodities moving downriver include:

- Wheat
- Sand, gravel and stone; limestone flux and calcareous stone; phosphate rock
- Forest products, lumber, logs and woodchips
- Vegetable products combine with other agricultural products and animal feed, grain mill products, flour and other processed grain
- Iron ore, iron steel waste and scrap
- Rye, barley, rice, sorghum and oats combined with corn
- Primary non-ferrous metallic products; fabricated metal products

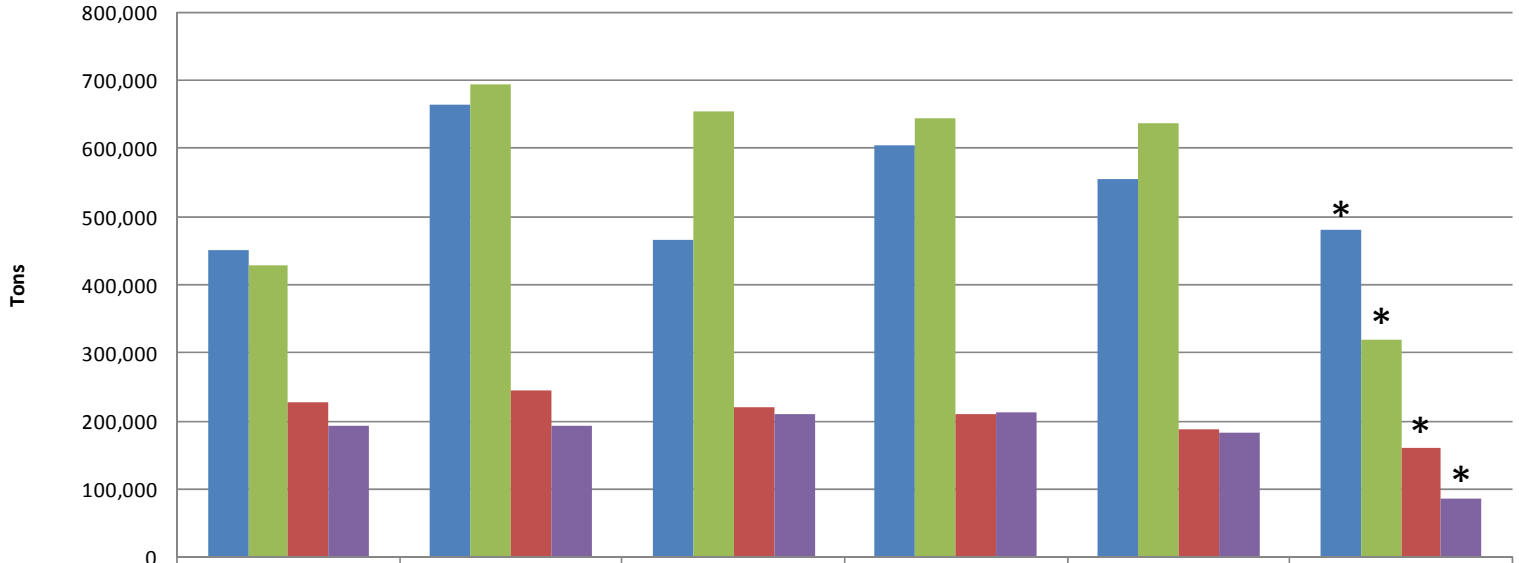
Major commodities moving upriver include:

- Distillate, residual and other fuel oils; lubricating oils and greases
- Gasoline, jet fuel and kerosene
- Waste material; garbage, landfill, sewage sludge and waste water
- Forest products, lumber, logs and woodchips
- Fertilizer – nitrogenous, potassic, phosphatic and others
- Primary non-ferrous metallic products; fabricated metal products

For each commodity, the monthly average was calculated for 2007-2009 period. Whenever there were no shipments in a particular month of the year, the research team labeled them as '0' shipments and calculated the monthly average for the three year period including any '0' values.

Total downriver tonnage volumes in 2010 were above the 2007-2009 average for a majority (four) of the six months (Figure 2.13). Total upriver tonnage volumes in 2010 on the other hand were all below average except for October. Downriver shipments were relatively lower for July and December on average and in 2010. Upriver movements were rather consistent from July to December on average and in 2010 (Figure 2.13). It is evident that shippers moved products in abundance during the months of July through December to avail themselves of the existing river option.

Figure 2.13 Monthly Total Tonnage of All Commodities from July - December 2010 Compared to July - December 2007-2009 Averages



	Jul	Aug	Sep	Oct	Nov	Dec
Downbound 2007-2009 Average	449,956	664,192	464,998	604,044	555,725	481,343
Downbound 2010	427,682	694,844	655,475	643,753	636,343	318,690
Upbound 2007-2009 Average	227,965	244,538	219,863	209,929	188,718	160,040
Upbound 2010	192,492	192,634	210,873	212,338	183,683	86,459

Months

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

* December 2010 data only includes the first nine days of the month.

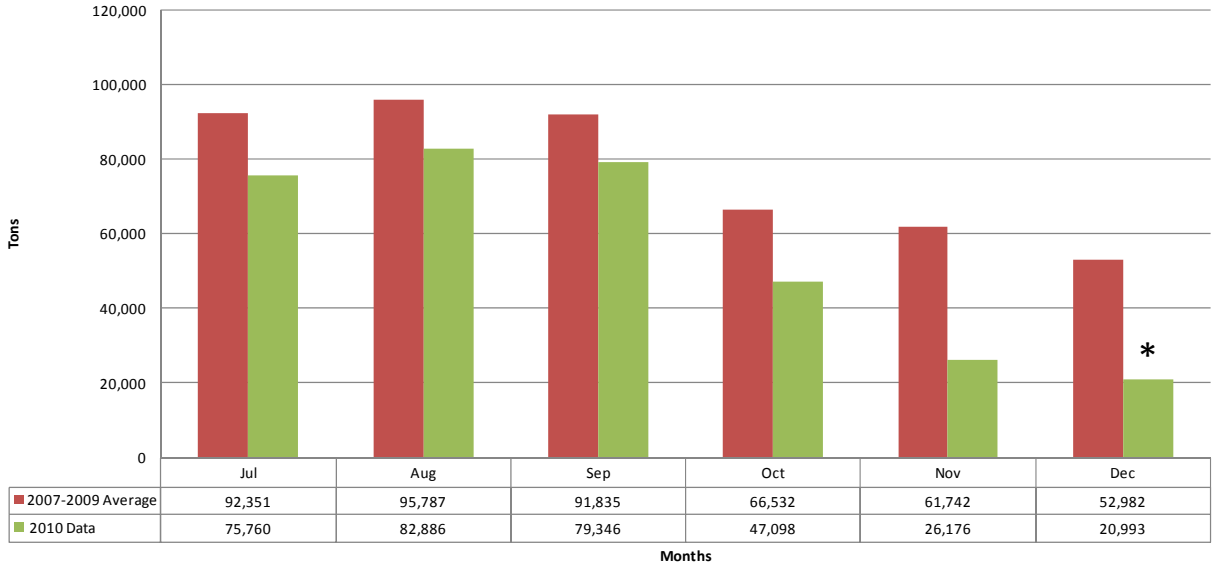
Note: in the following graphs, blue bars represent average downriver tonnage, red bars represent average upriver tonnage and green bars represent actual downriver or upriver tonnage for 2010 (depending on the title of the graph). Three year average tonnages are always on the left side and 2010 data are always on the right side of each monthly column.

Gasoline, Jet Fuel and Kerosene

Monthly upriver movements of gasoline, jet fuel and kerosene from July to December 2010 were all less than corresponding monthly volume averages for 2007 through 2009, suggesting that either other modes of movements were being used or demand for this commodity had slowed down. July 2010 upriver movements were 18 percent less when compared to the July average of 92,000 (Figure 2.14). For the past three years, August upriver shipments boasted the highest volume for the six month period at 96,000 tons, but August 2010 shipments fell short by 13.5 percent. September upriver shipments of gasoline products missed the three year September average of 92,000 tons by 13.5 percent as well (or by 13,000 tons). October and November upriver volume averages were fairly consistent at about 64,000 tons, but October 2010 upriver shipments missed the average by 29 percent and November upriver movements by a significant 58 percent (Figure 2.14). Typical December upriver shipments of gasoline products, according to the 2007-2009 average, are 53,000 tons compared to December 2010 upriver shipments tonnage of only 21,000, a 60 percent difference (Figure 2.14). However, December 2010 data only consisted of nine days, so tonnage could have hypothetically been about three times 21,000 tons or 63,000 tons. This large amount of tonnage for the nine days in December shows that the petroleum industry was gearing up for the extended lock outage by shipping more gasoline products prior to the closure date.

The highest monthly volume of gasoline products on average from 2007 to 2009 for the months July through December occurred in August (Figure 2.14); this trend continued in 2010. December was the lowest volume month for gasoline products on average for the months July through December; this trend also continued in 2010. But as explained above, December shipments could theoretically have reached 63,000 tons, which would make November 2010 upriver volumes the lowest for the six month period.

Fig. 2.14 Monthly and Average Tonnages of Gasoline, Jet Fuel and Kerosene Barged Upriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	92,351	95,787	91,835	66,532	61,742	52,982
2010 Data	75,760	82,886	79,346	47,098	26,176	20,993

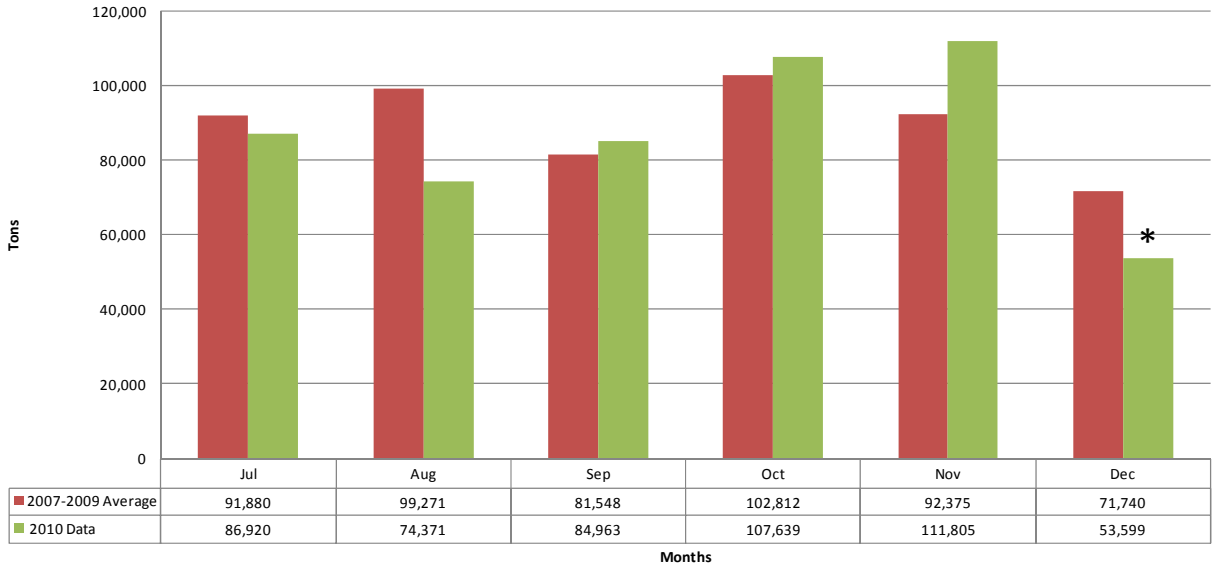
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Distillate, Residual and Other Fuel Oils, Lubricating Oils and Grease

When compared to corresponding averages from 2007-2009, upriver distillate, residual and other fuel oil (including diesel) shipments from July to December 2010 have been near average, especially later in the six month period. The July average for upriver distillate oil shipments was about 92,000 tons compared to smaller July 2010 shipments of 87,000 tons, only a 5 percent difference (Figure 2.15). August 2010 upriver shipments were also below average by 25 percent. Upriver shipments in September 2010 were four percent higher than the September average of 81,500 tons. October 2010 upriver shipments were higher than the October average by 5,000 tons (or 5 percent). The October average for distillate oils from the past three years was only 103,000 tons (Figure 2.15). Along with September and October, November 2010 upriver shipments of distillate oils were well above the three year average of 92,000 tons; in fact November 2010 upriver shipments were 22 percent or 20,000 tons higher than normal. December 2010 shipments were well under the 2007-2009 December average by 28 percent (Figure 2.15). This large amount of tonnage for the nine days in December shows that the petroleum industry apparently was gearing up for the extended lock outage by shipping more distillate products prior to the closure date.

The highest monthly volume of distillate oil on average for the months July through December occurred in October (Figure 2.15). However, when compared to July through December 2010 data, the highest volume was shipped in November, one month after the average high. The lowest monthly volume for distillate oils for the past three years occurred in December; December 2010 mimics this trend with the lowest volume for the six month period.

Fig. 2.15 Monthly and Average Tonnages of Distillate, Residual and Other Fuel Oils; Lubricating Oils; and Greases Barged Upriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	91,880	99,271	81,548	102,812	92,375	71,740
2010 Data	86,920	74,371	84,963	107,639	111,805	53,599

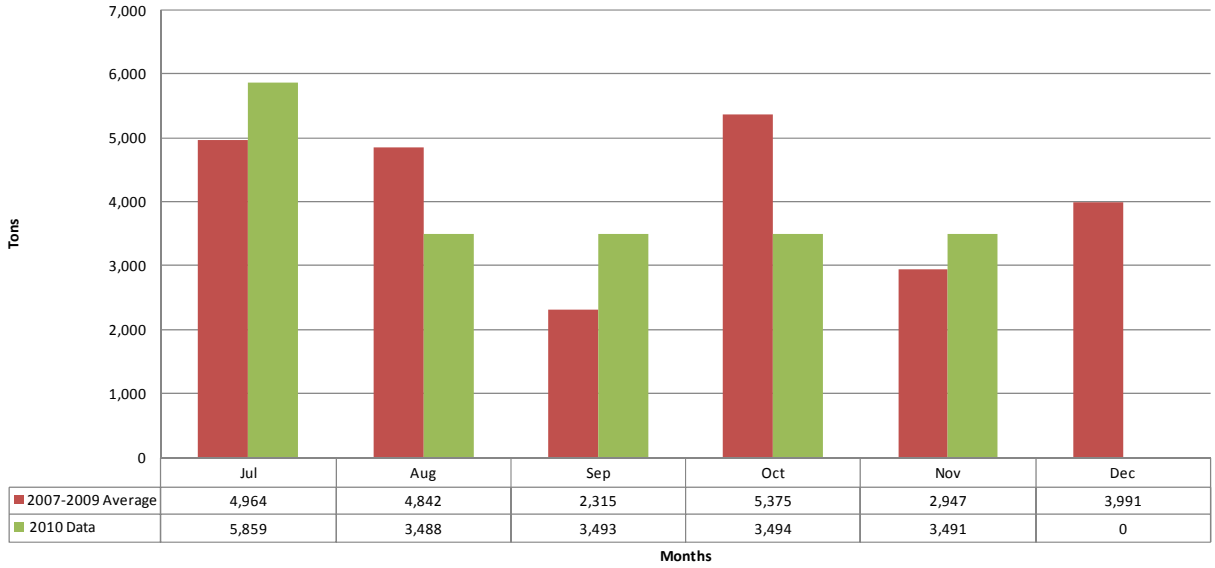
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Fertilizer – Nitrogenous, Potassic, Phosphatic and Others

Upriver shipments of fertilizer from July to December 2010 fluctuated around their 2007-2009 averages. In July 2010, upriver shipments surpassed the average of 5,000 tons by 20 percent (Figure 2.16). August 2010 upriver movements however were lower than the average; August 2010 only saw shipments of about 3,500 tons whereas the average was closer to 5,000 tons, a 28 percent difference. Upriver movements of fertilizer in September 2010 exceeded the three year average of 2,500 tons by over 50 percent. October 2010 upriver shipments missed the monthly average by about 35 percent. November 2010 upriver movements were about 3,500 tons; this month's movements surpassed the November average by 500 tons or 17 percent (Figure 2.16). No upriver shipments of fertilizer were made in December 2010; typically 4,000 tons are shipped upriver in December (according to the 2007-2009 December average). The lack of upriver shipments of fertilizer in December 2010 suggests that the fertilizer industry was either using other modes of transportation to prepare for the extended lock outage or demand for fertilizer had decreased drastically.

The highest monthly volume for fertilizer on average from 2007 to 2009 for the months July through December occurred in October. However, for July through December 2010 data, the highest volume of fertilizer was shipped in July (Figure 2.16). The lowest monthly volume of fertilizers from 2007 to 2009 typically occurred in September. Data from 2010 contradicted this trend as the lowest monthly volume occurred in August 2010. This observation does not take into account zero ton shipments.

Fig. 2.16 Monthly and Average Tonnages of Fertilizer (Nitrogenous, Potassic, Phosphatic and Others) Barged Upriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	4,964	4,842	2,315	5,375	2,947	3,991
2010 Data	5,859	3,488	3,493	3,494	3,491	0

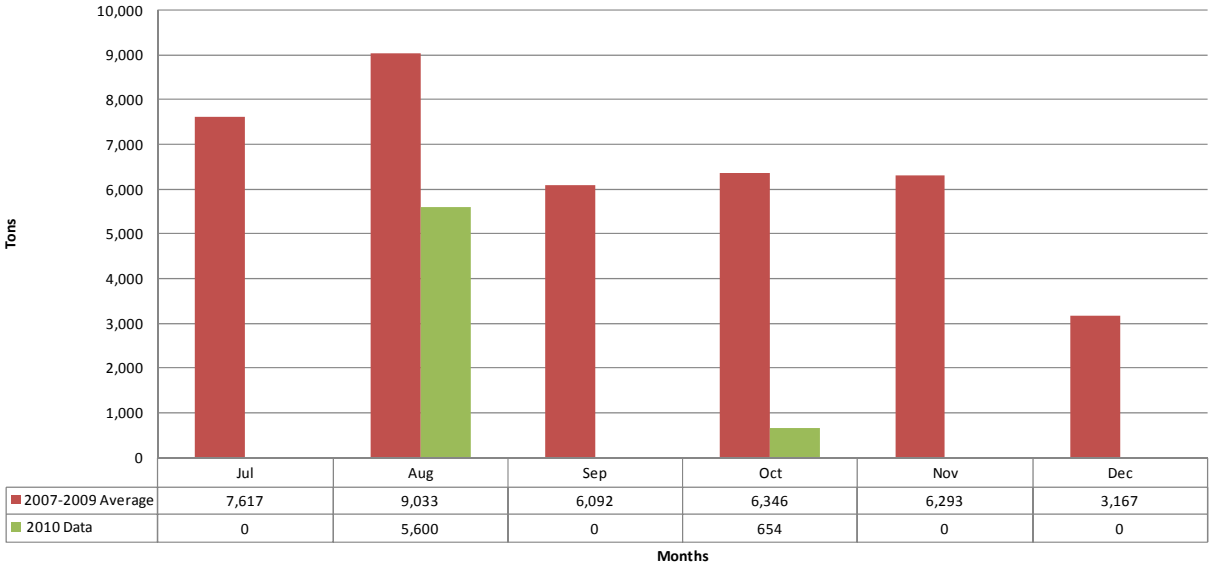
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Forest Products, Lumber, Logs and Woodchips

Upriver shipments of forest products, lumber, logs and woodchips (including rubber and fuel wood) from July to December 2010 were well below the monthly averages from 2007 to 2009. In fact, no shipments were made in July, September, November or December 2010 (Figure 2.17). Average upriver shipments for these months were 7,500 tons, 6,000 tons, 6,500 tons and 3,000 tons, respectively (according to data from 2007 to 2009). August 2010 upriver shipments of forest products fell short of the 2007-2009 average by 39 percent. October 2010 upriver movements also failed to reach the 2007-2009 October average by almost 6,000 tons or 90 percent (Figure 2.17). The lack of upriver shipments of forest products in November and December 2010 suggests that the forestry industry was using other modes of transportation to prepare for the extended lock outage or demand for forest products upriver had decreased.

The highest upriver volume of forest products usually moved in August according to data from 2007 to 2009. This was also true for 2010 (Figure 2.17). The lowest upriver volume moved in December on average for the years 2007 through 2009. However, in 2010, the lowest tonnage of forest products moved in October. This observation does not take into account zero ton shipments.

Fig. 2.17 Monthly and Average Tonnages of Forest Products, Lumber, Logs and Woodchips Barged Upriver for July - December 2010



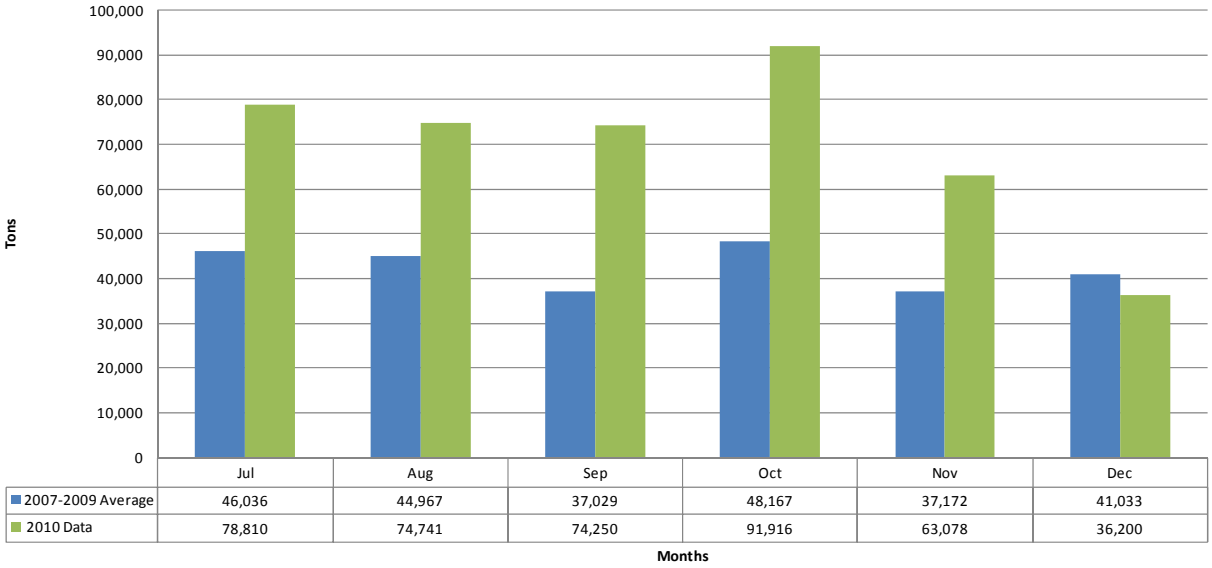
	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	7,617	9,033	6,092	6,346	6,293	3,167
2010 Data	0	5,600	0	654	0	0

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Downriver shipments of forest products (including rubber and fuel wood) for the months July through November were all well above their equivalent 2007-2009 averages. July 2010 downriver shipments of forest products were 71 percent above the 2007-2009 July downriver average (Figure 2.18). Tonnage shipped downriver in August and October 2010 was 66 and 91 percent above the 2007-2009 August and October averages, in that order. The largest difference in the 2010 data and the 2007-2009 averages occurred in September 2010, in which downriver shipments of forest products were 100 percent or 37,000 tons larger than the October average. November 2010 downriver shipments were higher than the 2007-2009 average by 70 percent (Figure 2.18). December 2010 downriver shipments missed the 2007-2009 average by 12 percent or by about 5,000 tons. However, December 2010 data only consists of nine days.

The highest monthly volume of forest products on average from 2007 to 2009 for the months July through December occurred in October (Figure 2.18); this trend continued in 2010. September is the lowest volume month for forest products on average from 2007-2009 for the months July through December; this trend does not continue in 2010 as the lowest downriver shipment occurred in December 2010. Yet, if December shipments were to have continued through the end of the month, December 2010 downriver tonnage levels would have been the high point for shipments in the six month period.

Fig. 2.18 Monthly and Average Tonnages of Forest Products, Lumber, Logs and Woodchips Barged Downriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	46,036	44,967	37,029	48,167	37,172	41,033
2010 Data	78,810	74,741	74,250	91,916	63,078	36,200

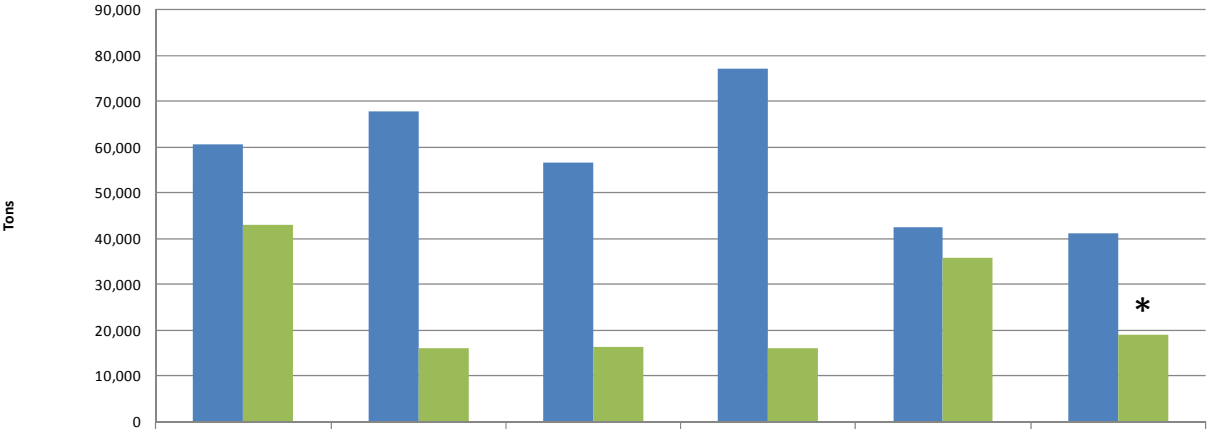
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock

Shipments of sand, gravel and stone products (including building stone, dredged material, soil and fill dirt) moving downriver in 2010 were far below their 2007-2009 averages. In July 2010, downriver movements only reach 43,000 tons, 29 percent less than average (Figure 2.19). Shipments moving downriver in August 2010 only totaled 16,000 tons compared to the 2007-2009 August average of 68,000 tons, a difference of 76 percent. September downriver shipments of sand, gravel and stone products were about 71 percent below the 2007-2009 September average. The largest difference in the 2010 data and 2007-2009 averages occurred in October 2010 when downriver shipments were 79 percent below average. Shipments moving downriver in November and December 2010 only missed their 2007-2009 averages by 16 percent (or 7,000 tons) and 54 percent (or 22,000 tons), respectively (Figure 2.19).

The highest downriver volume of sand, gravel and stone products usually moved in October according to data from 2007 to 2009. However, in 2010, the highest downriver volume occurred in July, three months prior to the average high (Figure 2.19). The lowest upriver volume moved in December on average for the years 2007 through 2009. However, in 2010, the lowest tonnage of sand, gravel and stone products moved in August and October.

Fig. 2.19 Monthly and Average Tonnages of Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock Barged Donwriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	60,512	67,858	56,553	77,249	42,440	41,134
2010 Data	43,009	16,000	16,300	16,000	35,729	18,950

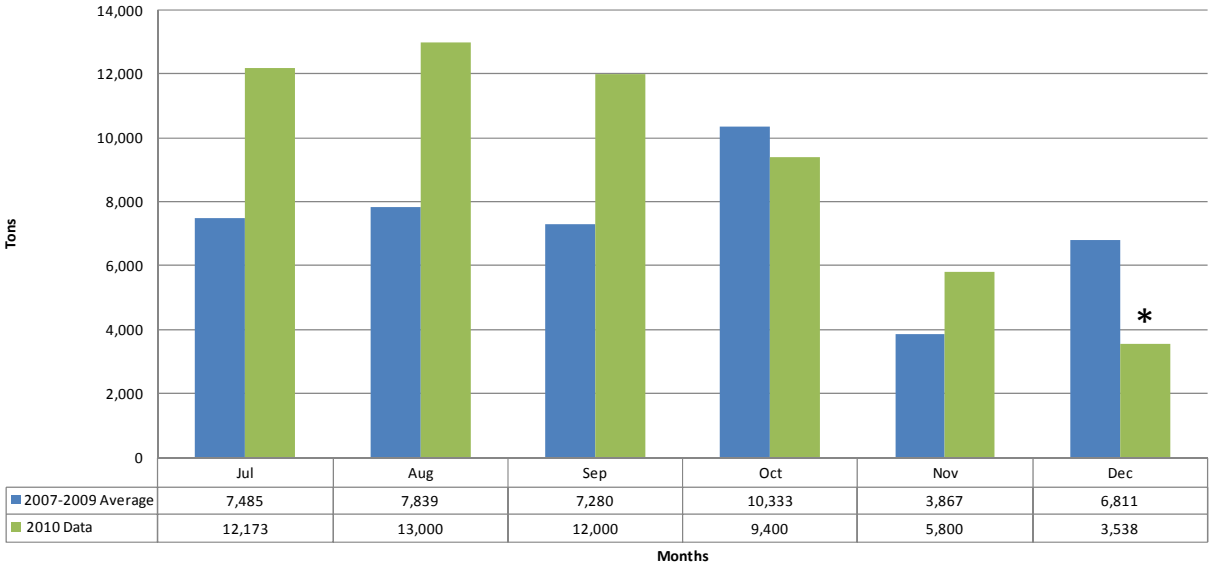
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Iron Ore, Iron Steel Waste and Scrap

Downriver shipments of iron ore, iron steel waste and scrap barged in 2010 were mostly above their 2007-2009 averages. In July 2010, downriver shipment volumes were 12,000 tons, about 63 percent above the July average (Figure 2.20). August 2010 shipments moving downriver were more than 66 percent above the 2007-2009 August average. Downriver movements of iron ore were 12,000 tons in September 2010, compared to the 2007-2009 September average of 7,000 tons, a difference of 65 percent. The October average for the past three years was only 1,000 tons (or 13 percent) larger than volumes shipped downriver in October 2010. Downriver shipments of iron ore again rose above average in November 2010 with a difference of 50 percent. December downriver shipments dropped below average by more than 48 percent (Figure 2.20). But, if December data included the rest of the month, downriver shipments could have reached a volume of about 10,500 tons, which would have been 56 percent above average. This surge of tonnage moved downriver in December demonstrates that the iron ore industry was evidently preparing for the extended lock outage by shipping more iron ore, iron steel waste and scrap prior to the closure date.

The highest monthly volume of iron ore products on average from 2007 to 2009 for the months July through December occurred in October (Figure 2.20). However, when compared to July through December 2010 data, the highest volume was shipped in August, two months prior to the average high. The lowest monthly volume for iron ore products for the past three years has occurred in November; December 2010, however, is the month in which the lowest downriver shipment occurred (Figure 2.20).

Fig. 2.20 Monthly and Average Tonnages of Iron Ore, Iron Steel Waste and Scrap Barged Donwriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	7,485	7,839	7,280	10,333	3,867	6,811
2010 Data	12,173	13,000	12,000	9,400	5,800	3,538

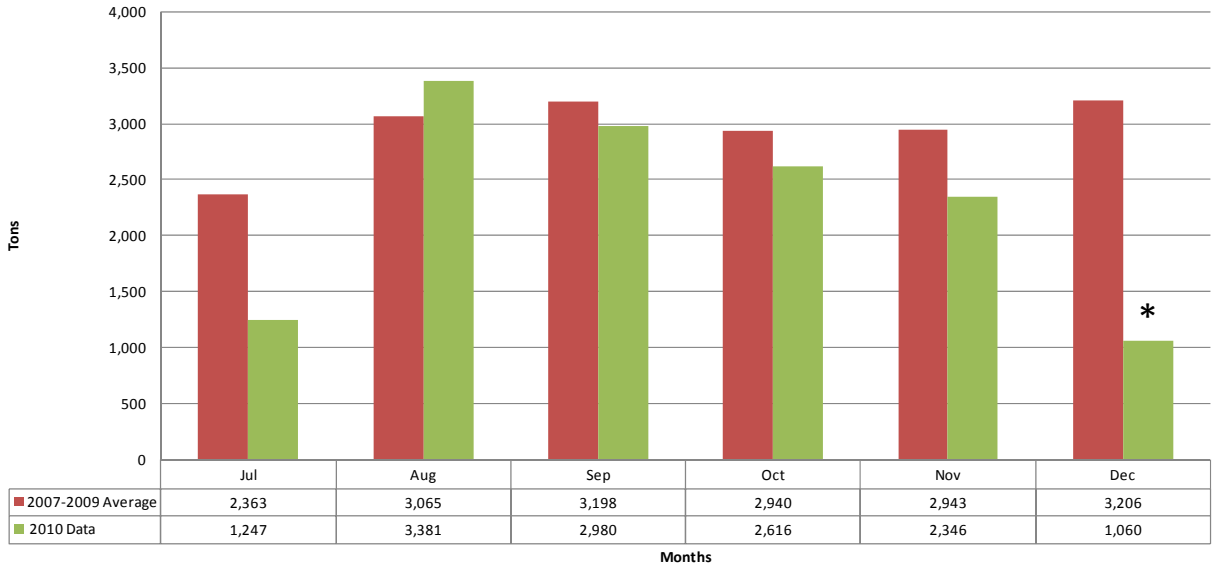
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Primary Non-Ferrous Metallic Products and Fabricated Metal Products

Besides the upriver shipments of primary non-ferrous metallic and fabricated metal products (including copper, aluminum and smelted products) in August 2010, monthly shipments from July to December 2010 were below average based on data from the past three years. Upriver shipments in July 2010 were more than 47 percent below the 2007-2009 July average (Figure 2.21). Tonnages moving upriver in August 2010 were about 10 percent higher than the average from 2007-2009. Upriver shipments of primary non-ferrous metallic products in September and October 2010 were seven and 11 percent below the September and October averages, respectively. November upriver movements in 2010 were only 600 tons or 20 percent below average. The largest difference in 2010 data and 2007-2009 averages occurred in December 2010 when volumes moved that month were 67 percent below normal volume levels for December (Figure 2.21). However, if December shipments had continued through the end of the month, upriver movements could have reached 3,000 tons (three times the reported December 2010 data), which would only have been six percent below average.

The highest monthly volume of primary non-ferrous metallic products on average from 2007 to 2009 for the months July through December occurred in December (Figure 2.21). However, when compared to July through December 2010 data, the highest volume was shipped in August, four months prior to the average high. The lowest monthly volume for primary non-ferrous metallic products for the past three years has occurred in July; December 2010, conversely, was the month in which monthly volumes reached their six month low.

Fig. 2.21 Monthly and Average Tonnages of Primary Non-Ferrous Metallic and Fabricated Metal Products Barged Upriver for July - December 2010



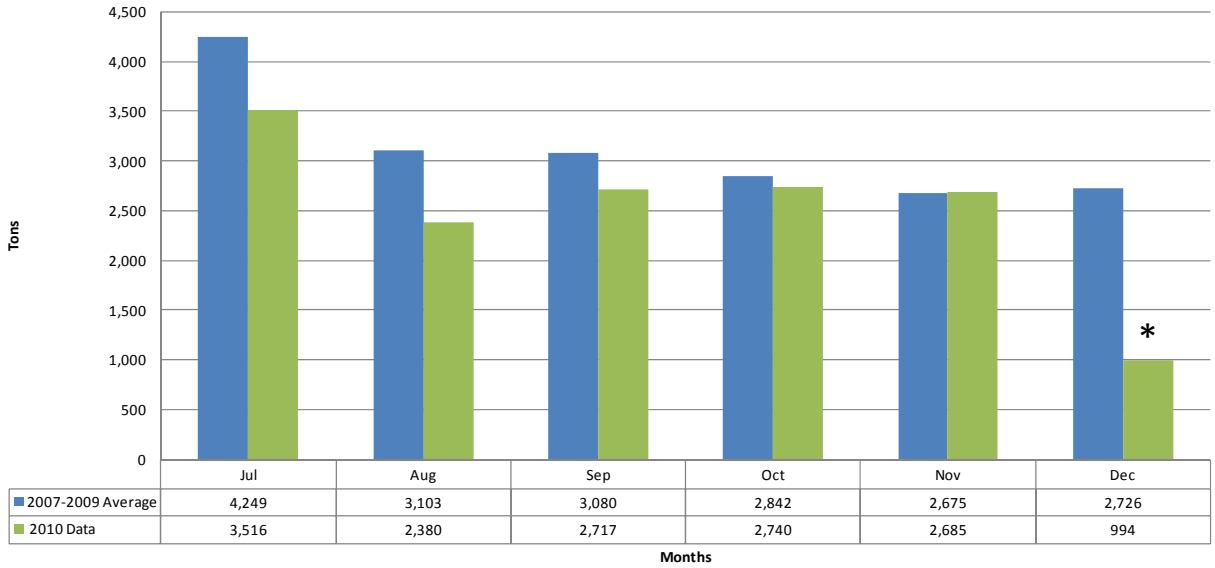
	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	2,363	3,065	3,198	2,940	2,943	3,206
2010 Data	1,247	3,381	2,980	2,616	2,346	1,060

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Downriver movements of primary non-ferrous metallic and fabricated metal products (including copper, aluminum and smelted products) were also mostly below 2007-2009 averages. Both downriver movements in July and August 2010 were about 700 tons or 17 and 23 percent below the July and August averages, in that order (Figure 2.22). September 2010 downriver shipments of primary non-ferrous metallic products were 12 percent below normal. During the month of October 2010, downriver shipments missed the 2007-2009 average by only four percent. November 2010 is the sole month in which the downriver tonnage was higher than the 2007-2009 average and only by 10 tons (less than one percent). December 2010 is the month in which the largest variance between 2010 data and 2007-2009 averages occurred. This month was almost 64 percent below average (Figure 2.22).

The highest volume of primary non-ferrous metallic products moving downriver usually occurred in July according to 2007-2009 data; this trend continued in 2010 (Figure 2.22). The lowest volume shipment moving downriver from 2007 to 2009 normally occurred in November. However, in 2010, the lowest movement occurred in December.

Fig. 2.22 Monthly and Averages Tonnages of Primary Non-Ferrous Metallic and Fabricated Metal Products Barged Downriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	4,249	3,103	3,080	2,842	2,675	2,726
2010 Data	3,516	2,380	2,717	2,740	2,685	994

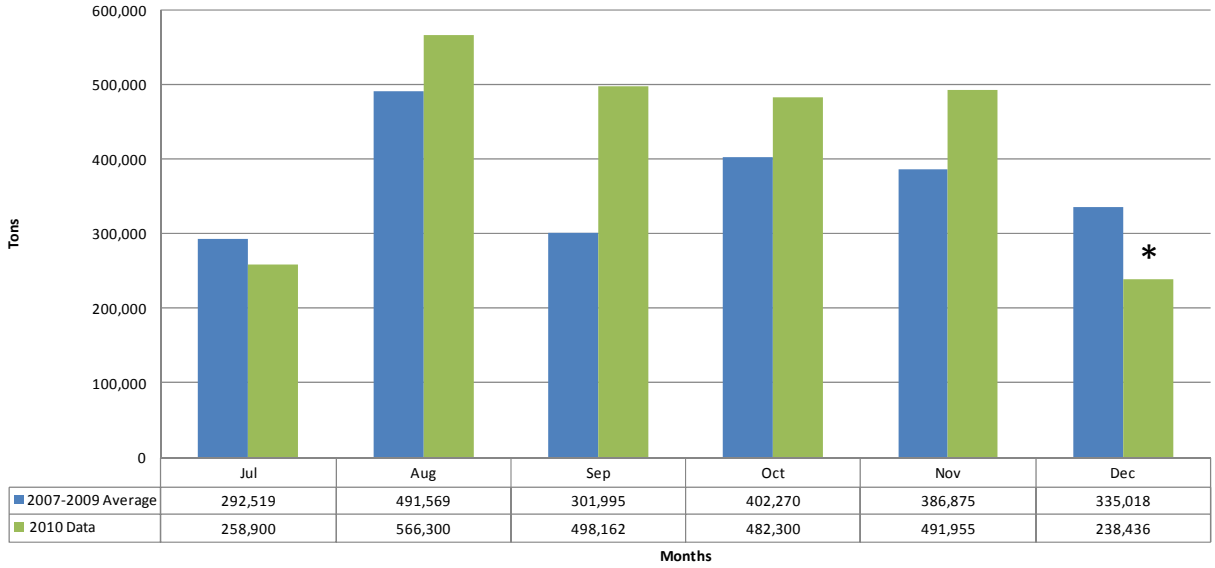
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Wheat

Downriver shipments of wheat from July through December 2010 were in general well above the 2007-2009 average. However, the six month period in 2010 started off with July downriver volumes of wheat missing the average of 293,000 tons by 12 percent (Figure 2.23). August 2010 downriver movements reached 566,000 tons surpassing the 2007-2009 average by 15 percent. The largest difference in 2010 data and the 2007-2009 averages occurred in September 2010 when downriver shipments of wheat exceeded the September average by 65 percent. October 2010 downriver movements were 20 percent higher than the 2007-2009 October average. November 2010 downriver movements totaled 492,000 tons, which was 27 percent more than the November average. Lastly, December 2010 downriver shipments of wheat missed the December average by 29 percent (Figure 2.23) and December 2010 data only consisted of nine days. This large amount of tonnage for the nine days in December shows that the wheat industry was gearing up for the extended lock outage by shipping a great more of their product prior to the closure date.

From 2007 to 2009, the highest volume tonnage of wheat shipped downriver normally occurred in August (Figure 2.23). The same observation occurred in 2010. The lowest tonnage of wheat barged downriver occurred in July from 2007 to 2009. However, in 2010, December shipments downriver were the lowest for the six month period.

Fig. 2.23 Monthly and Average Tonnages of Wheat Barged Downriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	292,519	491,569	301,995	402,270	386,875	335,018
2010 Data	258,900	566,300	498,162	482,300	491,955	238,436

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

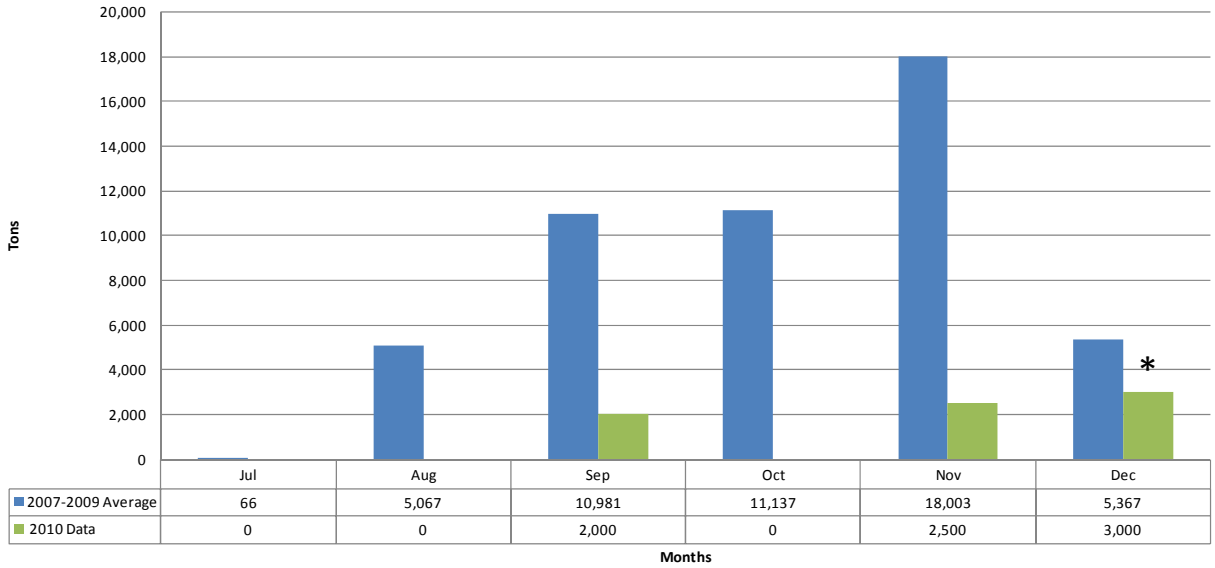
Corn, Rye, Barley, Rice, Sorghum and Oats

Downriver movements of corn, rye, barley, rice, sorghum and oats from July to December 2010 were insignificant when compared to corresponding averages from 2007 to 2009. No actual movements of corn, rye, barley, rice, sorghum and oats were shipped downriver in July, August or October 2010 (Figure 2.24). Therefore, shipments during these months were 70 tons, 5,000 tons and 11,000 tons below average, respectively. Downriver movements in September 2010 were 82 percent below the September average. The largest difference in 2010 data and the past three year averages occurred in November 2010 when downriver shipments missed the November average by 86 percent. December 2010 downriver movements were much closer to the December average; downriver shipments were 3,000 tons in December 2010 compared to an average of 5,500 tons, a 44 percent difference (Figure 2.24).

The highest monthly volume for corn, barley, rice, sorghum and oats on average from 2007 to 2009 for the months July through December occurred in November. However, when compared to July through December 2010 data, the highest volume was shipped in December (Figure 2.24). The lowest monthly volume of corn, barley, rice, sorghum and oats from 2007 to 2009 typically occurred in July. Data from 2010 refutes this trend as the lowest monthly volume occurred in September 2010 at a tonnage of 2,000. This observation does not take into account tonnages of zero.

Note: the commodities corn and rye, barley, rice, sorghum and oats have been combined into one commodity for Figure 2.24.

Fig. 2.24 Monthly and Average Tonnages of Corn and Rye, Barley, Rice, Sorghum and Oats Barged Downriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	66	5,067	10,981	11,137	18,003	5,367
2010 Data	0	0	2,000	0	2,500	3,000

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

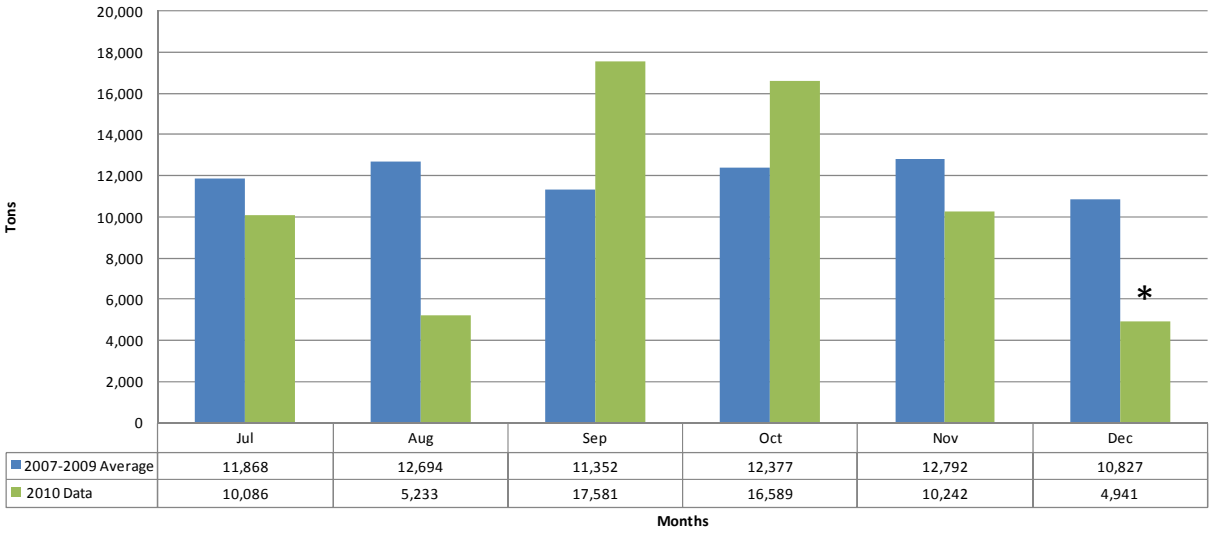
Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grains and Other Agricultural Products

Downriver shipments of vegetable products (including vegetable oils); animal feed, grain mill products, flour and other processed grains (including wheat flour, hay and fodder); and other agricultural products (including dairy products, sugar, coffee, alcoholic beverages and tobacco) only rose above 2007-2009 averages in September and October 2010. July 2010 downriver shipments missed the July average by 15 percent (Figure 2.25). August 2010 downriver movements had the largest difference in tonnage when compared to the August average; downriver shipments fell below average by 59 percent. Tonnage shipped downriver in September and October 2010 surpassed the September and October averages by 55 percent and 34 percent, respectively. Movements made downriver in November 2010 were only 2,500 tons or 20 percent below average. Finally, downriver shipments of vegetable products, animal feed and other agricultural products in December 2010 were below average by 54 percent (Figure 2.25).

The highest monthly volume of vegetable products, animal feed and other agricultural products on average for the months July through December occurred in November (Figure 2.25). However, the monthly high volume for 2010 occurred in September, two months prior to the average high. December is the lowest volume month on average from 2007 to 2009 for the months July through December; this was also true in 2010, although December 2010 data only consisted of the first nine days.

Note: the commodities vegetable products; animal feed, grain mill products, flour and other processing grains; and other agricultural products have been combined into one commodity for Figure 2.25.

Fig. 2.25 Monthly and Average Tonnages of Vegetable Products; Animal Feed, Grain Mill Products, Flour and Other Processed Grains; and Other Agricultural Products Barged Downriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	11,868	12,694	11,352	12,377	12,792	10,827
2010 Data	10,086	5,233	17,581	16,589	10,242	4,941

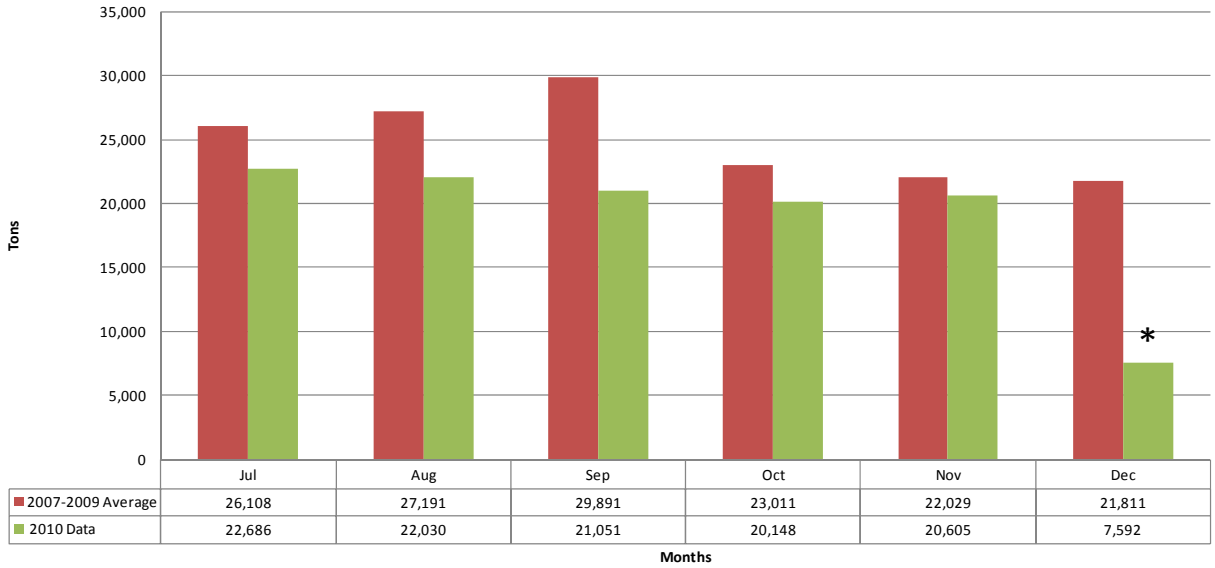
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water

Waste material, garbage, landfill, sewage sludge and waste water tonnages moving upriver from July to December 2010 were below the 2007-2009 averages for those months. Upriver movements in July and August 2010 were 13 and 19 percent below the July and August averages, in that order (Figure 2.26). September 2010 upriver shipments were 30 percent below average. October and November 2010 upriver shipments of waste material were only 12 percent and six percent below their averages, respectively. The largest variation in 2010 data and the past three year averages occurred in December 2010 when upriver shipment volumes missed the December average by a significant 65 percent (Figure 2.26). However, had December data consisted of all 31 days instead of nine, upriver shipments of waste material could theoretically have reached 22,500 tons.

From 2007 to 2009, the highest volume tonnage of waste material shipped upriver normally occurred in September (Figure 2.26). However, the highest volume tonnage in 2010 occurred in July. The lowest tonnage of waste material barged upriver occurred in December from 2007 to 2009. This is also true for 2010 data.

Fig. 2.26 Monthly and Average Tonnages of Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water Barged Upriver for July - December 2010



	Jul	Aug	Sep	Oct	Nov	Dec
2007-2009 Average	26,108	27,191	29,891	23,011	22,029	21,811
2010 Data	22,686	22,030	21,051	20,148	20,605	7,592

Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
* December 2010 data only includes the first nine days of the month.

2.3 Summary of Waterborne Movements for July – December 2010

The most notable characteristic of waterborne movements between July 2010 and December 2010 is that on the Columbia-Snake River about three times more tonnage travels downriver than upriver. Moreover, the monthly total tonnage traveling upriver remained quite stable between July and November 2010 at an average of 198,000 tons, whereas the total tonnage of downriver shipments ranged from a high of 695,000 in August to a low of around 319,000 tons in December. The monthly downriver high in August for this six month period is likely due to the start of the wheat harvest as wheat makes up about 70 percent of all downbound shipments on the Columbia-Snake River.

A total of 3.3 million tons were shipped downriver between July and December 2010. The commodities with the largest volume of downriver shipments over the six month period have been wheat; forest products; sand, gravel and stone products; iron ore products; and vegetable products. Between July and December 2010 the total downriver tonnage of each of these commodities exceeded 48,000 tons (Table 2.1). During this time period, wheat comprised more than 75 percent, or 2.5 million tons of the total 3.3 million tons.

Around one million tons were shipped upriver between July and December 2010. The commodities with the largest volume of upriver shipments over the six month span have been distillate, residual and other fuel oils; gasoline products; waste materials; sand, gravel and stone products; and manufactured equipment and machinery. Between July and December 2010 the total upriver tonnage of each of these commodities exceeded 26,000 tons (Table 2.2).

The highest proportion of total upriver shipments, 48 percent of the total one million tons, was distillate, residual and other fuel oils. The second highest proportion of total upriver shipments was gasoline, jet fuel and kerosene products, comprising about 31 percent of the total upriver tonnage for July through December 2010.

Manufactured equipment and machinery were shipped upriver in mass quantity in the months leading up to the extended lock outage. This surge in upriver shipments for these commodities is most likely due to the preparations of the U.S. Army Corps of Engineers for the construction and assembly of lock gates and repairs. Through the months of November and December, barges of crane equipment, lock doors and other construction equipment were shipped upriver in anticipation and preparation for the extended lock outage.

As seen in above graphs, major commodities in general moved in large and above average quantities on the Columbia-Snake River during the month of July through December 2010 in order to prepare for the extended lock outage. Those major commodities moving downriver from July to December 2010 that rose above average levels for at least two months include forest products; iron ore products; wheat; vegetable products; animal feed, grain mill products, flour and other processed grains; and other agricultural products. Those major commodities moving upriver from July to December 2010 that rose above average levels for at least two months include distillate, residual and other fuel oils and fertilizer.

These large shipments in the months leading up to the December 2010 reveals that commodity industries were preparing for the extended lock outage by shipping more products prior to the closure date. By sending shipments prior to the outage, industries could accumulate products in Portland, Oregon and Vancouver, Washington so that customers have easy access to shipping and international trade while the Columbia-Snake River is closed. Sending shipments early also allows industries to fill orders prior to the outage rather than completely missing out on commerce and avoid increased costs of alternate modes of transportation while barge transportation is curtailed.

3. Pacific Northwest Wheat Case Study

Wheat is by far the largest volume commodity that moves on the Columbia-Snake River. In fact, 75 percent of all downriver movements in a given month or year are shipments of wheat. Because it is such a large volume client of barge transportation, it is useful to pay particular attention to wheat and its movements in the Pacific Northwest.

The Pacific Northwest (Washington, Oregon and Idaho) has available a three pronged transportation system: rail, barge and trucking and some combinations of the three. Therefore, wheat (in particular soft white wheat) has three different modes of transportation to travel by, allowing wheat producers, elevators, shippers and carriers to select the most efficient and/or economical mode or combinations of modes. In order to capture the options and decisions of wheat producers, elevators and shippers when it comes to wheat transportation, a survey of wheat elevators in the Pacific Northwest was conducted. This will provide the baseline scenario so that possible changes brought on by the extended lock outage can be evaluated.

3.1 Survey Methodology

The authors initially contacted the wheat association representatives for each state. A list was obtained from each area and supplemented with the *2010 Directory for the Pacific Northwest Grain and Feed Association*. These were used to ensure that the coverage of wheat elevators that have access to the Columbia-River for barge transportation was complete.

The survey was done in three steps. Wheat elevator managers were first contacted by phone to explain the purpose and structure of the study. Those who agreed to participate (only 1 out of 27 declined) were emailed a letter again explaining the purpose of the study and a four question survey regarding tonnage of wheat shipped by the elevator, transportation modes used by the elevator, transportation rates experienced and seasonality of movement to market. Each question was with respect to a typical year, considered as an average of the last five years. A copy of the survey is available in Appendix A.

If elevator managers did not respond within two weeks, the authors called once again to remind them of the importance of the survey. Twenty six out of the 27 elevators responded in full, a response rate of 96 percent.

Once the results were compiled, past experience and studies guided the research team to divide the 26 firms into specific regions of the Pacific Northwest. Idaho elevators were grouped into two regions, Northern (5 firms) and Southern (3 firms) Idaho, by an imaginary line extending from Oregon's border with Washington. Washington was divided into Northern (5 firms) and Southern (8 firms) based on a previous study on Pacific Northwest regional transportation flows by Dr. Ken Casavant (see references). In the most general sense, the partition of the two regions is I-90, a major highway through Washington. For example, the city

of Wenatchee is north of I-90, so any elevators in that city would be considered Northern Washington. Oregon was simply grouped as Eastern Oregon since all 5 firms were located east of the Cascade Mountain Range, a common divider between the west and east sides of Oregon.

3.2 Wheat Industry Structure and Operations

Of the survey respondents, Northern and Southern Washington elevators each ship about 89 million bushels[1] per year, Northern Idaho firms ship 41 million bushels per year, Eastern Oregon elevators ship 33 million bushels per year and Southern Idaho firms ship 7.5 million bushels per year (Table 3.1).

Southern Washington elevators ship the most wheat in the Pacific Northwest. This region includes Whitman County, which "has consistently been the number one wheat-producing county in the United States every year since 1978" (Washington Grain Commission). For this sample, both Northern Washington and Southern Washington firms each ship about 35 percent of all wheat in the Pacific Northwest; Northern Idaho firms ship about 16 percent; Eastern Oregon elevators ship about 13 percent; and Southern Idaho elevators ship only 3 percent of all wheat in the Pacific Northwest (Figure 3.1). The percentages and volumes above have been verified as accurate averages by personal communication with Glen Squires, Vice President of the Washington Grain Commission. This survey captures 95 percent of wheat shipments from the Pacific Northwest (Washington Grain Commission and Idaho Wheat Commission).

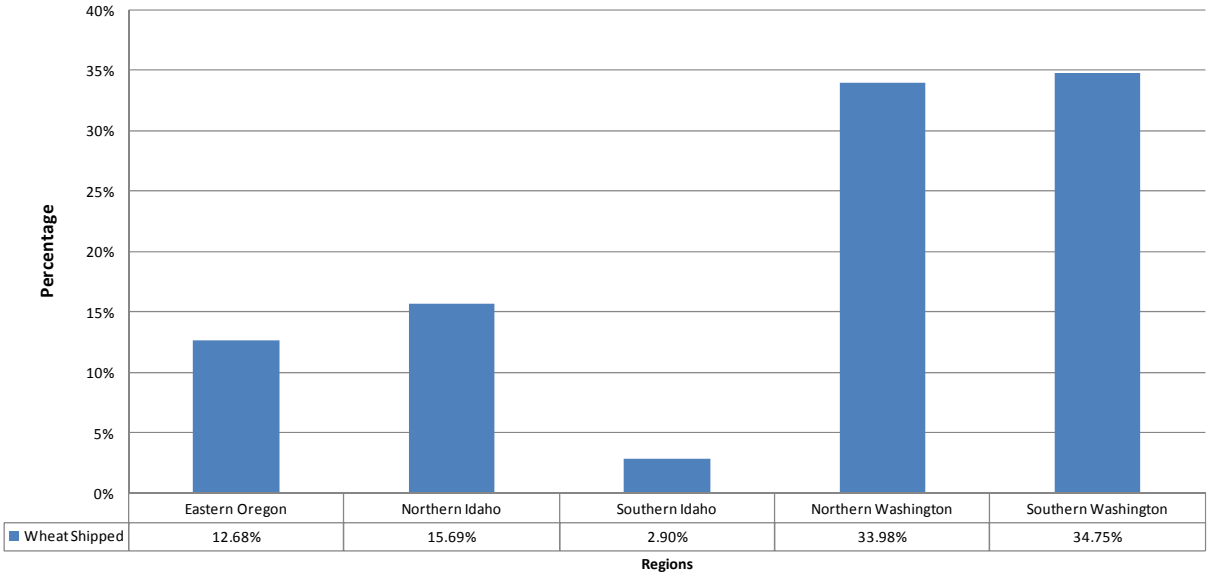
Table 3.1 Annual Wheat Tonnage Shipped by Survey Respondents

Region	Number of Firms	Annual Tonnage Shipped in Bushels	Percentage of the Total Annual Tonnage Shipped
Eastern Oregon	5	32,800,000	12.68%
Northern Idaho	5	40,600,000	15.69%
Southern Idaho	3	7,500,000	2.90%
Northern Washington	5	87,900,000	33.98%
Southern Washington	8	89,912,000	34.75%
Pacific Northwest	26	258,712,000	100.0%

Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

[1] One bushel of wheat is equal to 60 pounds and 2,000 pounds is equal to one U.S. ton, so one bushel is equal to 0.03 U.S. tons.

Figure 3.1 Percentage of Total Annual Wheat Tonnage Shipped by Survey Respondents



Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

The heart of this study is to determine how shippers choose and use alternative modes, in ordinary times and during the extended lock outage. In the Pacific Northwest, a combination of modes is generally used to transport commodity goods. Combinations of transportation modes include truck-barge[2], rail-barge[3] and truck-rail. Although rail-barge and truck-rail were not exclusively designated in the survey and the figures below, survey respondents included rail-barge shipments in the category of truck-barge and truck-rail movements in the category of rail.

According to survey respondents, Eastern Oregon elevators move 92 percent of their wheat by truck-barge, 7 percent by rail and only 1 percent by truck (Table 3.2). Northern Idaho elevators move most all of their wheat by truck-barge (79 percent) and the rest by rail (21 percent) and truck (less than 1 percent). Southern Idaho elevators move a third of wheat shipments by truck to final market, 22 percent by truck-barge and 45 percent by rail. Northern Washington wheat firms mostly move wheat by rail (71 percent); only 15 percent of wheat moves by truck-barge and 14 percent by truck in Northern Washington. Southern Washington elevators move 97.5 percent of their wheat by truck-barge, 1.5 percent by rail and 1 percent by truck (Figure 3.2).

The most obvious finding is that wheat firms in the Pacific Northwest move a majority of their product, about 61 percent, by truck-barge (Table 3.2). This is due to the low cost and convenience of barge transportation (see references). The Columbia-Snake River is centrally

[2] Truck-barge is the combination of trucking a commodity to a barge-loading facility and then shipping the product by barge to its destination.

[3] Rail-barge has recently made an appearance in the Pacific Northwest. Currently, only two elevators transport wheat by this mode.

located within the Pacific Northwest and wheat farms have been strategically situated near the river. It is often convenient for producers to simply load wheat into trucks and drive the product to centrally-located river terminals, or barge-loading facilities to be shipped west. The truck-barge option avoids the hassle, cost and emissions of trucking the wheat twice, once from the farm to a country elevator and once from a country elevator to a river terminal.

Another trend to notice is that Northern Washington and Southern Idaho mostly employ rail to transport wheat; about 71 percent of Northern Washington wheat and 45 percent of Southern Idaho wheat moves by rail (Figure 3.2). This is an outcome of the availability of several multiple rail car-loading facilities in these regions. These facilities have been strategically located in Northern Washington and Southern Idaho since wheat producers are a substantial distance from the Columbia-Snake River, where truck-barge is generally not economically feasible.

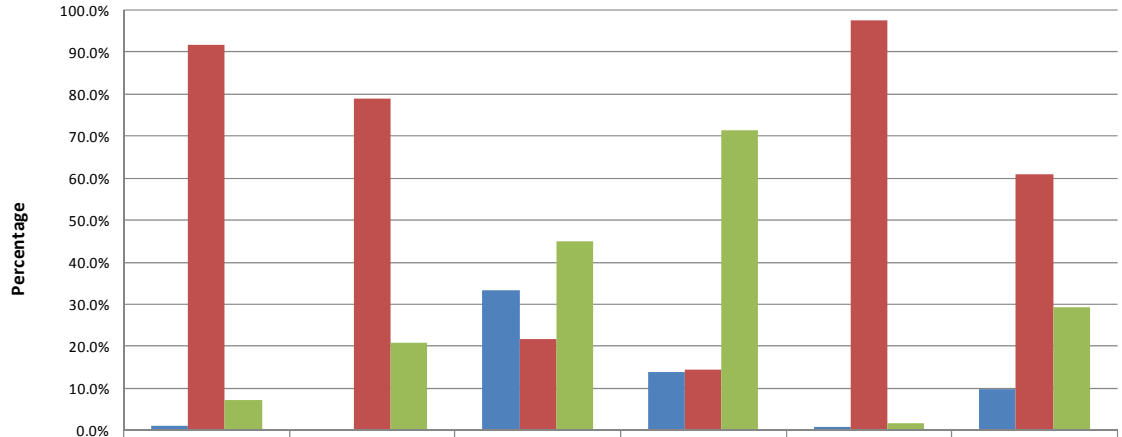
Thirty three percent of wheat coming from Southern Idaho and 14 percent of wheat coming from Northern Washington is shipped via truck to a final market (Figure 3.2). This could be because of the isolated nature of these regions, lack of rail access in the area (more likely for Idaho) or close proximity to flour mills, breweries and other facilities that process grain.

Table 3.2 Percentage Per Year of Wheat Shipped via Various Transportation Modes by Survey Respondents

Region	Number of Firms	Average Percentage Per Year		
		Direct Truck to Final Market	Truck-Barge	Rail
Eastern Oregon	5	1.0%	91.8%	7.2%
Northern Idaho	5	0.3%	78.9%	20.8%
Southern Idaho	3	33.3%	21.7%	45.0%
Northern Washington	5	14.0%	14.6%	71.4%
Southern Washington	8	0.9%	97.5%	1.6%
Pacific Northwest	26	9.9%	60.9%	29.2%

Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

Figure 3.2 Percentage Per Year of Wheat Shipped via Various Transportation Modes



	Eastern Oregon	Northern Idaho	Southern Idaho	Northern Washington	Southern Washington	Pacific Northwest
Direct Truck to Final Market	1.0%	0.3%	33.3%	14.0%	0.9%	9.9%
Truck-Barge	91.8%	78.9%	21.7%	14.6%	97.5%	60.9%
Rail	7.2%	20.8%	45.0%	71.4%	1.6%	29.2%

Regions

Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

Transportation rates in the Pacific Northwest vary due to distance, fuel usage, mode and other variables. However, in a very general finding, truck-barge ($0.55 per bushel) is at least 10 cents per bushel less than rail and truck (Table 3.3). Direct truck to final market is the most expensive form of transportation in the Pacific Northwest at 89 cents per bushel.

If all modes are considered, on average for the firms in each region, Eastern Oregon wheat elevators pay $0.50 per bushel for trucking and an average $0.29 per bushel for truck-barge; rail rates in Eastern Oregon are $0.58 per bushel (Table 3.3). Northern Idaho wheat firms pay $1.50 per bushel for trucking, $0.58 per bushel for truck-barge and $0.73 per bushel for rail. Southern Idaho wheat elevators have available rates of $0.71 per bushel for trucking, $0.86 per bushel for truck-barge and $0.83 per bushel for rail. Northern Washington wheat firms pay $0.52 per bushel for trucking, $0.57 per bushel for truck-barge and $0.54 per bushel for rail. Finally, Southern Washington wheat firms pay $1.12 per bushel to truck wheat, $0.47 per bushel to barge wheat and $0.55 to rail wheat (Figure 3.3).

The only regions in which truck-barge is more costly than both rail and truck are Southern Idaho and Northern Washington (Figure 3.3). This is most likely due to the fact that the firms in these regions represented in the survey were a substantial distance from the Columbia-Snake River. As was mentioned before, these areas have a number of multiple railcar loading facilities, which make rail the less expensive transportation option. Truck-barge costs in Southern Idaho and Northern Washington are an average $0.86 and $0.57 per bushel compared to rail costs of $0.83 and $0.54 per bushel and trucking costs of $0.71 and $0.52 per bushel, respectively.

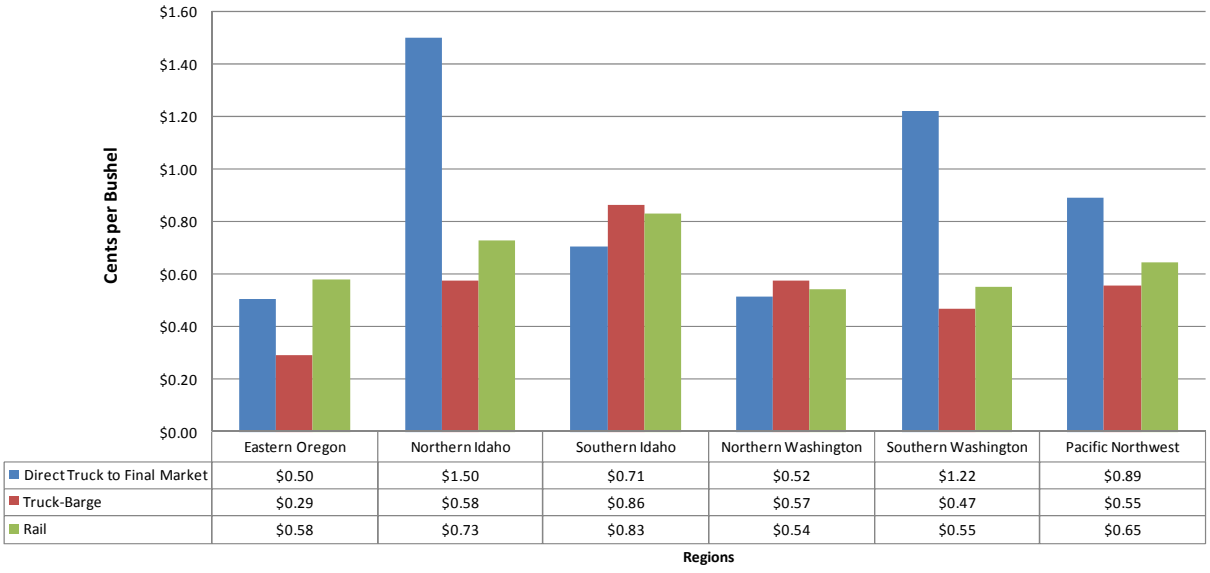
Eastern Oregon firms have the lowest rate for truck-barge, $0.29 per bushel (Table 3.3). Elevators surveyed in this region were all located within a 20 mile radius of the Columbia-River making truck-barge the most economical transportation choice. This region also has the lowest truck rate of $0.50 per bushel. Finally, Northern Washington elevators who participated in the survey experience the lowest rate for rail transportation at $0.54 per bushel. Again, Northern Washington has several multiple railcar loading facilities making rail transportation, on average, the efficient and cost-effective mode of transportation.

Table 3.3 Transportation Rates for Wheat by Survey Respondents

Region	Number of Firms	Average Rate in Cents per Bushel (Lower Columbia Terminals)		
		Direct Truck to Final Market	Truck-Barge	Rail
Eastern Oregon	5	$0.50	$0.29	$0.58
Northern Idaho	5	$1.50	$0.58	$0.73
Southern Idaho	3	$0.71	$0.86	$0.83
Northern Washington	5	$0.52	$0.57	$0.54
Southern Washington	8	$1.22	$0.47	$0.55
Pacific Northwest	26	$0.89	$0.55	$0.65

Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

Figure 3.3 Transportation Rates for Wheat to Lower Columbia Terminals by Survey Respondents



Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

Seasonality of wheat movements is important because of the extended lock outage. After wheat harvest, not all of the grain is shipped right away. In the Pacific Northwest, 43 percent of harvest is shipped in the August to November period, 36 percent from December to March

(roughly the period of the outage, the focus of this study) and 21 percent from April to July (Table 3.4).

Among the respondents, Eastern Oregon wheat firms ship 37 percent of their wheat from December to March, 23 percent from April to July and 40 percent from August to November (Table 3.4). Northern Idaho wheat elevators ship 42 percent of their wheat from December to March, 19.5 percent from April to July and 38.5 percent from August to November. Southern Idaho wheat firms ship over half of their wheat (55 percent) from August to November; 32 percent moves from December to March and only 13 percent moves from April to July. Northern Washington wheat elevators move 38 percent of their wheat from December to March, 24 percent from April to July and 38 percent from August to November. Finally, Southern Washington wheat firms move 32 percent of their wheat from December to March, 24 percent from April to July and 44 percent from August to November (Figure 3.4).

A seasonality finding that stands out is that Northern Idaho and Northern Washington elevators each ship about 40 percent of their wheat from December to March instead of from August to November, as the rest of the regions do (Figure 3.4). Besides Northern Idaho and Northern Washington, the majority of the Pacific Northwest's wheat moves from August to November, a smaller portion moves from December to March and the least amount of wheat is shipped from April to July.

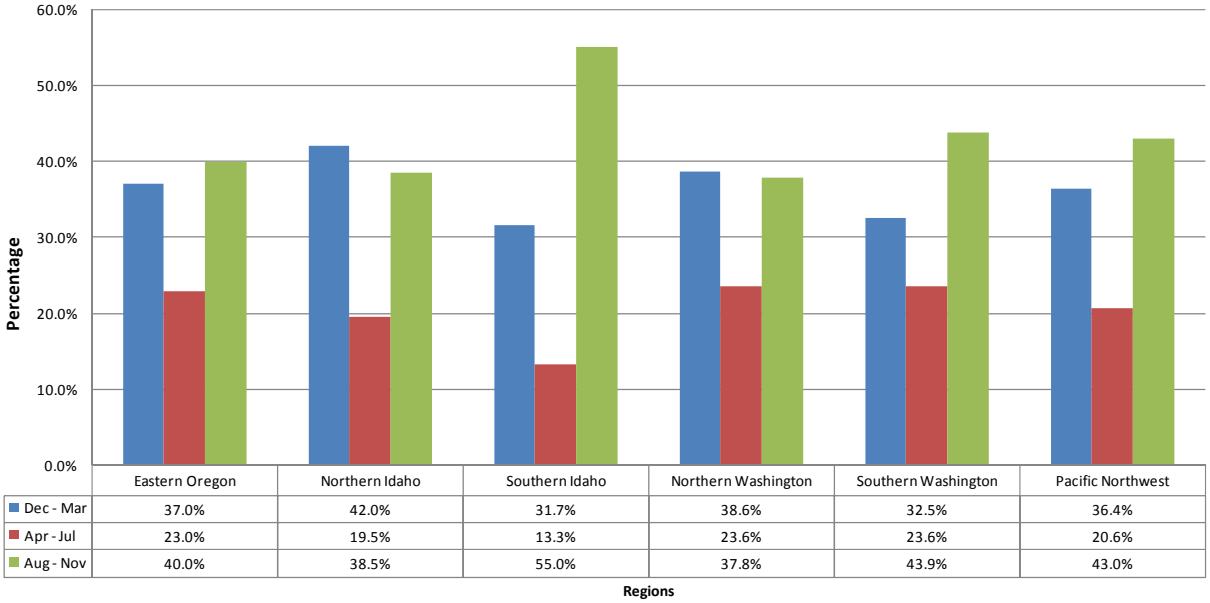
Southern Idaho and Southern Washington wheat firms ship over 40 percent of their wheat just after harvest, from August to November (Figure 3.4). All of the regions ship over 30 percent of their wheat from December to March, the period in which the extended lock outage will occur. As stated earlier, 61 percent of wheat in the Pacific Northwest travels by truck-barge (Table 3.2). And according to all of the respondents, 36 percent of wheat ships from December to March (Table 3.4). Sixty-one percent of 259 million bushels, the amount of wheat shipped from the Pacific Northwest in a typical year, is 158 million bushels or 4.75 million tons. Thirty six percent of 4.75 million tons is 1.7 million tons, meaning 1.7 million tons of wheat could have to move by a different mode of transportation other than barge from December 2010 through March 2011, the time in which the extended lock outage will occur. Another alternative would be moving wheat prior to or after the lock closure as was partially illustrated in Figure 2.23.

Table 3.4 Percentage of Wheat Shipped by Season

Region	Number of Firms	Average Percentage of Wheat Shipped		
		Dec - Mar	Apr - Jul	Aug - Nov
Eastern Oregon	5	37.0%	23.0%	40.0%
Northern Idaho	5	42.0%	19.5%	38.5%
Southern Idaho	3	31.7%	13.3%	55.0%
Northern Washington	5	38.6%	23.6%	37.8%
Southern Washington	8	32.5%	23.6%	43.9%
Pacific Northwest	26	36.4%	20.6%	43.0%

Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

Figure 3.4 Percentage of Wheat Shipped by Season



	Eastern Oregon	Northern Idaho	Southern Idaho	Northern Washington	Southern Washington	Pacific Northwest
Dec - Mar	37.0%	42.0%	31.7%	38.6%	32.5%	36.4%
Apr - Jul	23.0%	19.5%	13.3%	23.6%	23.6%	20.6%
Aug - Nov	40.0%	38.5%	55.0%	37.8%	43.9%	43.0%

Source: Elevator Firm Survey (Washington, Oregon and Idaho) – Washington State University

3.3 Conclusions of Survey Results

This survey allowed the authors to set up a benchmark for rate structures, seasonality and modal choices for wheat elevators in the Pacific Northwest. After the extended lock closure occurs and barge transportation returns to the Columbia-Snake River, these survey results can be compared to what actually occurs to understand how the outage impacts wheat shipments and sales in the Pacific Northwest.

Southern Washington, including the county of Whitman, ships the highest percentage of wheat in the Pacific Northwest. However, in general, Washington wheat elevators move 70 percent of all shipments from the three states.

Wheat firms in the Pacific Northwest move most of their product, about 61 percent, by truck-barge, due to the low cost and convenience of barge transportation (see references). However, Northern Washington firms mostly employ rail to transport wheat, about 71 percent.

Thirty three of wheat coming from Southern Idaho and 14 percent from Northern Washington is shipped via truck to a final market. This could be because of the isolated nature of these regions or close proximity to flour mills, breweries and other facilities that process grain.

In general, on average, truck-barge is at least 10 cents per bushel less than rail and truck. Direct truck to final market is the most expensive form of transportation in the Pacific Northwest at 89

cents per bushel and is seldom used. Northern Washington and Southern Idaho are the only regions in which barge is more costly than both rail and truck.

Northern Idaho and Northern Washington elevators both ship most of their wheat from December to March instead of from August to November, as contrasted to the rest of the regions. For all regions besides Northern Idaho and Washington, the majority of wheat is shipped from August to November, then from December to March and the least amount of wheat is shipped from April to July.

All regions of the Pacific Northwest (among survey respondents) ship over 30 percent of their wheat from December to March, the period in which the extended lock outage will occur. This means that 1.7 million tons of wheat will have to move by a different mode of transportation other than barge from December 2010 through March 2011, the time in which the extended lock outage will occur.

The percentages and volumes in this section have been compared to total figures for the state and have been verified as accurate averages by the Washington Grain Commission.

4. Industrial and Regional Preparations for the Extended Lock Outage

Since an extended lock outage of this magnitude is unprecedented, preparations by shippers, carriers, government institutions and private entities for the Columbia-Snake River lock outage were also unique. As in previous sections, this section only discusses the industries of major commodities' moving downriver and upriver.

4.1 Regional Carrier Preparations

This section not only examines the preparations of commodity industries that use barge transportation, but also the coordination of regional shippers. The authors conducted a broad survey and interview concerning the activities and preparations of the actors in the region, both state and federal, for the upcoming extended lock outage. These actors include carriers, shippers, associations and industries. The preparations and plans of these entities are discussed below.

Barge Line Preparations

The U.S. Army Corps of Engineers, the operators of the Columbia-Snake River lock and dams, announced plans for the extended lock outage in 2009 to shippers, carriers and industries invested in barge transportation. In particular, barge lines were notified in advance so that management could prepare for this four month pause in waterborne commerce. Of all transportation modes and industries involved in the extended lock outage, barge lines are expected to take the brunt of the economical impact in the short run as the Columbia-Snake River locks are essential to barge transportation. In the long run, this industry is expected to benefit greatly from the safer, more efficient and more reliable transportation system provided by the extended lock outage.

Due to the fact that barge transportation would cease for the four months of the extended lock outage, some barge lines implemented a "business interruption surcharge" of about seven percent. This add-on to current tariffs was designed to allow barge lines to recover some of the revenue loss from the interruption in waterborne commerce.

Along with preparing for revenue impacts, barge lines have also prepared customers and employees to weather the downturn in business. The barging industry in the Pacific Northwest briefed customers, employees and suppliers on the necessity of the extended lock outage and the required time to complete repairs, looked for ways to continue benefit packages for employees during the extended lock outage and aided customers in finding alternative transportation methods from December 2010 to March 2011.

Most barge lines in the Pacific Northwest plan to lay off a significant number of their employees, including boat crews, during the four month outage in order to reduce costs.

However, barge staff will still be employed after the outage and their health insurance will continue during the closure (Mayer, "Early Warning"). Managers of some barge lines will also take two to three months of layoff, including vacation time. In addition, barge lines plan to idle most all of their boats for the months of the extended lock outage.

Although the bulk of the Columbia-Snake River will be closed to barge traffic, Bonneville Lock and Dam will be open during a portion of the outage, which will allow barge lines to continue service to areas below The Dalles Lock and Dam and within pools. Barge lines plan to continue those shipments that are able to be delivered as long as this lock and adjacent pools are accessible. Products that will continue to move by barge during the outage include selected sources of forest products, paper, wheat and some petroleum.

One of the most important preparations that barge lines were a part of was to provide the capacity and power to respond to the increased demand of customers and their products prior to the lock outage. As mentioned in Section 2, industries have succeeded in shipping an increased amount of products before the extended lock outage, working with barge lines to move large shipments during the latter half of the year. Shipment tonnages for products such as wheat, forest products, vegetable products and petroleum were well above average from July to December 2010. This increase in tonnage allowed barge lines to increase revenue prior to the lock outage in order to offset loss of business during the actual outage while providing increased service to their customers.

Some barge lines also plan to preposition barges for some commodities, allowing consumers to have access to supplies during the outage without having to contend with alternative modes of transportation. Petroleum barge storage is expected to be prepositioned upriver for fuel consumers in eastern Washington, eastern Oregon and Idaho. Such prepositioning allows barge lines to charge a fee for the service of storage of commodities, creating another source of replacement revenue during the outage.

Rail Line Preparations

In contrast to barge companies, which will lose substantial business for the entirety of the lock outage, rail lines have been preparing for the increase in cargo loads. Rail lines stepped forward to aid customers, producers and industries in continuing shipments through the extended lock outage. Such preparation included advertising, identifying inland markets, reaching out to shippers and industries that may need transportation during the outage, partnering with local ports to aid in the movement of products and predicting expected shipment volumes.

Class I rail lines in the Pacific Northwest have planned to add a few additional trains per week during the outage with the intention of taking on cargo that would normally move by barge. Each train would haul 100 to 110 railcars. For comparison, a 60-foot, 100-ton rail car can carry a load equivalent to about four large semi loads. Therefore, a 100 car train moving from Lewiston to Portland could transport the same amount of cargo of 400 trucks, avoiding

pressure on the roadways of the state. These additional trains will primarily move from east to west and will carry wheat, forest products, barley and paper. Rail companies will also seek to move products from west to east, including consumer diesel and petroleum.

To prepare for additional trains during the extended lock outage months, rail lines also had to accumulate additional rail cars. This involves bidding on, obtaining and finding storage for rail cars. Planning for additional trains depends greatly on the availability of rail cars, which fluctuate in price, including a tariff, depending on demand. However, storage cars have disappeared in mass from short line railroads, suggesting rail lines may have obtained these cars for use during the extended lock outage (Washington State Department of Transportation).

According to their actions, preparations and comments, railways in the Pacific Northwest are anticipating heavier cargo loads from December 2010 to March 2011. Rail employees have been told to expect long shifts, large train loads and overtime hours (Washington & Idaho Railway).

General Carrier Preparations

In addition to coordinating shipments and storage of commodities during the outage, the Port of Portland has offered to reward shippers for their continued support and patronage by subsidizing rail and truck transportation. A Port of Portland commissioner stated that the port will pay carriers $400 per container for rail shipments from Lewiston, Idaho and $250 per container for trucked shipments from Umatilla, Oregon (Mayer). To subsidize patrons' alternative transportation modes, the Port of Portland has set aside $800,000. Port commissioners intend that this subsidy will encourage carriers and industries to continue business with Portland during and after the outage, instead of seeking commerce with other local ports.

4.2 Regional Industry Preparations

Major commodity industries that use the Columbia-Snake River have been preparing for the extended lock outage for more than a year. The early announcement by the U.S. Army Corps of Engineers of the planned outage in 2009 allowed industries, carriers, shippers and customers of barge lines to effectively plan for the four month halt in transportation. Below are some of the specific preparations of the industries of major commodities that use barge transportation in the Pacific Northwest, as revealed in the public documents, discussions and interviews for the preparation period.

Petroleum: Gasoline, Jet Fuel and Kerosene; Distillate, Residual and Other Fuel Oils; and Lubricating Oils and Grease

Petroleum companies have been rather reserved about their transportation plans during the extended lock outage. When a petroleum representative was asked about specific

preparations, he gave this statement: “Individual petroleum companies are managing their own supply and distribution plans... It will be up to individual companies to address as their trade group is not going to tackle the supply/distribution issue due to anti-trust concerns.”

However, the Washington State Department of Commerce (WSDC) and Oregon Department of Energy (ODE) have researched plans and preparations of petroleum companies and have both produced a number of situation reports including information on the anticipated impact of the extended lock outage, alternative transportation for the shipping of gasoline, diesel, jet fuel and bio fuels and suggestions on how to weather possible fuel shortages and price spikes.

According to the WSDC, “petroleum companies are evaluating all fuel supply points and distribution options throughout the region to ensure adequate supply and timely fuel deliveries to Eastern Oregon and Washington communities throughout the duration of the outage.” Normally, fuels are barged from petroleum distribution terminals at Portland and Pasco, Washington in order to supply eastern Washington and Oregon with petroleum. From Pasco, fuel is sent through the Chevron pipeline to Spokane, Washington for distribution or transported by tanker trucks to rural areas in eastern Washington and Oregon. On average, 1.47 million gallons per day of gasoline and diesel fuel move upriver for distribution as stated by WSDC. This department and petroleum companies have suggested three alternatives to barging 1.47 million gallons of fuel per day during the outage:

- Use of excess terminal and barge storage
- Use of excess capacity on pipelines from Montana and Salt Lake City
- Increased use of tanker trucks and tanker rail cars

In addition to these strategies, Tidewater Barge Lines plans to preposition six fuel barges containing over 200,000 barrels of petroleum product at the Pasco terminal prior to the beginning of the lock outage. Terminals in eastern Washington, eastern Oregon, Idaho and Montana will be filled in anticipation of the outage. These actions will help supply eastern Washington and Oregon for a limited amount of time, but gives petroleum companies more time to plan alternative transportation routes. Barge lines have also moved above average volumes of distillate and other fuel oils from July through December 2010 (Figure 2.15). This suggests terminals and industries are accumulating stores of petroleum in anticipation of the extended lock outage.

The U.S. Coast Guard (USCG) has also been working on petroleum shipment strategies for the upcoming lock outage. USCG is expecting an increase in truck shipments of petroleum scattered over several major highways in the Pacific Northwest during the river closure. An estimated 1,750 tanker trucks are expected to move gasoline, diesel fuel, jet fuel and bio fuel from western Washington and Oregon to the east side of these states. A few rail lines in the Pacific Northwest also plan to move about 5 cars of petroleum per day upriver which will ease the traffic load on major local highways.

According to the general manager of the Port of Morrow[4], movements of ethanol that are normally barged downriver to Portland will have to be rerouted during the extended lock outage as well. The ethanol, which is produced at the port and most often used as a bio fuel additive to gasoline, is scheduled to move by truck during the outage. Typically 30 million gallons per year are shipped from the Port of Morrow to Portland; officials say that about one third of that tonnage is shipped from December to March. Therefore, about 10 million gallons of ethanol is scheduled to be trucked from eastern Oregon to Portland during the extended lock outage.

Fertilizer – Nitrogenous, Potassic, Phosphatic and Others

Fertilizer generally moves prior to the two planting seasons of wheat. One of the mass movements of fertilizer occurs from March to May, prior to the planting of spring wheat, and the other occurs from September to October, prior to the planting of winter wheat. Therefore, fertilizer industry representatives have not made extensive plans and preparations for the extended lock outage since the two fertilizer seasons do not occur in the winter months (December through March).

According to industry interviews, the only concern expressed by fertilizer industry representatives is the possibility that the extended lock outage may not successfully open up on its announced date, March 18, 2011. If an extension of the lock outage were to occur, fertilizer companies in the Pacific Northwest may need to find alternative transportation so that their product could be delivered to wheat producers in time for the spring planting season. Alternative transportation options for the fertilizer business include truck and rail.

The majority of fertilizer in the region is delivered by rail. Class I and short line railroad companies deliver fertilizer from the Portland and Vancouver area to Eastern Washington, Oregon and Idaho. During the lock outage, some railroad and trucking firms plan to move a small volume of fertilizer from west to east that would normally move by barge.

Forest Products, Lumber, Logs and Woodchips

The forestry industry plans to use truck and rail transportation as an alternative to barge during the extended lock outage. Woodchips, lumber, logs and pulp are expected to be shipped by these modes from December 2010 to March 2011.

Industries that purchase and use forest products have also had to plan and prepare for the extended lock outage. Various paper companies in the Pacific Northwest accelerated their shipments by barge in the months prior to December 2010 to ensure they received their product and to avoid the cost increase of trucking and railing their entire loads during the outage time period. The paper industry also improved their supply of inputs by cleaning out

[4] The Port of Morrow is located on the Columbia River in Boardman, Oregon, about 20 miles west of McNary Lock and Dam.

inventories of storage units upriver from the Portland and Vancouver areas. One paper firm estimated that woodchip shipments during the lock outage could reach up to five truck deliveries per day from eastern Oregon.

According to industry interviews, another paper company that barges forest products upriver to its inland location also barges its finished product, paper and paperboard, downriver to the Port of Portland. This firm plans to work around the extended lock outage by trucking its paper products to Vancouver and then trans-loading[5] containers to be delivered to the Port of Portland. In addition to deliveries to Portland, this company will also be transporting its product via truck and rail to its warehouse in Tacoma, Washington for trans-loading into containers and shipment to the Port of Seattle.

Even though the majority of the locks on the Columbia-Snake River will be closed, Tidewater Barge Lines plans to continue to move paper and woodchips to communities downriver of The Dalles Lock and Dam. The continuation of lockage through Bonneville Lock and Dam during the greater part of the outage will allow barge lines, like Tidewater, to continue selected shipments during the downturn in commerce.

The forestry industry increased movements prior to December 2010 to build up inventories. From July to December, forest product shipment volumes moving downriver were consistently about 75 to 80 percent above 2007-2009 averages (Figure 2.18). This suggests that the forestry industry was shipping the bulk of their products that normally move during the winter during the summer and fall prior to the lock outage. The forestry industry suggests it took this route of action in order to satisfy customers' orders and inventories prior to the lock outage instead of foregoing all commerce that would usually ship from December to March.

Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock

Sand, gravel and stone movements are expected to slow during the extended lock outage, but will continue to ship by rail and truck in small amounts. Stone products that are normally barged from December to March moved heavily prior to the lock outage, mostly in December 2010, when shipment volumes were above average.

Industry interviews revealed that sand, gravel and stone products do not generally move in large quantities from December to March (see Interim Report #1). This is partially due to the lack of construction during the winter months in the Pacific Northwest. Therefore, the extended lock outage may not impact this industry as much as the petroleum and wheat industry who have taken great measures in planning around the closure of the Columbia-Snake River.

[5] Trans-loading is the process of transferring a load of goods from one mode of transportation to another. Trans-loading is most commonly used when one mode cannot be used for the entire journey. In the case of the Pacific Northwest, trans-loading often refers to a containerized shipment moving by truck and then being loaded onto and shipped via railcar.

Iron Ore, Iron Steel Waste and Scrap

Iron ore and steel products will move by rail and truck from Pasco, Washington to Portland, Oregon during the extended lock outage. Large volumes of iron and steel products were shipped downriver by barge from July to September 2010; shipments were above average by more than 60 percent for each of these months (Figure 2.20), reflecting the iron and steel industries prepositioning, storing and/or delivering iron ore and steel prior to the lock outage. These industries will therefore be able to continue business instead of sacrificing all iron and steel commerce during the extended lock outage.

In addition, the industry interviews indicated iron and steel industries in the Pacific Northwest plan to truck their products to rail loading facilities and ship products by train the remaining distance to Portland or Vancouver on an as needed basis.

Primary Non-Ferrous Metallic Products and Fabricated Metal Products

The authors were unable to find specific industries that transport primary non-ferrous metallic and fabricated metal products. Therefore, the authors were unable to learn of the preparations made for this commodity. However, shipments of primary non-ferrous metallic products moving downriver were well above average during the six months prior to the beginning date of the extended lock outage. Upriver movements of these products were also on par or slightly above average from July to December 2010. This suggests that industries that ship this commodity, which includes copper, aluminum and smelted products, were prepositioning, filling orders early and stocking inventories in anticipation of the extended lock outage.

Wheat

Since 70 percent of downriver barge shipments consist of wheat, this industry has been preparing customers and planning alternate transportation methods and storage since 2009. According to interviews, the wheat industry in the Pacific Northwest has taken a number of actions to prepare for this unprecedented outage, including notifying customers, shipping wheat prior to the extended lock outage and shipping wheat by rail and truck.

U.S. Wheat Associates, wheat commissions of the three state region, producers and shippers have known about the extended lock outage at least since August 2009. The first issue that US Wheat Associates tackled was to notify customers and producers of the unprecedented lock outage and how it could affect business. International and domestic customers were contacted and informed about the lock closure via email, telephone, brochures and international meetings. Pacific Northwest international and domestic wheat customers were advised by various entities that the extended lock outage was required to “make essential renovations to locks” and that the restoration of the Columbia-Snake River locks is an opportunity to augment the reliability, efficiency and safety of barge transportation for wheat. Customers overseas were also given options for alternative delivery dates for wheat; shippers could barge prior to

or after the lock outage occurred. Rail and truck transportation were suggested and contacts given to customers as alternatives as well.

The interviews and discussions in the region reveal that producers of wheat in the Pacific Northwest were also given early warning of the extended lock closure and how wheat shipments would be affected. Many producers have decided to sell prior to the lock outage in part because of high global demand and high wheat prices. Some producers have increased home storage capacities, including ground piling, or trucked all of their harvest to country and river elevators.

In addition to wheat producers' increase in home storage capacity, wheat firms and exporters have increased elevator storage at various locations along the Columbia-Snake River (Washington Grain Commission). Storage at wheat exporters' headquarters in Portland and Vancouver have increased in the months leading up the lock outage as to store increased shipments of wheat from eastern Washington, Oregon and Idaho. A wheat elevator near The Dalles Lock and Dam expanded elevator and ground pile storage in order to handle surplus wheat production from the Willamette Valley, which is located southwest of the elevator.

Some wheat producers shipped their product prior to the outage in significant quantities; downriver shipments of wheat were at least 15 percent, and as high as 65 percent, above average during the August through November 2010 period (Figure 2.23). This mass increase in wheat movements was in part due to price increases in all varieties of wheat, probably in response to a drought in Eastern Europe. Since countries in this region of the world could not produce wheat in any quantity, global demand for U.S. wheat has increased (including eastern European demand). This increase in demand increased wheat prices by 40 percent (Pacific Northwest Farmers Cooperative). Therefore, wheat producers and elevators shipped their product in large volumes during the fall harvest of 2010. By September 2010, Japan and the Philippines had bought 70 percent of their normal demand (U.S. Wheat Associates).

According to industry interviews, wheat shipments that normally move by barge transportation will move by truck and rail during the lock outage. There are several 110 railcar loading facilities in the Pacific Northwest including those located in eastern Washington and southern Idaho. These shippers plan to take on high volumes of wheat during the extended lock outage. Ritzville Warehouse Company, a grain elevator in Washington is expecting three times the normal winter business during the lock closure. These railcar loading facilities have access to hundreds of miles of track and country elevators, which makes this mode of transportation efficient and affordable, more so than direct trucking, for traditional barge customers.

Eastern Washington and Oregon wheat producers and elevators plan to utilize truck, in addition to rail, to ship wheat to Portland and Vancouver. However, those producers and firms in the far eastern regions and remote areas of these states plan to store their wheat or truck their wheat to rail facilities as direct trucking products from these distances would be uneconomical.

Willamette Valley[6] agricultural producers chose to plant and harvest wheat in 2010 due to a rise in price and demand for wheat. This region normally produces grass seed for golf courses and housing developments, but due to a weakened economy and a decline in price and demand for grass seed, producers planted increased wheat acreage in the fall of 2009 and the spring of 2010. Since Willamette Valley producers have not grown wheat for about ten years, rail car loading and storage are not conveniently located. In fact, previously used storage for wheat are either too dilapidated to use or filled with grass seed and therefore unable to house wheat stores. Due to the lack of storage, Willamette Valley wheat producers have and plan to truck and rail wheat to either an elevator below The Dalles Lock and Dam or to CLD Pacific Grain in Portland for export. Wheat producers in this area harvested and shipped seven million bushels in 2008 and expect to ship more during the 2010-2011 season.

Agricultural Products: Corn, Rye, Barley, Rice, Sorghum and Oats; Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grains; and Other Agricultural Products

During the extended lock outage, agricultural products from the Pacific Northwest are expected to mostly ship in containers by truck; the remaining tonnage is expected to move by rail. These products that normally move by barge include, hay, alfalfa, grass seed, potatoes, onions, rye, barley, oats, corn, soybeans, peas and lentils. In particular, agricultural goods from the Port of Morrow that usually move by barge transportation, including potatoes, onions, hay and grass seed, will move by truck with subsidies from the Port of Portland from December 2010 to March 2011.

The small amounts of frozen potatoes that move by barge from December to March are expected to move by truck during the lock closure, according to the Washington State Potato Commission (WSPC). The commission is expecting to compete for available trucks during the outage with the grain industry and other industries that normally use barge transportation during the winter months. Since fresh and frozen potatoes from eastern Washington and Oregon normally move year round by truck or rail to the Ports of Seattle, Tacoma and Portland, the potato industry does not expect to be greatly impacted by the closure of the Columbia-Snake River locks. Potatoes are moved by truck and rail since these commodities are perishable and barge transportation is generally too slow and leads to mold and rot.

Rye, barley, rice, sorghum and oats will move by truck to localized markets during the extended lock closure. According to the Washington Grain Commission, the decrease in tonnage of barley and oats moving downriver for the last ten years has been due to less production. Therefore, it is more convenient and economical to simply truck these small volume commodities to their destination. Grain industries, excluding the wheat industry, are not expected to be greatly impacted by the lock outage.

[6] Willamette Valley is located in western Oregon.

Peas, lentils and beans are expected to be shipped in containers by truck to either Portland or Seattle according to pulse[7] exporters and processors in the Pacific Northwest. A few of these firms' transportation costs will be subsidized by the Port of Portland. A majority of this product plans to be loaded into twenty foot containers, trucked to either Seattle or Portland and then trans-loaded onto ocean vessels for international delivery. Some processors shipped a majority of their product prior to the lock outage as to ensure deliveries and revenue.

Other processors and exporters of pulse products plan to use rail transportation during the outage. For some firms in the Pacific Northwest, this will be a financial burden since truck-barge is the most economical transportation option. However, other processors, especially in Northern Washington, regularly use the truck-rail option and have not needed to make alternate plans for December 2010 through March 2011.

In addition, many pulse exporters and processors moved their products in large shipments by barge prior to the lock outage. This allowed pulse firms to use the most economical mode of transportation while capitalizing on business prior to the lock outage. These large pulse movements by barge occurred in September and October 2010 (Figure 2.25).

According to various pulse exporters and processors in Washington and Idaho, recently, fewer vessels have recently been calling to Portland to transport goods overseas. Therefore, processors and exporters have been transporting their products by rail and truck to Seattle since more vessels have been calling on this port. So, these pulse exporters and processors plan to continue truck and rail shipments during the outage. These products include lentils, green peas and beans.

Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water

Waste materials from the Vancouver area which normally move by barge plan to move by truck during the extended lock outage, according to a waste management company in this area. This product is transported from Vancouver to a landfill in eastern Oregon. Typically, 650 to 700 containers of refuse per month are barged upriver by Tidewater Barge Lines. Industry representatives have hypothesized that 30 to 35 containers of waste material will move by truck five days per week along major Oregon and Washington highways from December 2010 to March 2011. Only if waste production in the Portland area increases will waste material and sewage move on weekends. The trucking of waste can create some but minimal additional traffic on identified major Pacific Northwest highways.

[7]A pulse is an annual legume crop and used for food and animal feed. This term includes dry beans (e.g. kidney beans), dry broad beans (e.g. field beans), dry peas, chickpeas, garbanzo beans, black-eyed peas and lentils. This term excludes green beans and green peas, which are considered vegetable crops.

5. Governmental and Institutional Preparations for the Extended Lock Outage

Below are the individual activities and plans made by government departments and institutions that are stakeholders in the Columbia-Snake River extended lock outage.

Pacific Northwest Waterways Association (PNWA)

Pacific Northwest Waterways Association (PNWA) in collaboration with the U.S. Army Corps of Engineers has been the main player and leader in preparations for the extended lock outage. PNWA is a non-profit organization that "advocates for federal policies and funding in support of regional economic development" (PNWA). This group also "led the way for Congressional authorization and funding to build the locks and dams on the Columbia and Snake Rivers."

Preparations

- Accurately and promptly notified its members of the extended lock outage via email, website, phone calls and public announcements
- Conducted conferences for its members justifying the importance of the lock outage
- Suggested alternative means of transportation to its members
- Spoke to the public and press about the significance of the outage
- Followed the progression of preparations of its members and when necessary aided members with contacts and references

U.S. Army Corps of Engineers (USACE)

Preparations

- Performed risk analysis of the current lock navigation system to determine necessary replacements and repairs
- Accurately and promptly notified individuals of the Columbia-Snake River extended lock outage via email, website, phone calls and public announcements
- Hosted several teleconference for stakeholders discussing progress made, projects completed and plans for the future for each Columbia-Snake River lock
- Documented all progression in the lock rehabilitation made prior to the lock outage on the USACE website
- Planned the extended lock outage around salmon runs and heavy cargo months
- Planned the extended lock outage to last four months while repairing and rehabilitating all eight locks instead of the originally planned intermittent interruptions over six years (Mayer, "Early Warning")
- Moved accessories, lock gate equipment and other necessary supplies for the extended lock outage by barge transportation as to not clog major highways or railways
- Made plans for potential disruptions of the lock outage including bad weather, unexpected delays in construction and traffic

- Accelerated prep work for the three locks that will be receiving new gates so that repairs and replacements can stay on or ahead of schedule (e.g. added Sunday shifts)

Washington State Department of Commerce and Oregon Department of Energy

Preparations

- Worked with petroleum companies to inform Pacific Northwest residents of potential fuel impacts due to the lock outage
- Have released situation reports warning residents of fuel price increases, shortages and availability of fuel from alternative sources
- Found alternative sources of petroleum from Montana and Salt Lake City, Utah by way of pipeline, truck and rail

Wheat and Grain Commissions in Washington, Oregon and Idaho

Preparations

- Alerted wheat producers and elevators well in advance about the extended lock outage
- Advised constituents of alternative modes of transportation and storage options
- Warned U.S. Wheat Associates of the extended lock outage and its potential impact to wheat prices and demand
- Worked with U.S. Wheat Associates to spread the news of the lock outage to overseas buyers and advise wheat customers on alternative plans to buy wheat prior to and after the outage

U.S. Wheat Associates

Preparations

- Alerted overseas wheat buyers of the extended lock outage and its potential impact to convenient and timely transportation by way of meetings, conferences, emails, phone calls and advisory pamphlets
- Advised wheat customers on alternative plans to buy wheat prior to and after the outage
- Heavily advertised Pacific Northwest wheat after the announcement of the Russian wheat export ban
- Aided in additional wheat sales due to the Russian wheat export ban
- Aided in the orchestration of shipments of wheat varieties prior to the lock outage
- Advised elevators and commissions on wheat storage planning

Washington State Department of Transportation

Preparations

- Alerted communities, regional shippers and industries well in advance about the extended lock outage
- Advised railways and trucking companies of the potential increase in transportation during the lock outage
- Followed the progression of preparations of its constituents and when necessary aided with contacts and references
- Spoke with the public and press about the significance and importance of the extended lock outage

U.S. Coast Guard

Preparations

- Conducted several meetings to discuss potential impacts, both economic and environmental, of the extended lock outage
- Provided information for river stakeholders including contacts, references and preparations of industries for the lock outage
- Met with members of the petroleum industry to determine alternative means of transportation and the traffic load that the lock outage may cause
- Considered possible waterborne transportation impacts including safety risks and pollution
- Plans to enforce state and federal regulations for pollution prevention, especially in regards to barge storage of petroleum

Summary

The preceding analysis identified the preparations of shippers, carriers, industries, government departments and institutions for the upcoming extended lock outage on the Columbia-Snake River. In addition, waterborne movements between July 2010 and December 2010 were also analyzed.

About three times more tonnage travels downriver than upriver by barge on the Columbia-Snake River. Moreover, the monthly total tonnage traveling upriver remained quite stable between July and November 2010 at an average of 198,000 tons, whereas the total tonnage of downriver shipments ranged from a high of 695,000 in August to a low of around 319,000 tons in July. The monthly downriver high in August for this six month period is likely due to the start of the wheat harvest as wheat makes up about 70 percent of all downbound shipments on the Columbia-Snake River.

Commodities with the largest volume of downriver shipments over the six month period have been wheat; forest products; sand, gravel and stone products; iron ore products; and vegetable products. During this time period, wheat comprised more than 75 percent, or 2.5 million tons of the total 3.3 million tons.

Commodities with the largest volume of upriver shipments over the six month span have been distillate, residual and other fuel oils; gasoline products; waste materials; sand, gravel and stone products; and manufactured equipment and machinery. The highest proportion of total upriver shipments, 48 percent of the total one million tons, was distillate, residual and other fuel oils.

Major commodities in general moved in large and above average quantities on the Columbia-Snake River from July to December 2010 in order to prepare for the extended lock outage. Those major commodities moving downriver from July to December 2010 that rose above average levels for at least two months include forest products; iron ore products; wheat; vegetable products; animal feed, grain mill products, flour and other processed grains; and other agricultural products. Those major commodities moving upriver from July to December 2010 that rose above average levels for at least two months include distillate, residual and other fuel oils and fertilizer.

These large shipments in the months leading up to the December 2010 reveals that commodity industries were preparing for the extended lock outage by shipping more products prior to the closure date. By sending shipments prior to the outage, industries could accumulate products in Portland, Oregon and Vancouver, Washington so that customers have easy access to shipping and international trade while the Columbia-Snake River is closed. Sending shipments early also allows industries to fill orders prior to the outage rather than completely missing out on commerce and avoid increased costs of alternate modes of transportation while barge transportation is curtailed.

The Pacific Northwest Wheat Case Study survey allowed the authors to set up a benchmark for rate structures, seasonality and modal choices for wheat elevators in the Pacific Northwest. After the extended lock closure occurs and barge transportation returns to the Columbia-Snake River, these survey results can be compared to what actually occurs to understand how the outage impacts wheat shipments and sales in the Pacific Northwest.

Along with preparing for monetary impacts, barge lines have prepared customers and employees to weather the downturn in business. The barging industry in the Pacific Northwest briefed customers, employees and suppliers on the necessity of the extended lock outage and the required time to complete repairs, looked for ways to continue benefit packages for employees during the extended lock outage and aided customers in finding alternative transportation methods from December 2010 to March 2011.

In contrast to barge companies, which will lose substantial business for the entirety of the lock outage, rail lines have been preparing for the increase in cargo loads. Rail lines stepped forward to aid customers, producers and industries in continuing shipments through the extended lock outage. Such preparation included advertising, identifying inland markets, reaching out to shippers and industries that may need transportation during the outage, partnering with local ports to aid in the movement of products and predicting expected shipment volumes.

Pacific Northwest Waterways Association's preparations included accurately and promptly notifying its members of the extended lock outage via email, website, phone calls and public announcements; conducting conferences for its members justifying the importance of the lock outage; and suggesting alternative means of transportation to its members

U.S. Army Corps of Engineers' preparations included performing a risk analysis of the current lock navigation system to determine necessary replacements and repairs; planning the extended lock outage around salmon runs and heavy cargo months; and accelerating prep work for the three locks that will be receiving new gates so that repairs and replacements can stay on or ahead of schedule.

Washington State Department of Commerce and the Oregon Department of Energy preparations included working with petroleum companies to inform Pacific Northwest residents of potential fuel impacts due to the lock outage and finding alternative sources of petroleum from Montana and Salt Lake City, Utah by way of pipeline, truck and rail.

Wheat commissions' preparations included alerting wheat producers and elevators well in advance about the extended lock outage; advising constituents of alternative modes of transportation and storage options; and warning U.S. Wheat Associates of the extended lock outage and its potential impact to wheat prices and demand.

U.S. Coast Guard preparations included conducting several meetings to discuss potential impacts, both economic and environmental, of the extended lock outage; meeting with

members of the petroleum industry to determine alternative means of transportation and the traffic load that the lock outage may cause; and considering possible waterborne transportation impacts including safety risks and pollution.

References

Casavant, Ken, Marie Drews, Eric Jessup, and Shushanik Makaryan. "Waterborne Commerce on the Columbia/Snake Waterway: Commodity Movements Up/Down River, 1995-2003." SFTA Research Report Number 14. Pullman, WA: September 2005.

Casavant, Ken and Nancy Lee. "Waterborne Commerce on the Columbia-Snake System." EWITS Research Report Number 12. Pullman, WA: October 1996.

Clark, Michael, Eric Jessup and Ken Casavant. "Freight Truck Origin and Destination Study: Methods, Procedures and Data Dictionary." SFTA Research Report Number 2. Pullman, WA: December 2002.

Mayer, James. "Columbia River Lock Closures Will Have Impact, but Early Warning Will Help." *The Oregonian*, December 9, 2010. Accessed February 1, 2010. http://www.oregonlive.com/business/index.ssf/2010/12/columbia_river_lock_closures_w.html.

Mayer, James. "Port of Portland to Pay Shippers during Upriver Locks Shutdown." *The Oregonian*, November 11, 2010. Accessed November 18, 2010. http://www.oregonlive.com/business/index.ssf/2010/11/port_to_pay_shippers_during_up.html.

Simmons, Sara, and Ken Casavant. "Historical Waterborne Commerce on the Columbia-Snake River System: Commodity Movements Up and Down River, 1991-2010." FPTI Report Number 1. Pullman, WA: November 2010.

Appendix A: Pacific Northwest Wheat Elevator Survey

Below is a copy of the authors' wheat elevator survey that was distributed via email to 27 elevators around the Pacific Northwest.

Thank you for our recent telephone conversation. As we discussed, the Columbia Snake River System in the Pacific Northwest is soon to be undergoing a massive and sustained lock outage, eliminating barge transportation on much of the upper Columbia and all of the Snake Rivers. The impact of this loss of a major mode of transportation may be substantial and the impact on demands of other modes of transportation dramatic. The Freight Policy Transportation Institute at Washington State University, in response to a request by the Washington State Department of Transportation and aided by the Pacific Northwest Waterways Association, is conducting a study on the impact and residual effects of such a massive transportation interruption.

The closure of these locks is expected to have impacts on shippers, river carriers, roads, alternative modes, ports, communities, economic development decisions, energy and the environment as these entities react to the temporary loss of this transportation alternative. But, the extent and form of these impacts is uncertain and unclear. This project will, by identifying shipping flows, transportation rates and seasonal patterns of the system prior to, during and after the recovery of the system, provide guidance to policy makers and action agents in instances whenever major planned disruptions in the transportation system occur.

We appreciate your responding to the attached list of questions which will help us identify potential and actual impacts of the extended lock closure. Please answer the questions taking into account all elevators within your firm. Simply hit the reply button and you can fill out the survey in your email viewer and return the email to us.

Questions, comments or concerns? Please call or email Sara Simmons or Dr. Ken Casavant.

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EXTENDED LOCK CLOSURE STUDY

ELEVATOR FIRM SURVEY: SEPTEMBER 2010

Please note that this is a confidential and anonymous study. Specific names, firms, quantities and rates will NOT be mentioned. Subsequent reports will simply include average rates and quantities along with a list of interviewees to express our gratitude.

NAME OF THE FIRM:

HEADQUARTERS LOCATION:

NAME OF PERSON RESPONDING:

We are interested in the type of transportation services available (truck, rail and truck-barge); the flow of WHEAT out of each location; and current charges for various modes of transportation. We are contacting each major grain company in Washington, Idaho and Oregon.

1. *Please estimate the average annual tonnage (over the last four years) of WHEAT shipped by your entire firm.*

WHEAT

_____ *bu.*

2. *Please estimate the approximate percentage per year of WHEAT shipped from your overall firm for each of the following transportation modes.*

	WHEAT
	Average Percent Shipped
Direct Truck to Final Market	_____*%*
Truck-Barge	_____*%*
Rail	_____*%*
TOTAL	*100%*

3. *What is the <u>average</u> rate available to your overall firm for the following transportation modes:*

	Lower Columbia Terminals *Average <u>Rate</u> for Firms*
Direct Truck to Final Market	_____ *¢/bu.*
Truck-Barge	_____ *¢/bu.*
Rail	_____ *¢/bu.*

	Puget Sound Terminals *Average <u>Rate</u> for Firms*
Direct Truck to Final Market	_____ *¢/bu.*
Rail	_____ *¢/bu.*

4. *To determine the seasonal pattern of shipping <u>from</u> this location, please <u>estimate</u> how much WHEAT is <u>shipped</u> during the following time periods in an average year:*

	WHEAT
December-March	_____ *%*
April-July	_____ *%*
August-November	_____ *%*
TOTAL	*100%*

Thank you again for your contribution.

Appendix B: Industrial, Regional, Governmental and Institutional Representatives

Below is a list of Columbia-Snake River barge transportation stakeholders, including firms, government departments and private entities, which were interviewed for this report.

ADM Milling Limited
AgVentures Northwest, LLC
Almota Elevator Company
Bernert Barge Lines, Incorporated
Blue Mountain Seed, Incorporated
BNP Lentil Company
Burlington Northern Santa Fe Railway
Central Washington Grain Growers, Incorporated
Chevron Corporation
CLD Pacific Grain, LLC
Clearwater Paper
Columbia County Grain Growers
Columbia Grain International, Incorporated
Connell Grain Growers (a division of Cenex Harvest States)
Cooperative Agricultural Producers, Incorporated
Evans Grain, Feed and Seed Company
General Feed and Grain, Incorporated
George F. Brocke & Sons, Incorporated
Great Western Malting Company
Idaho Wheat Commission
Kelley Bean Company
Lewis-Clark Terminal, Incorporated
Longview Fibre Paper and Packaging, Incorporated
Maviga N.A., Incorporated U.S.A.
Mid Columbia Producers, Incorporated
Morrow County Grain Growers, Incorporated
Northwest Grain Growers, Incorporated
Northwest Pea & Bean Company
Oregon Department of Energy
Oregon Wheat Commission
Pacific Northwest Farmers Cooperative
Pacific Northwest Farmers Cooperative
Pacific Northwest Waterways Association
Palouse River and Coulee City River Railroad (Watco Companies, Incorporated)
Pendleton Grain Growers
Pomeroy Grain Growers, Incorporated

Port of Lewiston
Port of Morrow County
Port of Portland
Port of Whitman County
Premier Pulses International, Incorporated
Primeland Cooperatives (a division of Cenex Harvest States)
Ririe Grain and Feed Cooperative, Incorporated
Ritzville Warehouse Company
SDS Lumber Company
Shaver Transportation Company
The McGregor Company
Tidewater Barge Lines, Incorporated
U.S. Army Corps of Engineers
U.S. Wheat Associates
U.S.A. Dry Pea and Lentil Council
Union Pacific Railway
Washington and Idaho Railway
Washington Grain Commission
Washington State Department of Commerce
Washington State Department of Transportation – State Rail and Marine Office
Washington State Potato Commission
Waste Connections
Weiser Feed and Storage, Incorporated
Weyerhaeuser
Whitgro, Incorporated