

FREIGHT POLICY TRANSPORTATION INSITUTE



Historical Waterborne Commerce on
the Columbia-Snake River System:
Commodity Movements Up and
Down River, 1991-2010

Historical Waterborne Commerce on the Columbia-Snake River System: Commodity Movements Up and Down River, 1991-2010

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By

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Transportation and Environmental Assessment of the Impact of Extended Lock Outages: the Columbia-Snake River System Interim Report #1

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FPTI Research Reports: Background and Purpose

This is the first 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 first 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 a standard, specification or regulation.

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 is soon to be undergoing 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 first 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 overall project.

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

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ACKNOWLEDGEMENTS

This study was partially funded by Transportation Northwest (TransNow). We would like to thank the United States Army Corps of Engineers for providing the data used in this study.

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Table of Contents

Executive Summary.....	1
Introduction	4
1. Research Objectives and Analysis Approach	4
1.1. Data Coding.....	5
2. General Trends in Commodity Movements, 1991-2010	8
Down River Movements	10
Up River Movements	13
2.1 General Trends in Commodity Movements.....	16
2.2 Annual Wheat and Total Tonnages Moving Downriver.....	49
3. Upriver and Downriver Movements of Major Commodities: Seasonal Effects	52
3.1. Major Commodities: Seasonal Effects	53
4. Upriver and Downriver Movements of Major Commodities: 2008-2010	64
4.1. Major Commodities: 2008-2010.....	65
Downriver Movements:	65
Upriver Movements:	79
5. Upriver and Downriver Movements during the Four Months of the Extended Lock Outage..	91
5.1. Upriver and Downriver Movements	91
Downriver Movements:	91
Upriver Movements:	92
Summary	95

Appendix A: Annual Up and Down Bound Tonnage through Bonneville Lock and Dam	97
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List of Tables

Table 1.1	Major Commodity Groups and Commodity Codes for Goods Transported by Barge along the Columbia-Snake River System.....	6
Table 2.1	Annual Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010.....	11
	Continued.....	12
Table 2.2	Annual Tonnage Shipped Upriver on the Columbia-Snake River, 1991-2010.....	14
	Continued.....	15
Table 2.3	Annual Wheat and Total Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010.....	51
Table 2.4	Average Wheat and Total Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010.....	51
Table 4.1	Downbound Movements of Wheat, Through Bonneville, 2008-2010.....	66
Table 4.2	Downbound Movements of Sand, Gravel and Stone; Limestone Flux and Calcareous Stone; Phosphate Rock, Through Bonneville, 2008-2010.....	68
Table 4.3	Downbound Movements of Forest Products, Lumber, Logs and Woodchips, Through Bonneville, 2008-2010.....	70
Table 4.4	Downbound Movements of Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grain and Other Agricultural Products, Through Bonneville, 2008-2010.....	72
Table 4.5	Downbound Movements of Iron Ore, Iron Steel Waste and Scrap, Through Bonneville, 2008-2010.....	74
Table 4.6	Downbound Movements of Corn, Rye, Barley, Rice, Sorghum and Oats, Through Bonneville, 2008-2010.....	76
Table 4.7	Downbound Movements of Primary Non-Ferrous Metallic Products and Fabricated Metal Products, Through Bonneville, 2008-2010.....	78

Table 4.8	Upbound Movements of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases, Through Bonneville, 2008-2010.....	80
Table 4.9	Upbound Movements of Gasoline, Jet Fuel and Kerosene, Through Bonneville, 2008-2010.....	82
Table 4.10	Upbound Movements of Waste Material; Garbage, Landfill, Sewage Sludge and Waste Water, Through Bonneville, 2008-2010.....	84
Table 4.11	Upbound Movements of Forest Products, Lumber, Logs and Woodchips, Through Bonneville, 2008-2010.....	86
Table 4.12	Upbound Movements of Fertilizer-Nitrogenous, Potassic, Phosphatic and Others, Through Bonneville, 2008-2010.....	88
Table 4.13	Upbound Movements of Primary Non-Ferrous Metallic Products and Fabricated Metal Products, Through Bonneville, 2008-2010.....	90
Table 5.1	Average Down Bound Movements through Bonneville, 2008-2010.....	94
Table 5.2	Average Up Bound Movements through Bonneville, 2008-2010.....	94
Table A.1	Up Bound Movements through Bonneville, 1991.....	98
Table A.2	Down Bound Movements through Bonneville, 1991.....	99
Table A.3	Up Bound Movements through Bonneville, 1992.....	100
Table A.4	Down Bound Movements through Bonneville, 1992.....	101
Table A.5	Up Bound Movements through Bonneville, 1993.....	102
Table A.6	Down Bound Movements through Bonneville, 1993.....	103
Table A.7	Up Bound Movements through Bonneville, 1994.....	104
Table A.8	Down Bound Movements through Bonneville, 1994.....	105
Table A.9	Up Bound Movements through Bonneville, 1995.....	106
Table A.10	Down Bound Movements through Bonneville, 1995.....	107
Table A.11	Up Bound Movements through Bonneville, 1996.....	108

Table A.12	Down Bound Movements through Bonneville, 1996.....	109
Table A.13	Up Bound Movements through Bonneville, 1997.....	110
Table A.14	Down Bound Movements through Bonneville, 1997.....	111
Table A.15	Up Bound Movements through Bonneville, 1998.....	112
Table A.16	Down Bound Movements through Bonneville, 1998.....	113
Table A.17	Up Bound Movements through Bonneville, 1999.....	114
Table A.18	Down Bound Movements through Bonneville, 1999.....	115
Table A.19	Up Bound Movements through Bonneville, 2000.....	116
Table A.20	Down Bound Movements through Bonneville, 2000.....	117
Table A.21	Up Bound Movements through Bonneville, 2001.....	118
Table A.22	Down Bound Movements through Bonneville, 2001.....	119
Table A.23	Up Bound Movements through Bonneville, 2002.....	120
Table A.24	Down Bound Movements through Bonneville, 2002.....	121
Table A.25	Up Bound Movements through Bonneville, 2003.....	122
Table A.26	Down Bound Movements through Bonneville, 2003.....	123
Table A.27	Up Bound Movements through Bonneville, 2004.....	124
Table A.28	Down Bound Movements through Bonneville, 2004.....	125
Table A.29	Up Bound Movements through Bonneville, 2005.....	126
Table A.30	Down Bound Movements through Bonneville, 2005.....	127
Table A.31	Up Bound Movements through Bonneville, 2006.....	128
Table A.32	Down Bound Movements through Bonneville, 2006.....	129
Table A.33	Up Bound Movements through Bonneville, 2007.....	130

Table A.34	Down Bound Movements through Bonneville, 2007.....	131
Table A.35	Up Bound Movements through Bonneville, 2008.....	132
Table A.36	Down Bound Movements through Bonneville, 2008.....	133
Table A.37	Up Bound Movements through Bonneville, 2009.....	134
Table A.38	Down Bound Movements through Bonneville, 2009.....	135
Table A.39	Up Bound Movements through Bonneville, 2010.....	136
Table A.40	Down Bound Movements through Bonneville, 2010.....	137

List of Figures

Figure 2.1	Annual Total Downbound and Upbound Tonnage of All Commodities in 1991-2010.....	9
Figure 2.2	Annual Total Number of Empty Barges Transported Up and Down River in 1991-2010.....	16
Figure 2.3	Annual Tonnage of Coal, Lignite and Coke Barged Up and Down River in 1991-2010.....	17
Figure 2.4	Annual Tonnage of Petroleum and Petroleum Products Barged Up and Down River in 1991-2010.....	18
Figure 2.5	Annual Total Tonnage of Crude Petroleum Barged Up and Down River in 1991-2010.....	18
Figure 2.6	Annual Tonnage of Gasoline, Jet Fuel, and Kerosene Barged Up and Down River in 1991-2010.....	19
Figure 2.7	Annual Tonnage of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases Barged Up and Down River in 1991-2010.....	20
Figure 2.8	Annual Tonnage of Petroleum Pitches, Asphalt, Naphtha, and Solvents Barged Up and Down River in 1991-2010.....	21
Figure 2.9	Annual Tonnage of Chemicals and Related Products Barged Up and Down River in 1991-2010.....	22

Figure 2.10	Annual Tonnage of Fertilizer-Nitrogenous, Potassic, Phosphatic, and Others Barged Up and Down River in 1991-2010.....	23
Figure 2.11	Annual Tonnage of Organic and Inorganic Industrial Chemicals and Synthetic Materials Barged Up and Down River in 1991-2010.....	24
Figure 2.12	Annual Tonnage of Crude Materials, Inedible, Except Fuels Barged Up and Down River in 1991-2010.....	25
Figure 2.13	Annual Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up and Down River in 1991-2010.....	26
Figure 2.14	Annual Tonnage of Pulp and Waste Products Barged Up and Down River in 1991-2010.....	27
Figure 2.15	Annual Tonnage of Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock Barged Up and Down River in 1991-2010.....	28
Figure 2.16	Annual Tonnage of Iron Ore, Steel Waste and Scrap Barged Up and Down River in 1991-2010.....	29
Figure 2.17	Annual Tonnage of Unmanufactured Marine Shells Barged Up and Down River in 1991-2010	29
Figure 2.18	Annual Tonnage of Non-Ferrous Metallic Ores, Waste and Scrap Barged Up and Down River in 1991-2010.....	30
Figure 2.19	Annual Tonnage of Dry and Liquid Sulfur, Clay and Salt Barged Up and Down River in 1991-2010.....	31
Figure 2.20	Annual Tonnage of Primary Manufactured Goods Barged Up and Down River in 1991-2010.....	32
Figure 2.21	Annual Tonnage of Paper and Allied Products Barged Up and Down River in 1991-2010.....	33
Figure 2.22	Annual Tonnage of Building Cement and Concrete, Lime and Glass Barged Up and Down River in 1991-2010.....	34
Figure 2.23	Annual Tonnage of Primary Iron and Steel Products Barged Up and Down River in 1991-2010.....	35
Figure 2.24	Annual Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Up and Down River in 1991-2010.....	36

Figure 2.25	Annual Tonnage of Primary Wood Products, Veneer and Plywood Barged Up and Down River in 1991-2010.....	37
Figure 2.26	Annual Tonnage of Food and Farm Products Barged Up and Down River in 1991-2010.....	38
Figure 2.27	Annual Tonnage of Fresh Fish and Other Marine Products Barged Up and Down River in 1991-2010.....	38
Figure 2.28	Annual Tonnage of Wheat Barged Up and Down River in 1991-2010.....	39
Figure 2.29	Annual Tonnage of Corn Barged Up and Down River in 1991-2010.....	40
Figure 2.30	Annual Tonnage of Rye, Barley, Rice, Sorghum and Oats Barged Up and Down River in 1991-2010.....	41
Figure 2.31	Annual Tonnage of Oilseeds-Soybean, Flaxseed and Others Barged Up and Down River in 1991-2010.....	42
Figure 2.32	Annual Tonnage of Vegetable Products Barged Up and Down River in 1991-2010.....	43
Figure 2.33	Annual Tonnage of Animal Feed, Grain Mill Products, Flour and Other Processed Grains Barged Up and Down River in 1991-2010.....	44
Figure 2.34	Annual Tonnage of Other Agricultural Products (Including Food and Kindred Products) Barged Up and Down River in 1991-2010.....	45
Figure 2.35	Annual Tonnage of All Manufactured Equipment and Machinery Barged Up and Down River in 1991-2010.....	46
Figure 2.36	Annual Tonnage of Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water Barged Up and Down River in 1991-2010.....	47
Figure 2.37	Annual Tonnage of Commodity Unknown Barged Up and Down River in 1991-2010.....	48
Figure 2.38	Annual Tonnage of Juvenile Salmonid (Salmon and Steelhead Fin) Barged Up and Down River in 1991-2010.....	49

Figure 2.39	Average Wheat and Total Tonnage Shipped Downriver, 1991-2009.....	51
Figure 3.1	Average Monthly Tonnage of Gasoline, Jet Fuel, and Kerosene Barged Up and Down River in 1991-2010.....	53
Figure 3.2	Average Monthly Tonnage of Distillate, Residual and Other Fuel Oils, Lubricating Oils, and Greases Barged Up and Down River in 1991-2010.....	54
Figure 3.3	Average Monthly Tonnage of Fertilizer-Nitrogenous, Potassic, Phosphatic, and Others Barged Up and Down River in 1991-2010.....	55
Figure 3.4	Average Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up and Down River in 1991-2010.....	56
Figure 3.5	Average Monthly Tonnage of Sand, Gravel, Stone, Limestone Flux and Calcareous Stone, Phosphate Rock Barged Up and Down River in 1991-2010.....	57
Figure 3.6	Average Monthly Tonnage of Paper and Allied Products Barged Up and Down River in 1991-2010.....	58
Figure 3.7	Average Monthly Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Up and Down River in 1991-2010... ..	59
Figure 3.8	Average Monthly Tonnage of Wheat Barged Up and Down River in 1991-2010.....	60
Figure 3.9	Average Monthly Tonnage of Corn, Rye, Barley, Rice, Sorghum and Oats Barged Up and Down River in 1991-2010.....	61
Figure 3.10	Average Monthly Tonnage of Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processing Grains and Other Agricultural Products Barged Up and Down River in 1991-2010.....	62
Figure 3.11	Average Monthly Tonnage of Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water Barged Up and Down River in 1991-2010.....	63
Figure 4.1	Average Monthly Tonnage of Wheat Barged Down River in 2008-2010.....	66
Figure 4.2	Average Monthly Tonnage of Sand, Gravel and Stone; Limestone Flux and Calcareous Stone; Phosphate Rock Barged Down River in 2008-2010.....	68
Figure 4.3	Average Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Down River in 2008-2010.....	70

Figure 4.4	Average Monthly Tonnage of Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grain and Other Agricultural Products Barged Down River in 2008-2010.....	72
Figure 4.5	Average Monthly Tonnage of Iron Ore, Iron Steel Waste and Scrap Barged Down River in 2008-2010.....	74
Figure 4.6	Average Monthly Tonnage of Corn, Rye, Barley, Rice, Sorghum and Oats Barged Down River in 2008-2010.....	76
Figure 4.7	Average Monthly Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Down River in 2008-2010.....	78
Figure 4.8	Average Monthly Tonnage of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases Barged Up River in 2008-2010.....	80
Figure 4.9	Average Monthly Tonnage of Gasoline, Jet Fuel and Kerosene Barged Up River in 2008-2010.....	82
Figure 4.10	Average Monthly Tonnage of Waste Material; Garbage, Landfill, Sewage Sludge and Waste Water Barged Up River in 2008-2010.....	84
Figure 4.11	Average Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up River in 2008-2010.....	86
Figure 4.12	Average Monthly Tonnage of Fertilizer-Nitrogenous, Potassic, Phosphatic, and Others Barged Up River in 2008-2010.....	88
Figure 4.13	Average Monthly Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Up River in 2008-2010.....	90

Historical Waterborne Commerce on the Columbia-Snake River System: Commodity Movements Up and Down River, 1991-2010

Executive Summary

Waterborne movements are one of the more economical and cost-efficient methods of transport among all modes of transportation, and they certainly comprise 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.

The overall purpose of this report is to capture the general characteristics of commodity transportation movements up and down the Columbia-Snake River for the twenty year period between 1991 and June 2010, with particular emphasis on the four months of extended lock closure. The report's main objective is to describe the volume and variety of commodities shipped during this time period, to identify the trends in their movements and to draw inferences regarding future trends.

The specific research objectives and methodology are first discussed in Chapter 1. A thorough evaluation of annual tonnage shipped up and down river from 1991 to June 2010 follows in Chapter 2. The end of Chapter 2 specifically looks at wheat and total commodity tonnages and their corresponding averages over several time periods. To construct a typical year and allow identification of seasonal trends, available data is used to average the monthly upriver and downriver tonnage for each major commodity type over the twenty year period; this is discussed in Chapter 3. To focus on the major commodities in the years before the extended lock outage, the monthly upriver and downriver tonnage for each major commodity from 2008 to June 2010 is presented along with monthly averages during this time period as well; this is discussed in Chapter 4. To further study the months of the extended lock outage, Chapter 5 looks at the average monthly tonnages and percentages for each major commodity type from December to March for the years 2008 through June 2010.

Information provided in this report is based on data available from the U.S. Corps of Army 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 lock on the Columbia-Snake River analyzed in this report – Bonneville – is under the U.S. Army Corps monitoring system. The data have been collected since 1975 and contain detailed information about commodity traffic on a monthly basis for each commodity, targeting 100 percent coverage of all commodities transported. This report focuses only on the data collected for the years 1991-2010. Observations of Bonneville Lock and Dam by year, month and commodity are provided in Appendix A: Annual Up and Down Bound Tonnage through Bonneville Lock and Dam.

The most notable characteristic of waterborne movements between 1991 and June 2010 is that on the Columbia-Snake River about three times more tonnage travels downriver than upriver. Previous analyses of Columbia-Snake River transportation suggest that this trend has been consistent for the last 30 years. Moreover, the annual total tonnage traveling upriver has remained quite stable between 1991 and June 2010 at an average of 2.4 million tons, whereas the total tonnage of downriver shipments has ranged from a high of 8.4 million tons in 1998 to a low of around 5.3 million tons in 2009.

The commodities with the largest volume of downriver shipments over the twenty year span between 1991 and 2010 have been wheat; forest products, lumber, logs and woodchips; sand, gravel, stone, limestone flux, calcareous stone and phosphate rock; rye, barley, rice, sorghum and oats; vegetable products; animal feed, grain mill products, flour and other processed grains; and paper and allied products. It is interesting to note that these commodities are of an agricultural nature and generally not of man-made materials.

The commodities with the largest volume of upriver shipments over the twenty year span between 1991 and 2010 have been gasoline, jet fuel and kerosene; distillate, residual, other fuel oils, lubricating oils and greases; waste material, garbage, landfill, sewage sludge and waste water; fertilizer (nitrogenous, potassic, phosphatic and others); and primary non-ferrous metallic and fabricated metal products. It is interesting to note that these commodities are of an industrial nature and generally of man-made materials.

Because of the heavier movement of commodities downstream, a large number of empty barges traveled upriver to be repositioned for future downriver movements. Accordingly, a total of about four times more empty barges traveled upriver than downriver.

When looking at seasonal effects of the major commodities listed above for 1991-2010, one can notice that the agricultural and natural products (wheat; forest products; corn; rye, barley, rice, sorghum and oats; vegetable products; animal feed, grain mill products, flour and other processing grains; and other agricultural products) move downriver in the highest volumes during the late summer and fall. The highest tonnage within a typical year of other natural products (sand, gravel, stone, limestone flux, calcareous stone and phosphate rock and paper and allied products) move downriver from October to December.

On average, during the 1991-2010 time period most industrial commodities (gasoline, jet fuel and kerosene; distillate, residual and other fuel oils, lubricating oils and greases; waste material, garbage, landfill, sewage sludge and waste water; and primary non-ferrous metallic and fabricated metal products) move upriver in the largest volumes during the late summer and fall. Fertilizer (nitrogenous, potassic, phosphatic and others), however, moves upriver in May and June in the largest tonnages. This is due to the spring planting season.

Since wheat makes up 70 percent of the total annual tonnage moving downriver, the researchers decided to take a closer look at the annual trends for wheat and total tonnage moving downriver. When annual wheat and annual total tonnage shipments are isolated from

other commodities, one can notice a clear trend; annual wheat and total tonnages moving downriver have decreased over the last ten years of the twenty year period. Wheat and total tonnages reached their peaks in 1998 and have since declined with some variation over the last ten years.

The average for annual wheat shipments for 1991-1995 was about 4.9 million tons. Average annual tonnages for wheat moving downriver then increased to 5.5 million for 1996-2000. This time period includes the twenty year-high of 6 million tons in 1998. Averages then decreased to 4.8 million tons in 2001-2005 dropping below the average annual wheat tonnage for 1991-1995. From 2006-2009, averages dropped even further to 4.4 million tons. This quick rise and then fall is also captured in the averages for total tonnage shipped downriver for the four, five year periods.

During the months of December through March, 1.7 million tons typically travel downriver. Wheat; forest products; vegetable products, animal feed and other agricultural products; sand, gravel and stone products; iron ore products; corn, rye, barley, rice, sorghum and oats; and primary non-ferrous metallic products comprise 97 percent of all tonnage shipped downriver from December to March. Among the 1.7 million tons shipped during these four months, about 392,000 tons of commodities ship downriver in December, 452,000 tons in January, 500,000 tons in February and 339,000 tons in March.

Within the months of December, January, February and March, wheat shipments make up, on average, about 79 percent of all downriver shipments. Forest products make up, on average, ten percent of all downriver shipments and sand, gravel and stone make up about three percent.

During the months of December through March, 631,000 tons typically travel upriver. Distillate fuel oils, gasoline products, waste materials, forest products, fertilizer and primary non-ferrous metallic products comprise 98 percent of all tonnage shipped upriver from December to March. Among the 631,000 tons shipped during these four months, about 153,000 tons ship upriver in December, 162,000 tons in January, 181,000 tons in February and 134,000 tons in March.

Within the month of December, January, February and March, distillate fuel oil shipments make up about 45 percent of all upriver shipments. Gasoline products make up 33 percent of all upriver shipments and waste materials make up 13 percent.

Introduction

Waterborne movements are one of the more economical and cost-efficient methods of transport among all modes of transportation, and they certainly comprise 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 aims to capture the general characteristics of transportation movements up and down the Columbia-Snake River for the twenty year period between 1991 and June 2010. The report's main objective is to describe the volume and variety of commodities shipped during this time period, to identify the trends in their movements and to draw inferences regarding future trends.

The results of the report will be of special interest to transportation policymakers, government agencies, private stakeholders and businesses throughout the region.

The specific research objectives and methodology are first discussed in Chapter 1. A thorough evaluation of annual tonnage shipped up and down river from 1991 to June 2010 follows in Chapter 2. The end of Chapter 2 specifically looks at wheat and total commodity tonnages and their corresponding averages over several time periods. To construct a typical year and allow identification of seasonal trends, available data is used to average the monthly upriver and downriver tonnage for each major commodity type over the twenty year period; this is discussed in Chapter 3. To focus on the major commodities in the years before the extended lock outage, the monthly upriver and downriver tonnage for each major commodity from 2008 to June 2010 is presented along with monthly averages during this time period as well; this is discussed in Chapter 4. To further study the months of the extended lock outage, Chapter 5 looks at the average monthly tonnages and percentages for each major commodity type from December to March for the years 2008 through June 2010.

Note: the total annual tonnage of movements provided in all chapters 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 #1 are as follows:

- To describe in detail the commodity movements along the Columbia-Snake River for the period from 1991-2010
- To identify the general trends and seasonality of commodity movements, both overall and for major commodities
- To identify major commodities that could be affected by the extended lock outage
- To draw inferences and evaluate likely future trends

Information provided in this report 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 lock on the Columbia River analyzed in this report—Bonneville—is under the U.S. Army Corps monitoring system. The data have been collected since 1975 and contain detailed information about commodity traffic on a monthly basis for each commodity, targeting 100 percent coverage of all commodities transported. This report focuses only on the data collected for the years 1991-2010. For an evaluation of commodity movements on the Columbia-Snake River prior to 1991, please refer to the EWITS Research Report #12 at <http://ewits.wsu.edu/reports.htm>.

The data analyzed in this report capture more than 35 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.

The dataset analyzed in this report contains 9,047 observations of Bonneville Lock and Dam over the twenty year period from 1991-2010 and incorporates the detailed information stated above. Observations of Bonneville Lock and Dam by year, month and commodity are provided in Appendix A: Annual Up and Down Bound Tonnage through Bonneville Lock and Dam.

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. To make commodity classification compatible across North America, in 1992 the NAICS replaced the U.S. Standard Industrial Classification (SIC) system. Due to the change in the coding system and the difficulty of mapping commodities between the two systems, there may be minor differences in commodity estimates when compared to previous reports on Columbia-Snake River System waterborne transportation.

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 and 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

Locally Designated Commodities: The lock operator can create a “Locally Designated Commodity” sub-code within a category, usually coded as 29, 39, 49, 59, etc. To some of the locally designated commodities, the lock operators assign a four-digit code within a category, codes also captured within the dataset. For example, if the general category code for “Food and Farm Products” is 60, and “Fresh Fish and Other Marine Products” are coded as 61, then the “Barged Juvenile Salmonid” is coded as 6003 as one of the locally designated commodities with a four-digit code. To continue, “Barged Juvenile Salmonid” and “Fructose” are the *only* commodities reported in a dataset with four-digit codes. For the vast majority of “locally designated commodities,” the dataset contains no specification on commodity composition. As stated, no detailed information on commodity composition and description exists for those locally designated commodities that have *not* been assigned a four-digit code. Therefore, the analyses of locally designated commodities are not as informative, and hence, are not discussed in this report.

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.

Extreme Outlier Values: Commodities are coded by the tonnage and the number of barges shipped. The tonnage of a particular barge varies based on the type of commodity. However, a general pattern of average tonnage and average number of barges shipped appears for a certain month from a particular lock for a specific direction and commodity code. In some cases, the tonnage and number of barges reported for a particular commodity at a particular lock deviate drastically from the typical pattern of estimates reported for that commodity. In these cases, whenever a general pattern of shipment was identifiable, the research team replaced the ‘extreme’ values with the more typical average annual value of the commodity for that lock.

As stated above, the dataset used for this report contains 9,047 observations of Bonneville Lock and Dam on the Columbia-Snake Rivers between 1991 and June 2010. A total of 12 observations (0.001 percent) have been replaced with their corresponding annual average values.

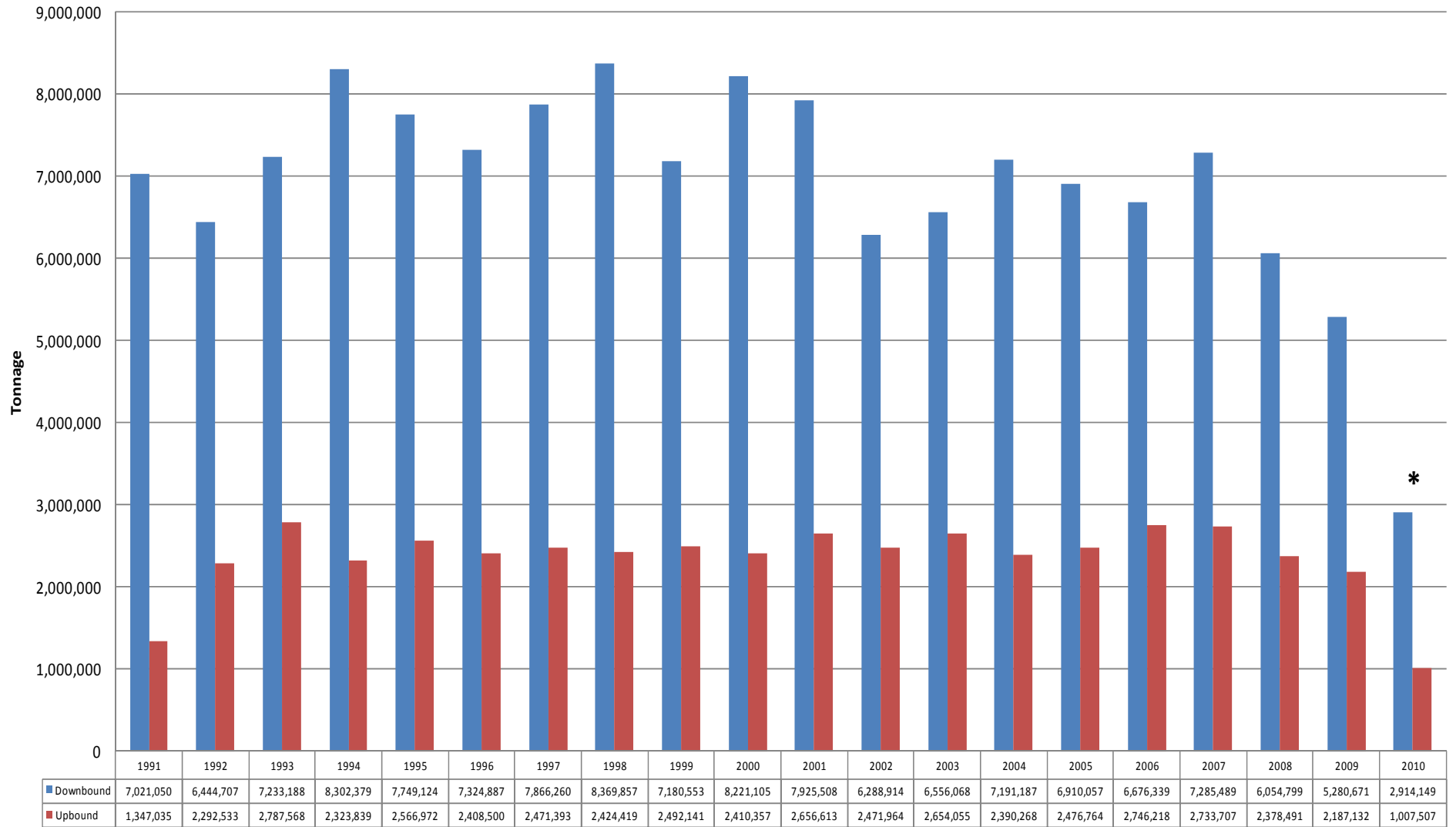
2. General Trends in Commodity Movements, 1991-2010

In order to eliminate repetitive entries of the same shipment to other locks, commodity-specific movements discussed in this report are based on the total arrival and departure estimates of commodities from the Bonneville Lock and Dam. Bonneville was selected because it is the last receiving lock on the Columbia-Snake River and the first lock that sends goods upriver. The total amount of downriver shipments from the Columbia-Snake River departs through Bonneville en route to other cities and the ocean for access to international markets. Similarly, for upriver shipments, Bonneville is the first lock and lock to receive goods that then travel to subsequent locks of the Columbia-Snake River system as well as markets inland.

The most notable characteristic of waterborne movements between 1991 and June 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 during the 1991-2010 time period. Moreover, the annual total tonnage traveling upriver has remained quite stable between 1991 and June 2010 at an average of 2.4 million tons, whereas the total tonnage of downriver shipments has ranged from a high of 8.4 million tons in 1998 to a low of around 5.3 million tons in 2009 (Figure 2.1).

Note: these averages and ranges do not include 2010 as the research team has chosen to only include the months January through June of 2010. Since the year is not complete, low estimates for 2010 would skew these averages and ranges. Subsequent interim reports for this study will focus on 2010 movements.

**Fig. 2.1 Annual Total Downbound and Upbound Tonnage
of All Commodities in 1991 - 2010**



Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

More than 35 separate commodities move up and down river. However, some commodities make up the major percentage of tonnage shipped both upriver and downriver. As previous studies have shown, grains, gasoline, various fuels (distillate and other fuels), forest products, crushed rock products (sand, gravel and stone products) and waste material have historically comprised the dominant amount of tonnage transported over the Columbia-Snake River System.

Down River Movements: A total of 139 million tons were shipped downriver between 1991 and 2010. The commodities with the largest volume of downriver shipments over the twenty year span between 1991 and 2010 have been (in *descending* order of their tonnage on downriver shipment):

- Wheat
- Forest products, lumber, logs and woodchips
- Sand, gravel and stone; limestone flux and calcareous stone; phosphate rock
- Rye, barley, rice, sorghum and oats
- Vegetable products
- Animal feed, grain mill products, flour and other processed grains
- Paper and allied products

Between 1991 and 2010 the total downriver tonnage of these commodities has exceeded 1.9 million tons (Table 2.1). During this time period, wheat comprised about 70 percent, or 96 million tons of the total 139 million tons, of commodities transported downriver. The second highest commodity by total tonnage was forest products at about 18.4 million tons. Sand and other stone products accounted for around 9 million tons of total downriver movements, while the total downriver shipment of rye, barley, rice, sorghum, and oats measured around 3.3 million tons. The total tonnage of vegetable products, animal feed and paper and allied products was around 2 million tons each for the twenty year period.

Over 725,000 tons of primary non-ferrous metallic products as well as iron ore were shipped downriver over this twenty year span. The total downriver tonnage of food and farm products was more than 690,000 tons and the total downriver tonnage of other agricultural products was more than 635,000 tons, followed closely by a total of about 620,000 tons of corn. The total downriver tonnage of fertilizer products, gasoline and various fuels (distillate and other fuels) ranged from 290,000 tons to 580,000 tons. The other commodities had a total tonnage of less than 250,000 tons with unmanufactured marine shells having the lowest total tonnage (77 tons).

A detailed description of annual tonnage for each commodity moving downriver is provided in Table 2.1. During the 1991 to 2010 period there were no reported shipments of coal, lignite and coke transported downriver.

Table 2.1 Annual Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010											
Commodity Description	Code	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Empty Barges	1	0	0	0	0	0	0	0	0	0	0
Coal, Lignite & Coke	10	0	0	0	0	0	0	0	0	0	0
Petroleum & Petroleum Products	20	0	0	0	25	0	0	0	10,550	0	0
Crude Petroleum	21	0	1,420	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel & Kerosene	22	77,994	107,805	9,865	26,056	13,679	10,673	3,370	0	9,354	8,622
Distillate, Residual & Other Fuel Oils	23	37,327	41,203	15,072	10,648	19,774	0	2,204	0	0	5,925
Petroleum Pitches, Asphalt, Naphtha & Solvents	24	1,895	0	2,400	3,348	2,150	0	0	3,200	3,600	0
Chemicals & Related Products	30	3,009	0	0	0	0	0	1,404	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	31	30,016	42,408	42,034	46,484	70,804	56,399	40,629	48,763	54,518	65,864
Organic & Inorganic Industrial Chemicals & Synthetic Materials	32	0	8,119	212	1,566	23	10,031	605	141	5,903	64
Crude Materials, Inedible, Except Fuels	40	0	0	0	0	20	0	23	101	1,362	0
Forest Products (Lumber, Logs & Woodchips)	41	1,508,795	1,324,903	1,698,042	1,489,135	1,303,790	1,025,353	1,270,470	1,134,923	1,084,040	1,022,499
Pulp, Waste Products	42	108,483	19,776	5,880	8,272	17,496	17,792	22,220	5,075	12,099	11,330
Sand, Gravel, Stone; Limestone Flux & Calcereous Stone; Phosphate Rock	43	0	16,439	5,000	208	41,556	38,253	169,169	311,250	374,044	391,050
Iron Ore; Iron Steel Waste & Scrap	44	65	0	0	0	1,729	8,690	18,850	18,938	32,910	57,149
Marine Shells (Unmanufactured)	45	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Waste & Scrap	46	0	0	7,563	21	594	900	5,100	3,000	7,600	9,600
Sulfur (Liquid & Dry); Clay; Salt	47	2,600	0	5,697	2,791	2,907	716	1,135	1,156	3,346	3,131
Primary Manufactured Goods	50	9,605	828	887	0	0	21	0	0	0	300
Paper & Allied Products	51	116,090	109,752	102,345	122,716	120,214	53,992	101,619	201,426	183,326	188,205
Building Cement & Concrete; Lime; Glass	52	0	321	1,340	1,134	256	127	361	0	0	0
Primary Iron & Steel Products	53	0	0	750	0	0	1,000	0	216	2,400	0
Primary Non-Ferrous Metal Products; Fabricated Metal Products	54	12,145	32,368	30,814	37,126	33,437	44,160	34,304	36,088	42,640	46,060
Primary Wood Products; Veneer; Plywood	55	7,090	3,927	25	478	2,362	0	0	1,150	0	3,000
Food & Farm Products	60	28,042	25,804	4,903	9,848	15,974	32,172	81,013	36,031	14,308	62,555
Fresh Fish & Other Marine Products	61	5,770	10	1,285	18,623	9,763	500	32	543	1,693	2,765
Wheat	62	4,461,688	4,177,675	4,695,413	5,680,845	5,477,144	5,555,625	5,552,094	6,017,319	4,698,433	5,702,494
Corn	63	46,157	44,799	21,281	414,891	10,694	16,948	16,574	13,517	8,755	1,641
Rye, Barley, Rice, Sorghum & Oats	64	386,329	242,112	308,629	133,078	337,228	166,573	238,525	186,624	187,875	178,171
Oilseeds (Soybean, Flaxseed, & Others)	65	12,807	13,847	13,052	17,204	14,015	9,007	12,512	6,923	8,475	4,707
Vegetable Products	66	58,356	60,827	84,403	91,656	107,338	106,341	131,840	129,857	144,722	168,864
Animal Feed, Grain Mill Products, Flour & Other Processed Grains	67	65,618	110,992	108,816	109,393	93,352	101,324	74,741	110,757	174,296	209,252
Other Agricultural Products, Including Food	68	24,117	30,372	32,626	54,404	32,969	44,916	57,598	70,055	106,261	70,326
Barged Juvenile Salmonid	6003	0	0	303	1,239	0	0	0	0	0	374
All Manufactured Equipment & Machinery	70	8,160	19,984	23,655	7,301	8,312	16,763	21,084	19,249	4,779	6,846
Waste Material (Garbage, Landfill, Sewage Sludge & Waste Water)	80	0	0	0	0	0	0	3,500	78	1,054	61
Commodity Unknown	99	8,892	9,016	10,896	13,889	11,544	6,611	5,284	2,927	12,760	250
Total		7,021,050	6,444,707	7,233,188	8,302,379	7,749,124	7,324,887	7,866,260	8,369,857	7,180,553	8,221,105

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

Table 2.1 Continued; Annual Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010

Commodity Description	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total Tons
Empty Barges	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite & Coke	0	0	0	0	0	0	0	0	0	0	0
Petroleum & Petroleum Products	0	0	0	0	0	0	0	13,672	6,182	1,177	31,606
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	1,420
Gasoline, Jet Fuel & Kerosene	3,879	6,229	4,504	6,300	3,917	0	30,741	39,470	32,621	17,137	412,216
Distillate, Residual & Other Fuel Oils	0	0	3,270	0	0	0	80,103	33,337	29,831	13,962	292,656
Petroleum Pitches, Asphalt, Naphtha & Solvents	0	0	0	0	0	0	0	0	0	240	16,833
Chemicals & Related Products	3,200	0	0	0	0	0	0	0	2,450	0	10,063
Fertilizer (Nitrogenous, Potassic, Phosphoric)	16,983	23,810	8,525	7,933	7,400	3,047	5,416	3,123	4,088	0	578,244
Organic & Inorganic Industrial Chemicals & Synthetic Materials	5,172	139	266	215	65	506	8,221	16,675	23,204	0	81,127
Crude Materials, Inedible, Except Fuels	519	0	25	0	0	0	800	139	0	0	2,989
Forest Products (Lumber, Logs & Woodchips)	746,973	530,066	533,634	539,537	695,800	655,172	593,588	440,113	443,451	366,815	18,407,099
Pulp, Waste Products	9,270	6,000	15,781	1,194	6,084	3,647	0	546	102	2,700	273,747
Sand, Gravel, Stone; Limestone Flux & Calcareous Stone; Phosphate Rock	916,705	984,270	745,948	649,352	882,204	791,370	785,224	1,588,162	146,211	225,324	9,061,739
Iron Ore; Iron Steel Waste & Scrap	43,600	48,479	63,889	47,747	54,152	61,095	67,780	71,514	74,236	57,893	728,716
Marine Shells (Unmanufactured)	0	77	0	0	0	0	0	0	0	0	77
Non-Ferrous Metallic Ores, Waste & Scrap	5,948	11,126	10,534	11,224	11,812	5,000	6,683	4,715	8,000	16,400	125,820
Sulfur (Liquid & Dry); Clay; Salt	4,317	3,422	1,802	1,067	3,808	2,646	3,316	2,578	49	0	46,484
Primary Manufactured Goods	33	58	30	187	33	78	64	0	0	0	12,124
Paper & Allied Products	137,152	138,624	70,318	87,197	25,920	67,448	95,283	51,457	8,034	3,664	1,984,782
Building Cement & Concrete; Lime; Glass	0	1,100	3,960	0	0	3,600	0	129	0	0	12,328
Primary Iron & Steel Products	110	2,000	28	709	3,491	0	235	0	10	300	11,249
Primary Non-Ferrous Metal Products; Fabricated Metal Products	42,692	34,425	37,788	39,326	44,690	50,574	41,830	38,123	35,489	16,351	730,430
Primary Wood Products; Veneer; Plywood	2,500	0	1,064	194	0	38	0	1	20	5,025	26,874
Food & Farm Products	87,536	50,512	70,230	60,197	15,470	22,411	7,691	21,404	41,782	6,829	694,712
Fresh Fish & Other Marine Products	0	0	0	30	6,945	1,515	0	0	0	0	49,474
Wheat	5,312,597	3,923,953	4,478,235	5,359,988	4,884,451	4,712,151	5,236,245	3,453,526	4,253,201	2,122,131	95,755,208
Corn	1,186	1,658	1,321	762	2,300	267	6,150	10,800	3,830	0	623,531
Rye, Barley, Rice, Sorghum & Oats	158,913	136,797	133,388	64,065	105,127	115,421	122,227	100,915	23,000	240	3,325,237
Oilseeds (Soybean, Flaxseed, & Others)	6,730	4,898	5,850	625	3,603	6,798	5,146	4,255	1,442	3,234	155,130
Vegetable Products	167,501	146,075	152,431	133,219	105,415	106,547	113,583	85,635	84,324	34,771	2,213,705
Animal Feed, Grain Mill Products, Flour & Other Processed Grains	219,845	208,315	186,379	151,856	36,158	44,822	57,490	53,655	39,149	13,623	2,169,833
Other Agricultural Products, Including Food	25,499	18,310	17,646	11,071	7,846	8,333	7,251	12,340	712	2,418	635,070
Barged Juvenile Salmonid	938	755	751	1,082	1,050	5,261	352	607	684	365	13,761
All Manufactured Equipment & Machinery	4,162	6,447	7,205	15,013	2,093	6,931	8,144	7,339	16,829	2,750	213,046
Waste Material (Garbage, Landfill, Sewage Sludge & Waste Water)	27	50	312	309	0	261	514	226	411	0	6,803
Commodity Unknown	1,521	1,319	954	788	223	1,400	1,412	343	1,329	800	92,158
Total	7,925,508	6,288,914	6,556,068	7,191,187	6,910,057	6,676,339	7,285,489	6,054,799	5,280,671	2,914,149	138,796,291

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

Up River Movements: As mentioned above, about three times less tonnage travels upriver than downriver. A total of 47 million tons were shipped upriver between 1991 and 2010. The commodities with the largest volume of upriver shipments over the twenty year span between 1991 and 2010 have been (in *descending* order of their tonnage on upriver shipment):

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

Between 1991 and 2010 the total upriver tonnage of these commodities exceeded 1 million tons (Table 2.2). The highest proportion of total upriver shipments, about 41 percent or 19.3 million tons of the total 47.2 million tons, was attributed to gasoline, jet fuel and kerosene products. The second highest proportion of total upriver shipments was for distillate, residual and other fuel oils, comprising 17 million tons (about 36 percent of the total upriver tonnage for 1991-2010). Over 3.5 million tons of waste materials, 2.3 million tons of fertilizer products and 1.1 million tons of primary non-ferrous metallic products were transported upriver between 1991 and 2010.

A detailed description of annual tonnage for each commodity moving upriver is provided in Table 2.2. During the 1991 to 2010 period there were no reported upriver shipments of marine shells or oilseeds.

Table 2.2 Annual Tonnage Shipped Upriver on the Columbia-Snake River, 1991-2010											
Commodity Description	Code	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Empty Barges	1	0	0	0	0	0	0	0	0	0	0
Coal, Lignite & Coke	10	0	0	0	0	0	0	15,270	6,900	0	0
Petroleum & Petroleum Products	20	20,841	3,734	1,785	11,451	19,872	12,562	15,314	0	16,491	1,477
Crude Petroleum	21	0	0	900	0	0	1,485	1,182	11,115	2,966	0
Gasoline, Jet Fuel & Kerosene	22	418,587	567,194	836,391	901,712	1,281,300	1,173,402	1,054,491	1,181,341	1,235,627	1,093,871
Distillate, Residual & Other Fuel Oils	23	487,745	600,244	1,285,112	655,208	676,036	710,140	870,473	820,354	849,079	837,241
Petroleum Pitches, Asphalt, Naphtha & Solvents	24	27,289	11,362	58,361	60,547	70,048	76,258	45,018	17,095	0	0
Chemicals & Related Products	30	12,550	7,377	5,450	7,200	8,500	13,700	5,950	5,150	5,900	15,186
Fertilizer (Nitrogenous, Potassic, Phosphoric)	31	279,676	132,975	218,920	388,331	238,157	72,315	113,062	56,767	38,166	64,032
Organic & Inorganic Industrial Chemicals & Synthetic Materials	32	20,982	25,375	27,530	14,751	3,500	27,500	26,650	24,650	19,500	21,470
Crude Materials, Inedible, Except Fuels	40	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs & Woodchips)	41	14,289	4,398	2,506	14,975	4,539	1,956	3,077	585	2,263	2,911
Pulp, Waste Products	42	0	260,453	28,495	34,472	45,261	43,008	47,137	8,822	3,210	0
Sand, Gravel, Stone; Limestone Flux & Calcereous Stone; Phosphate Rock	43	0	451,276	93,440	0	44	0	1,678	2,500	2,560	4,903
Iron Ore; Iron Steel Waste & Scrap	44	0	0	0	0	0	0	0	20	0	0
Marine Shells (Unmanufactured)	45	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Waste & Scrap	46	0	3,266	0	1,800	0	0	0	0	0	0
Sulfur (Liquid & Dry); Clay; Salt	47	0	0	0	0	0	159	0	0	0	0
Primary Manufactured Goods	50	0	0	0	0	0	0	0	0	0	0
Paper & Allied Products	51	2,246	3,511	6,694	740	0	0	114	1,894	690	0
Building Cement & Concrete; Lime; Glass	52	0	0	2,000	0	0	84	200	0	0	0
Primary Iron & Steel Products	53	200	540	0	400	500	1,220	0	200	50	315
Primary Non-Ferrous Metal Products; Fabricated Metal Products	54	34,261	49,953	51,182	57,056	52,592	55,059	65,740	77,430	72,312	98,033
Primary Wood Products; Veneer; Plywood	55	277	0	123	0	0	0	0	0	0	1,338
Food & Farm Products	60	0	0	0	0	0	0	0	0	146	0
Fresh Fish & Other Marine Products	61	0	0	0	0	0	0	0	0	0	6
Wheat	62	3,600	0	0	6,800	3,001	25,513	1,906	6,571	19,625	13,750
Corn	63	0	0	0	0	0	2,700	0	0	0	0
Rye, Barley, Rice, Sorghum & Oats	64	0	0	0	0	0	0	0	0	3,300	0
Oilseeds (Soybean, Flaxseed, & Others)	65	0	0	0	0	0	0	0	0	0	0
Vegetable Products	66	502	0	0	52	0	938	0	0	21	0
Animal Feed, Grain Mill Products, Flour & Other Processed Grains	67	1,513	0	0	0	0	0	0	0	450	1,063
Other Agricultural Products, Including Food	68	2,824	979	0	0	70	0	0	0	606	0
Barged Juvenile Salmonid	6003	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment & Machinery	70	12,203	30,872	27,353	14,714	26,070	22,257	33,986	15,535	13,465	18,126
Waste Material (Garbage, Landfill, Sewage Sludge & Waste Water)	80	0	0	0	0	0	7,362	149,524	184,354	205,714	236,635
Commodity Unknown	99	7,450	139,024	141,326	153,630	137,482	160,882	20,621	3,136	0	0
Total		1,347,035	2,292,533	2,787,568	2,323,839	2,566,972	2,408,500	2,471,393	2,424,419	2,492,141	2,410,357

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

Table 2.2 Continued; Annual Tonnage Shipped Upriver on the Columbia-Snake River, 1991-2010											
Commodity Description	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total Tons
Empty Barges	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite & Coke	0	0	0	0	0	0	0	0	0	0	22,170
Petroleum & Petroleum Products	0	0	0	0	0	3,587	0	3,557	3,257	0	113,928
Crude Petroleum	713	0	0	0	5,902	0	0	0	0	0	24,263
Gasoline, Jet Fuel & Kerosene	1,205,839	1,095,995	1,217,641	872,360	971,487	1,121,384	1,051,169	816,775	851,588	400,488	19,348,642
Distillate, Residual & Other Fuel Oils	879,171	906,572	922,009	983,118	934,634	1,082,968	1,188,736	1,004,051	909,430	428,511	17,030,832
Petroleum Pitches, Asphalt, Naphtha & Solvents	0	0	3,157	0	0	0	0	0	0	0	369,135
Chemicals & Related Products	6,300	0	0	0	0	0	0	0	0	0	93,263
Fertilizer (Nitrogenous, Potassic, Phosphoric)	178,441	74,418	51,715	57,455	74,365	71,888	48,028	66,568	48,982	25,635	2,299,896
Organic & Inorganic Industrial Chemicals & Synthetic Materials	5,000	2,999	3,012	0	3,569	1,875	0	6,478	3,515	0	238,356
Crude Materials, Inedible, Except Fuels	1,600	0	12,000	0	1,900	0	0	0	2,000	0	17,500
Forest Products (Lumber, Logs & Woodchips)	618	5,858	53,862	106,675	94,569	98,193	71,960	87,292	87,170	12,100	669,796
Pulp, Waste Products	0	0	0	0	0	3,850	0	0	0	0	474,708
Sand, Gravel, Stone; Limestone Flux & Calcereous Stone; Phosphate Rock	6,250	4,500	21,525	6,800	4,513	0	0	27,200	0	3,000	630,189
Iron Ore; Iron Steel Waste & Scrap	0	0	400	0	0	0	0	0	0	0	420
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Waste & Scrap	0	0	0	0	1,000	0	0	0	0	0	6,066
Sulfur (Liquid & Dry); Clay; Salt	76	0	0	0	0	0	0	0	0	0	235
Primary Manufactured Goods	437	0	0	0	0	0	0	1,600	0	0	2,037
Paper & Allied Products	2,045	724	0	0	0	0	120	0	0	0	18,778
Building Cement & Concrete; Lime; Glass	0	0	0	0	0	0	0	50	0	0	2,334
Primary Iron & Steel Products	0	40	1	75	0	20	100	125	0	0	3,786
Primary Non-Ferrous Metal Products; Fabricated Metal Products	89,188	79,336	79,055	59,177	27,777	35,784	44,447	39,186	26,096	9,163	1,102,827
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	1,738
Food & Farm Products	228	2	0	1	0	0	0	895	1,802	160	3,234
Fresh Fish & Other Marine Products	0	0	0	0	0	0	0	0	0	0	6
Wheat	6,600	3,000	0	0	9,200	0	2,957	3,400	0	0	105,923
Corn	0	0	0	0	0	0	0	0	0	0	2,700
Rye, Barley, Rice, Sorghum & Oats	0	3,000	0	0	0	0	0	0	0	0	6,300
Oilseeds (Soybean, Flaxseed, & Others)	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	594	0	0	0	0	0	0	0	0	0	2,107
Animal Feed, Grain Mill Products, Flour & Other Processed Grains	911	1,076	0	0	0	0	0	0	0	0	5,013
Other Agricultural Products, Including Food	500	0	0	0	0	0	0	0	0	0	4,979
Barged Juvenile Salmonid	4	2	0	1	0	0	0	0	0	0	7
All Manufactured Equipment & Machinery	20,309	22,924	12,868	12,570	7,150	5,171	11,083	8,887	3,818	2,726	322,087
Waste Material (Garbage, Landfill, Sewage Sludge & Waste Water)	251,789	271,518	276,810	292,036	339,698	321,204	315,107	312,427	249,374	123,950	3,537,502
Commodity Unknown	0	0	0	0	1,000	294	0	0	100	1,774	766,719
Total	2,656,613	2,471,964	2,654,055	2,390,268	2,476,764	2,746,218	2,733,707	2,378,491	2,187,132	1,007,507	47,227,476

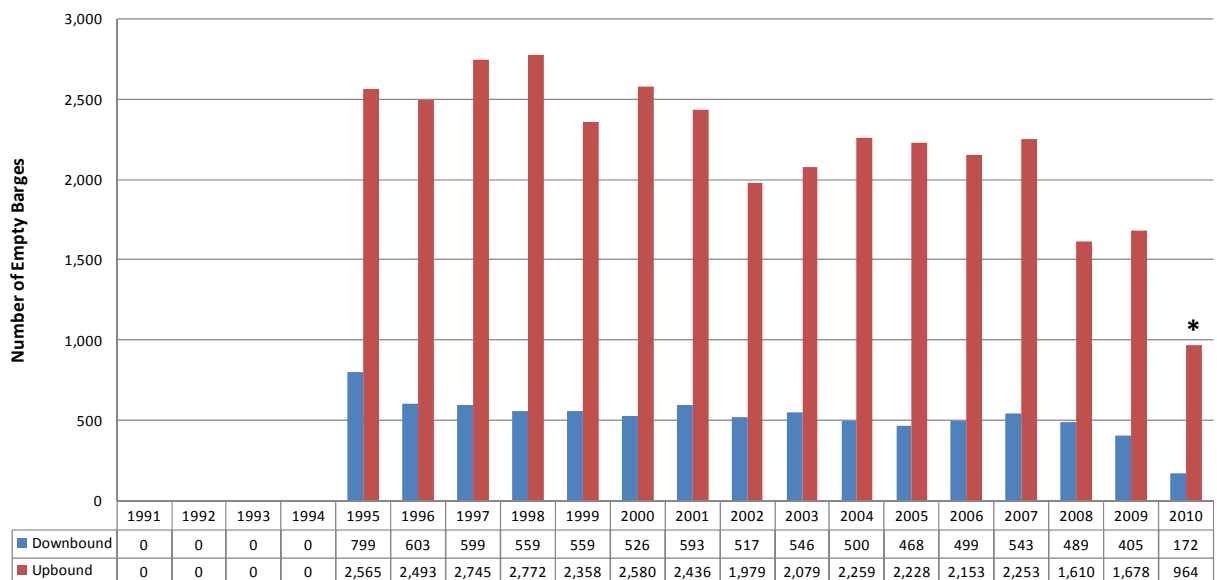
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

2.1 General Trends in Commodity Movements

To capture general trends in commodity movements upriver and downriver, comparative analyses are provided for each commodity in this chapter. As mentioned earlier, about three times more tonnage traveled downriver than upriver. Likewise, a large number of empty barges traveled back upriver to be repositioned for future downriver movements. Accordingly, a total of about four times more empty barges traveled upriver than downriver (Figure 2.2).

Note: from 1991 through 1994, no empty barges moved upriver, no empty barges moved downriver and/or empty barges were not captured in the statistics.

Fig. 2.2 Annual Total Number of Empty Barges Transported Up and Down River in 1991-2010



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

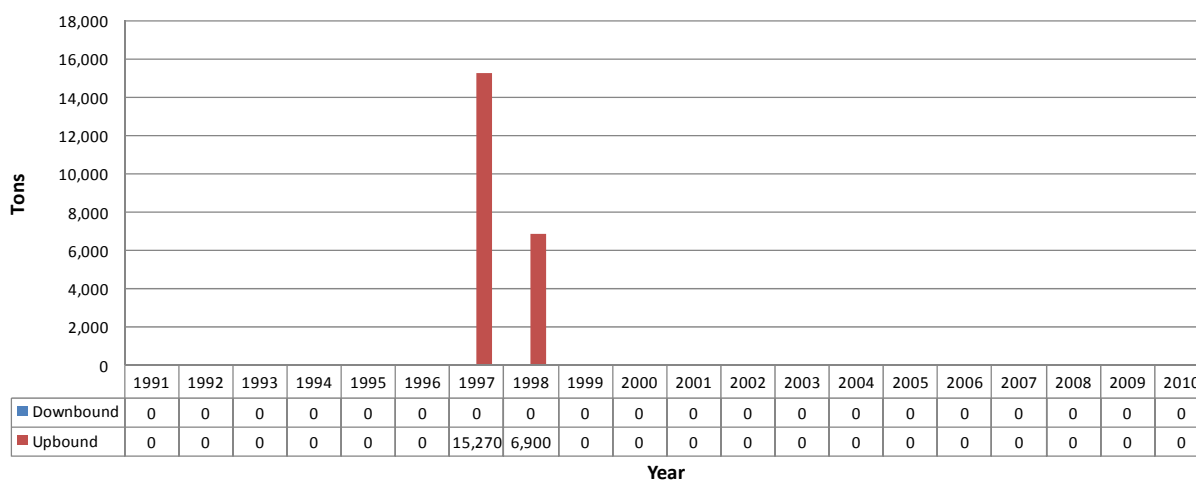
*Indicates that 2010 data consists of the months January through June

Coal, Lignite and Coke

Coal, lignite and coke rarely travel over the Columbia-Snake River System. In fact, no downriver shipments were reported for this commodity during the twenty year evaluation period.

However, upriver shipments of coal, lignite and coke were reported in 1997 and 1998 (Figure 2.3).

Fig. 2.3 Annual Tonnage of Coal, Lignite and Coke Barged Up and Down River in 1991-2010

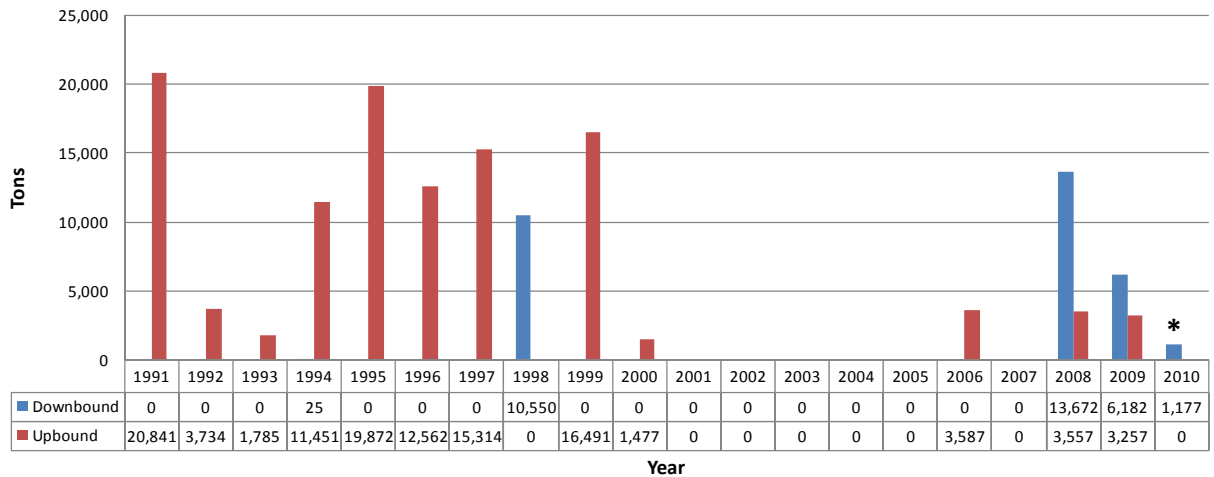


Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Petroleum and Petroleum Products

Between 1991 and 2010, downriver shipments of petroleum and petroleum products were reported during the years 1994, 1998 and 2008-2010 at tonnages of 25, 10,500, 14,000, 6,000 and 1,000, respectively (Figure 2.4). Petroleum products traveled mostly upriver, but their movement declined in the later 1990s with no upriver shipments reported in 1998 or from 2001 to 2005. Upriver shipments of petroleum products returned in 2006. However, much less tonnage was barged in recent years as compared to the 1990s. From 1991 to 2000, the total upriver tonnage of petroleum products ranged from a high of 21,000 tons in 1991 to a low of 1,500 tons in 2000, whereas from 2006 to 2010, the total upriver tonnage of petroleum product averaged 3,500 tons with no shipments in 2007 or 2010.

Fig. 2.4 Annual Tonnage of Petroleum and Petroleum Products Barged Up and Down River in 1991-2010



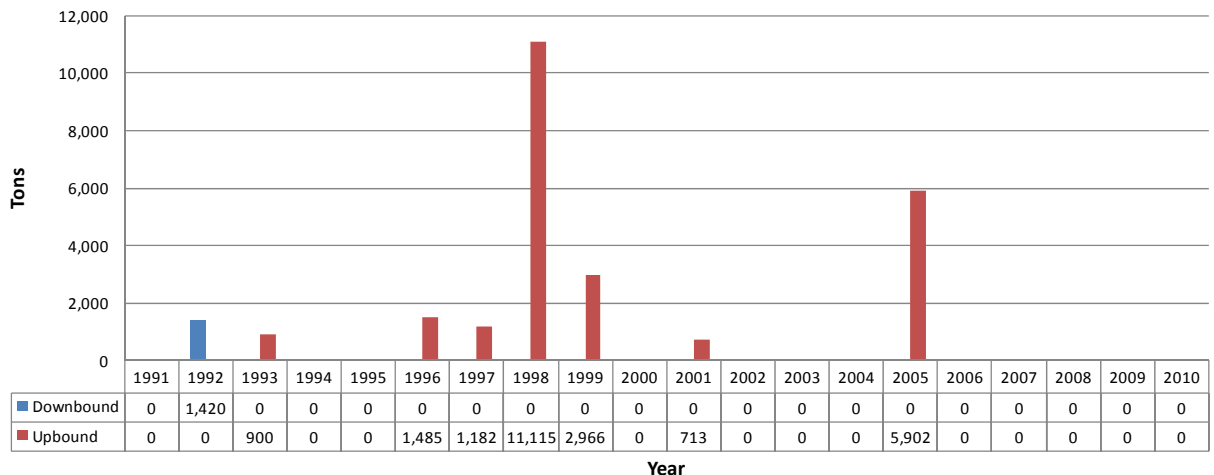
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

Crude Petroleum

Movements of crude petroleum products exhibited a similar pattern as coal and other petroleum products in that they were rarely shipped downriver (Figure 2.5). Between 1991 and 2010, only one downriver shipment of crude petroleum reached the Bonneville Lock and Dam in 1992.

Upriver shipments of this commodity were highly variable. Between 1991 and 1995, there was one upriver shipment of crude petroleum. In 1998, upriver crude petroleum shipments reached their peak of 11,000 tons and gradually declined to 700 tons in 2001 with no shipments reported in 2000, 2002-2004 and 2006-2010.

Fig. 2.5 Annual Total Tonnage of Crude Petroleum Barged Up and Down River in 1991-2010

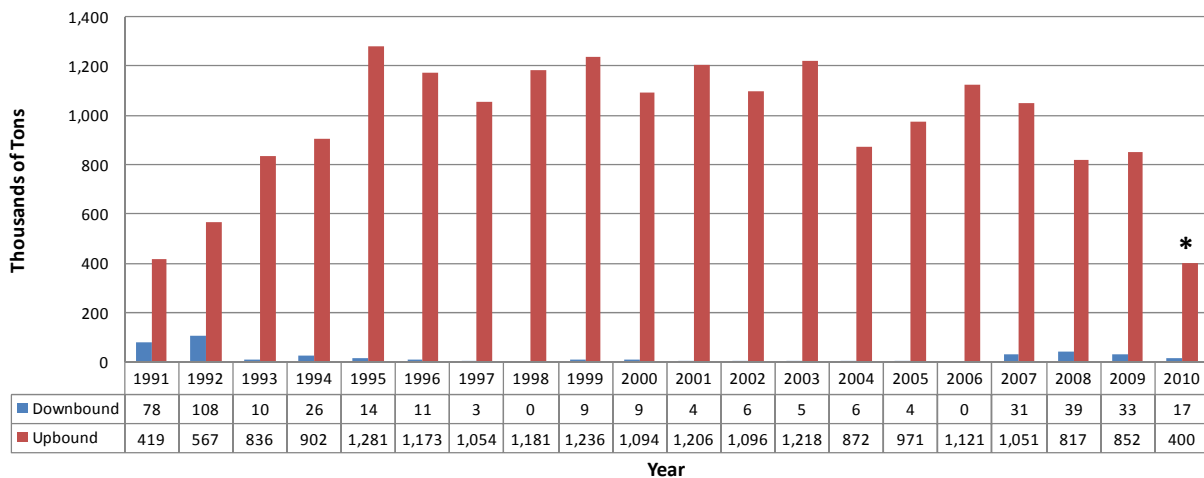


Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
Gasoline, Jet Fuel and Kerosene

Among all commodities traveling upriver, total tonnage of gasoline, jet fuel and kerosene were the highest (Figure 2.6). Upriver shipments of this commodity accounted for about 41 percent (19.3 million tons) of all upriver tonnage that traveled over the Columbia-Snake River System from 1991-2010 (Table 2.2). During the twenty year period from 1991-2010, gasoline, jet fuel and kerosene reached upriver shipment peaks in 1995 and 1999. As the data suggest, the total tonnage of gasoline, jet fuel and kerosene transported upriver remained relatively stable over this time period (1991-2010). The highest volume of shipments was reported in 1995 at 1.3 million tons. Since then, upriver shipments have declined slightly but have not fallen below 800,000 tons, with the exception of 2010, which only covers the months of January through June.

Compared to the upriver pattern, downriver shipments of gasoline, jet fuel and kerosene have followed a more variable pattern with lower estimates, ranging from as high as 108,000 tons in 1992 to a reported low of 3,000 tons in 1997. No downriver shipments of these fuels were reported in 1998 or 2006. Downriver shipments of gasoline, jet fuel and kerosene reached the highest volume in 1992 and have since drastically decreased, especially between 1997 and 2006. From 2007 to 2010, downriver shipments increased, ranging from about 17,000 (January-June 2010) to 39,000 tons (2008).

Fig. 2.6 Annual Tonnage of Gasoline, Jet Fuel and Kerosene Barged Up and Down River in 1991-2010



Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

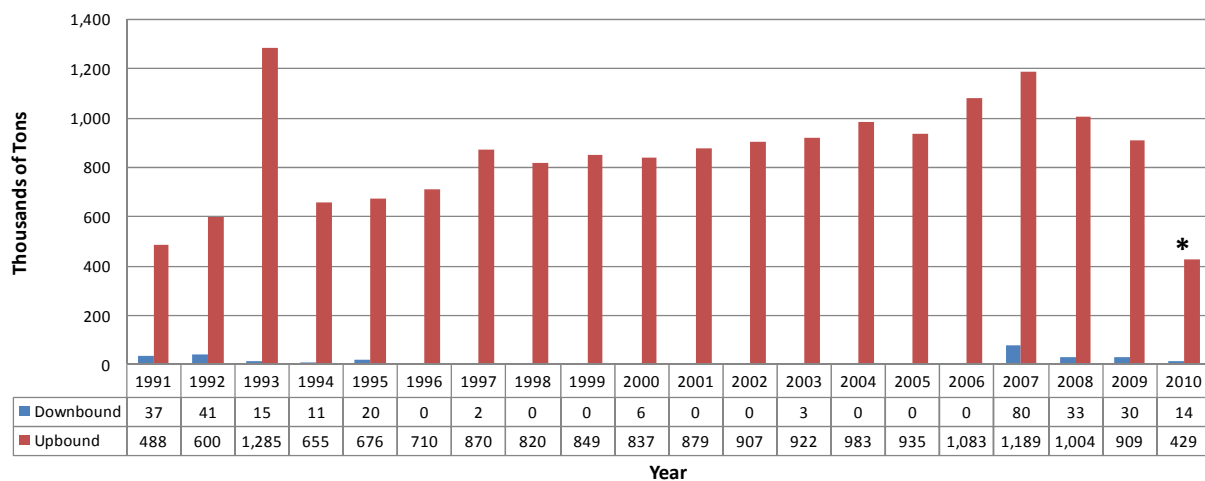
Distillate, Residual and Other Fuel Oils, Lubricating Oils and Grease

After gasoline, jet fuel and kerosene, total upriver shipments of distillate, residual and other fuel oils were the second highest reported between 1991 and 2010, slightly above 17 million

tons for the entire period (Table 2.2). From 1992 to 2009 the upriver shipments of distillate products averaged 895,000 tons (Figure 2.7). The highest tonnage shipped upriver, almost 1.3 million tons, occurred in 1993. The lowest tonnage shipped upriver, nearly 488,000 tons, was reported in 1991; higher volumes were reported thereafter with the exception of 2010.

Downriver shipments of distillate and related commodities were variable. The largest reported volume occurred in 2007, about 80,000 tons. Prior to 2007, the second highest downriver shipment took place in 1992 (41,000 tons) followed by a drastic decline in total annual tonnage of distillate oil and related commodities. Compared to the peak movements in 1992, shipments declined by at least twelve times, and no downriver shipments were made in 1996, 1998-1999, 2001-2002 and 2004-2006. The lowest value, roughly 2,000 tons, was reported in 1997.

Fig. 2.7 Annual Tonnage of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases Barged Up and Down River in 1991-2010



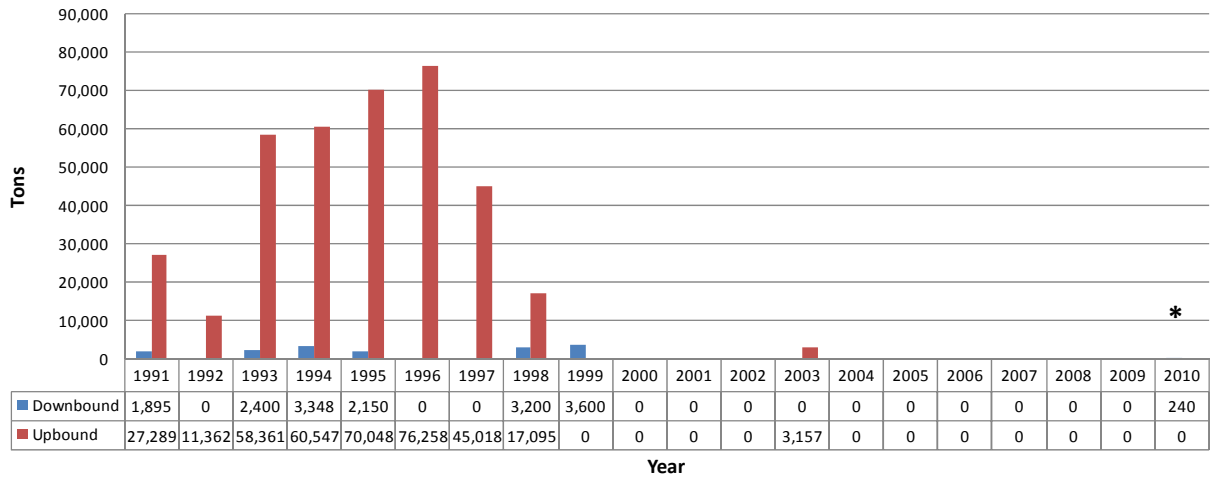
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

*Indicates that 2010 data consists of the months January through June

Petroleum Pitches, Asphalt, Naphtha and Solvents

Shipments of petroleum pitches, asphalt, naphtha and solvents reported for the years 1991-1998 demonstrated that a predominantly higher level of tonnage traveled upriver rather than downriver. As Figure 2.8 suggests, in 1996 upriver shipments of petroleum pitches, asphalt, etc. reached a high of over 76,000 tons and decreased since then to the lowest reported value in 2003 of 3,000 tons. Downriver shipments were reported in 1991, 1993-1995, 1998, 1999 and 2010. From 1991 to 1999, downriver shipments of petroleum pitches, asphalt, naphtha and solvents averaged 2,700 tons and were reported highest in 1999 at 3,600 tons. As one can notice from Figure 2.8, only two shipments in either direction were reported for the period from 2000 to 2010.

Fig. 2.8 Annual Tonnage of Petroleum Pitches, Asphalt, Naphtha and Solvents Barged Up and Down River in 1991-2010



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

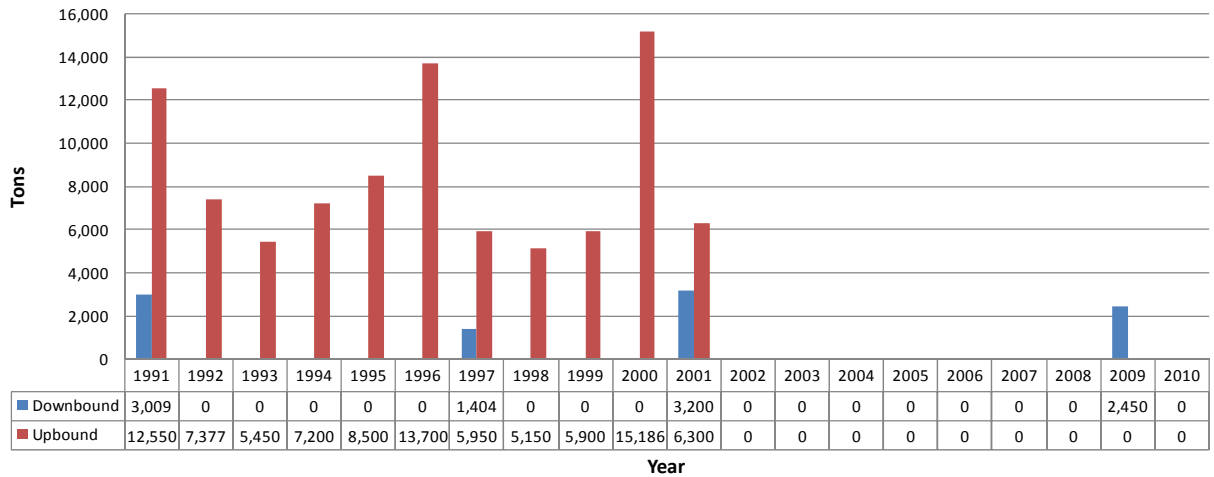
*Indicates that 2010 data consists of the months January through June

Chemicals and Related Products

Upriver shipments of chemicals and related products were much greater than shipments downriver from 1991 to 2001 (Figure 2.9). Over the years 1991 to 2001, the upriver shipments of chemicals and related products ranged from as high as 15,000 tons in the year 2000 to as low as 5,000 tons in 1998. No upriver shipments were reported during the 2002-2010 period.

Downriver transportation of chemical products was quite sporadic: from 1991 to 2010, chemical products traveled downriver only four times with an average tonnage of 2,500 tons.

Fig. 2.9 Annual Tonnage of Chemicals and Related Products Barged Up and Down River in 1991-2010



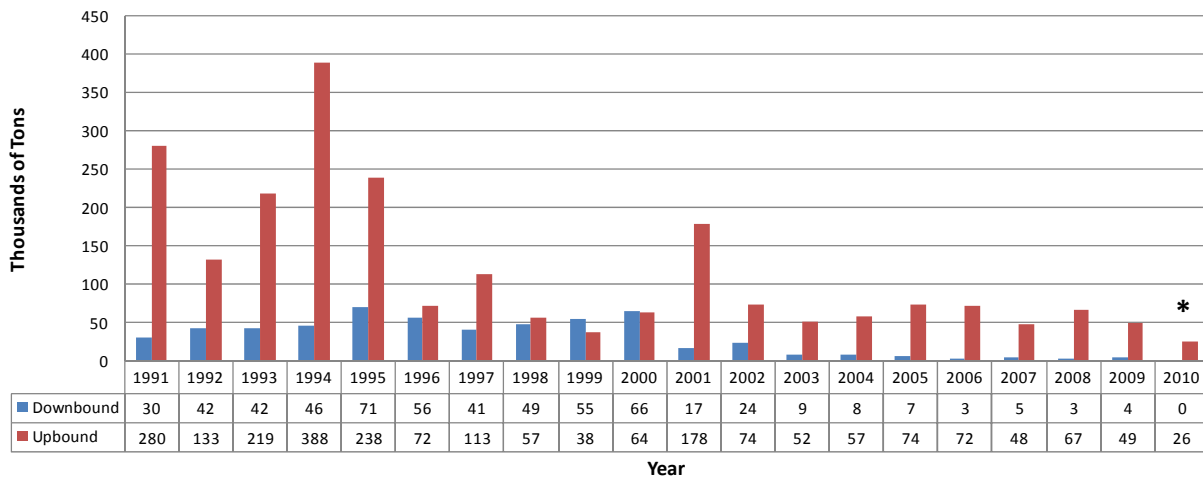
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Fertilizer – Nitrogenous, Potassic, Phosphatic and Others

Fertilizer products were the fourth highest tonnage commodities traveling upriver, grossing a total of 2.3 million tons moved from 1991 to 2010 (Table 2.2). The highest tonnages were shipped between 1991 and 1994; in 1991 280,000 tons were shipped, followed by a high of 388,000 tons shipped in 1994 (Figure 2.10). Despite the high gross tonnage, movement was not consistent: tonnage showed a dramatic decrease between 1994 and 2000 as well as another sharp decrease in 2002 after elevated 2001 shipments. During these lower shipment years, the values for upriver shipments varied from 38,000 to 238,000 tons.

Compared to the tonnage of upriver shipments, tonnage of downriver shipments was much lower. The downriver traffic of fertilizer products increased from 1991 to 1995, declined from 1995 to 1997 and increased again from 1997 to 2000. The highest tonnages were shipped downriver in 1995 and 2000 and ranged from 66,000 to 71,000 tons. After 2000, downriver shipment tonnage fell to 16 percent of previous levels (an average of 8,000 tons).

Fig. 2.10 Annual Tonnage of Fertilizer-Nitrogenous, Potassic, Phosphatic and Others Barged Up and Down River in 1991-2010



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

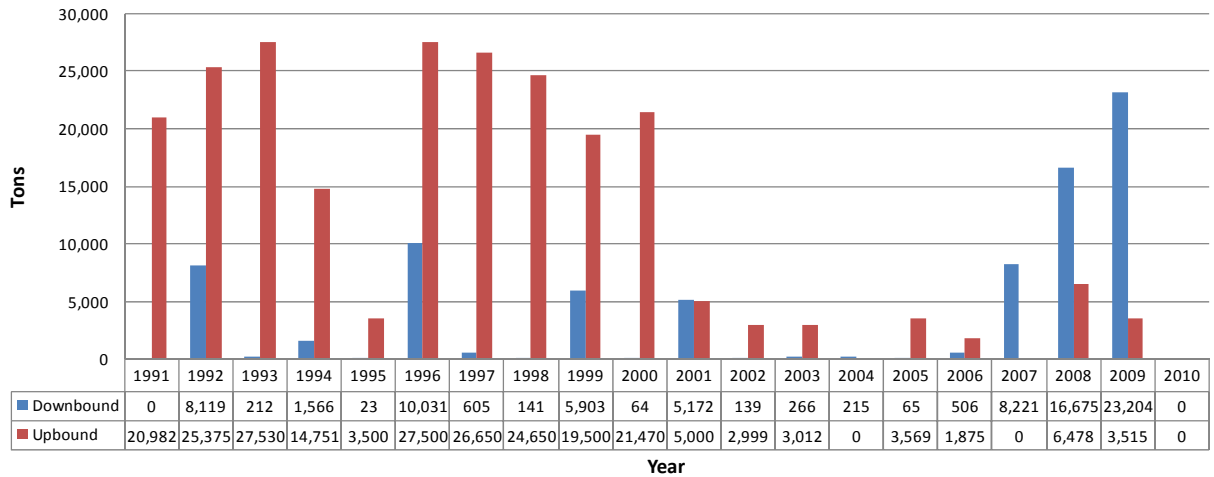
*Indicates that 2010 data consists of the months January through June

Organic and Inorganic Industrial Chemicals and Synthetic Materials

Upriver tonnage of organic and inorganic industrial chemicals and synthetic materials were at high levels from 1991 to 2000, with the exceptions of 1994 and 1995, followed by a significant decrease after 2000. The highest upriver tonnage of 27,500 tons was reported in 1993 and the lowest upriver tonnage of 2,000 tons was reported in 2006 (Figure 2.11). While there was a subtle increase in tonnage shipped in 2000, this slight increase was followed by a 15,000 ton decrease the following year including no reported upriver shipments in 2004, 2007 and 2010.

One can identify a decreasing tonnage pattern for downriver shipments of these commodities followed by an increasing pattern from 2007 to 2009. Compared to upriver shipments, however, the downriver shipment pattern was inconsistent and sporadic. As Figure 2.11 confirms, the highest downriver tonnages were shipped in 1996, 2008 and 2009; 10,000, 17,000 and 23,000 tons, respectively. In addition to the high volumes shipped downriver in 1996 and from 2008 to 2009, movements of organic and inorganic industrial chemicals and synthetic materials reached a low of 25 tons in 1995, 98.5 percent less than shipments made the preceding year.

Fig. 2.11 Annual Tonnage of Organic and Inorganic Industrial Chemicals and Synthetic Materials Barged Up and Down River in 1991-2010



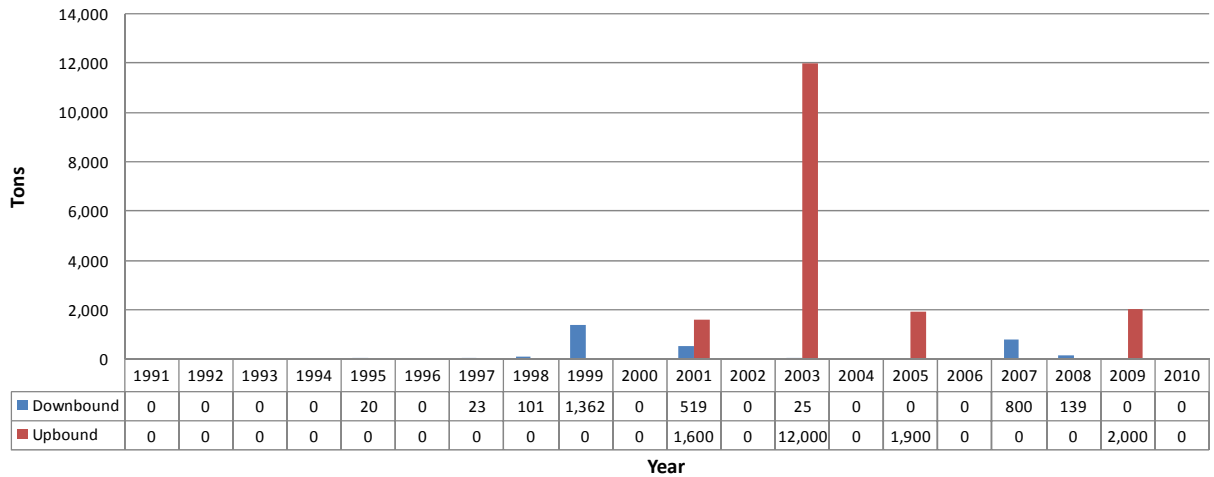
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Crude Materials, Inedible, Except Fuels

Both downriver and upriver shipments of crude materials have been inconsistent and with interruptions (Figure 2.12). Downriver shipments were negligible between 1995 and 1998, ranging from 20 to 100 tons barged with no reported downriver shipments of this commodity from 1991 to 1994 and in 1996. In 1999 downriver tonnage of these materials increased drastically to 1,500 tons. This uncharacteristically high tonnage was followed by no shipments in 2000, 2002, 2004-2006 and 2009 and low shipments of 500, 25, 800 and 150 tons shipped in 2001, 2003, 2007 and 2008, respectively.

Crude materials traveled upriver only in 2001, 2003, 2005 and 2009. The materials shipped in 2001 (2,000 tons) increased six fold in 2003 to a high of 12,000 tons. In 2005 and 2009, downriver shipments of crude materials returned to 2,000 tons.

Fig. 2.12 Annual Tonnage of Crude Materials, Inedible, Except Fuels Barged Up and Down River in 1991-2010



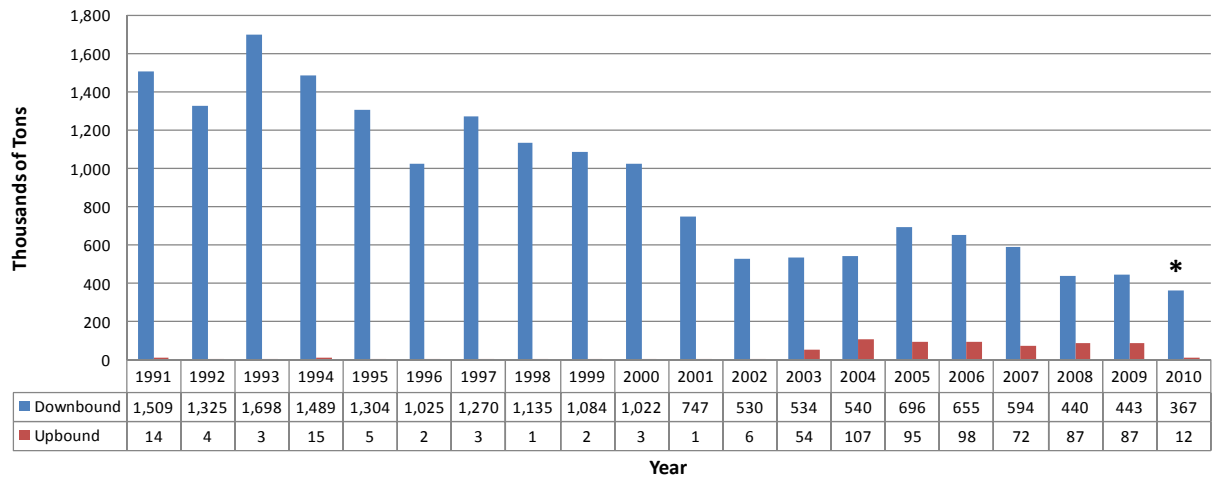
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Forest Products, Lumber, Logs and Woodchips

One can notice a more interesting pattern for the movement of forest products (Figure 2.13), the second highest tonnage commodity shipped downriver after wheat, with a total amount of 18.4 million tons transported between 1991 and 2010 (Table 2.1). Contrary to this high volume, the tonnage of forest products shipped downriver has decreased steadily since 1993. The highest estimate of 1.7 million tons was reported in 1993. After 1993 shipment tonnages consistently declined to estimated lows of 535,000 tons recorded from 2002 to 2004. By 2004 downriver shipments of forest products had decreased by about 70 percent from 1993 levels. However, downriver shipments of forest products did increase to 700,000 in 2005 followed by a decline to 440,000 in 2009.

Contrary to the significant tonnage of forest products transported downriver, upriver tonnages of the commodity are only four percent of downriver tonnage levels. From 1991 to 2010, forest products were shipped upriver mostly during the 2003-2009 period, exceeding 100,000 tons shipped in 2004, which is about twice the overall total tonnage shipped during the 1991-2002 period.

Fig. 2.13 Annual Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up and Down River in 1991-2010



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

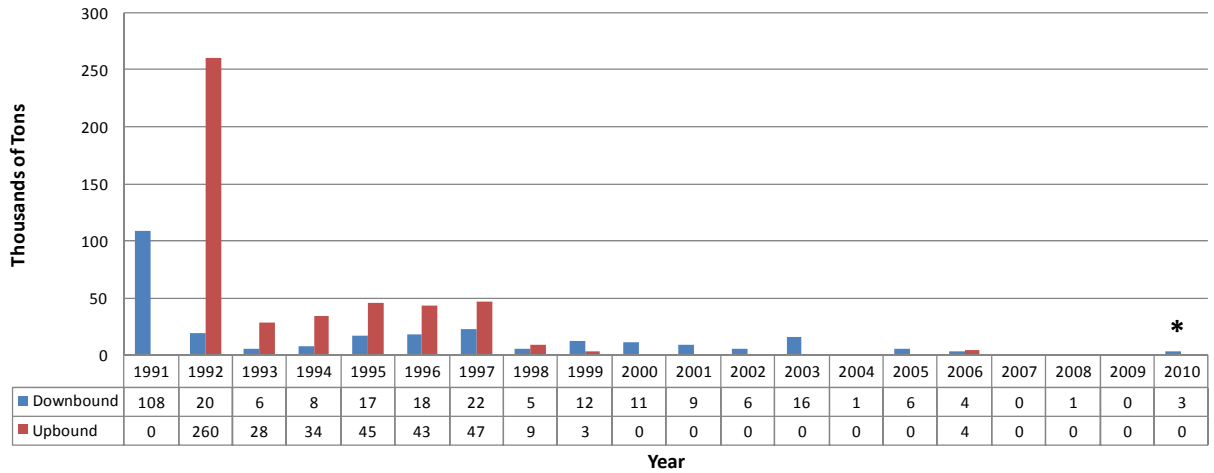
*Indicates that 2010 data consists of the months January through June

Pulp and Waste Products

In general, annually transported tonnage of pulp and waste products was higher between 1991 and 1997 than during 1998-2010 (Figure 2.14). Downriver shipments of pulp and waste products reached their highest level in 1991 with a movement of 110,000 tons. Shipments drastically decreased in 1992 to 20,000 tons. Between 1995 and 1997, downriver shipments of pulp and waste products were quite stable with an average of 19,000 tons barged down the river each year. This stable period was followed by an extreme decline to 5,000 tons shipped in 1998. Tonnage of pulp and waste products shipped downriver again increased to 12,000 tons in 1999 yet continued in a declining pattern until 2002. One can observe another wave of increase as the downriver tonnage rose to 16,000 tons in 2003 followed by a decrease through 2010, never reaching shipment levels higher than 6,000 tons.

Upriver shipments of pulp and waste products were highest in 1992 at 260,000 tons. Following this high shipment year, upriver tonnages from 1993-1997 averaged 40,000 tons shipped each year. Shipments dropped suddenly in 1998 to 9,000 tons and fell lower still in 1999 to 3,000 tons. No shipments passed through Bonneville during 2000-2010 with the exception of a 4,000 ton shipment in 2006.

Fig. 2.14 Annual Tonnage of Pulp and Waste Products Barged Up and Down River in 1991-2010



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

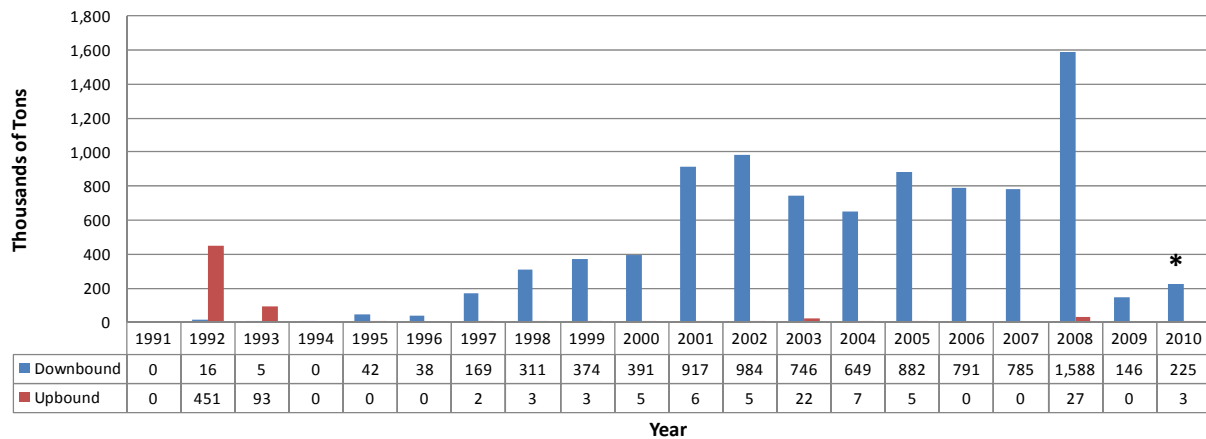
*Indicates that 2010 data consists of the months January through June

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

Contrary to the movement of pulp and waste products, the downriver shipments of sand and various stone products (Figure 2.15) have increased since 1993 from as low as 5,000 tons to as high as 1.6 million tons in 2008. According to Table 2.1, total downriver sand, gravel and stone shipments reached nine million tons from 1991 to 2010 and the commodity is ranked third for total tonnage moving downriver.

After an extreme decrease in upriver shipments from 1992 (450,000 tons) to 1994 (no shipment), one can notice an increase in the annual tonnage shipped up the river with shipments rising from 2,000 tons in 1997 to a dramatic 27,000 tons in 2008 after two previous years of no shipments.

Fig. 2.15 Annual Tonnage of Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock Barged Up and Down River in 1991-2010



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

*Indicates that 2010 data consists of the months January through June

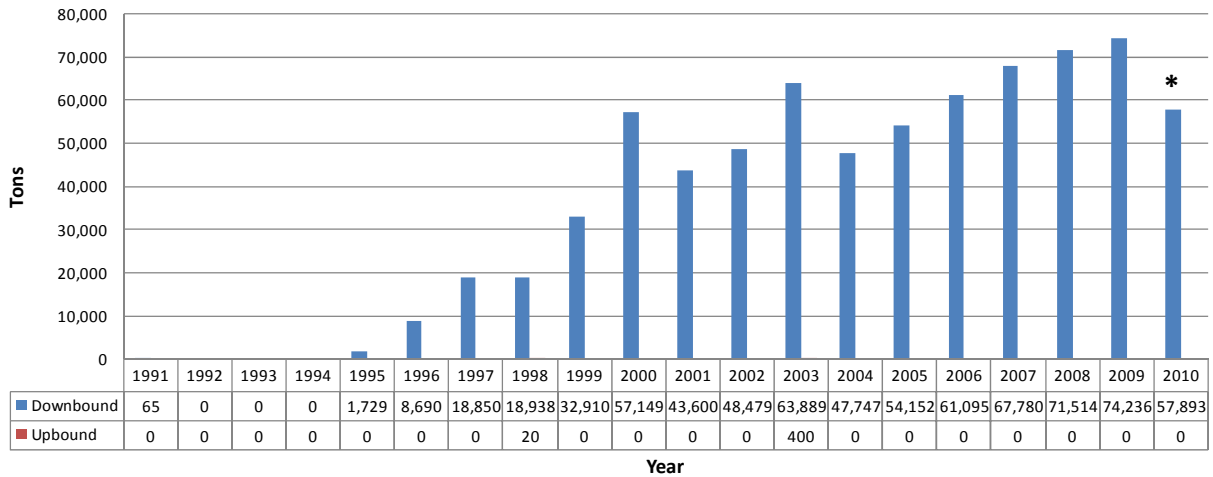
Iron Ore, Iron Steel Waste and Scrap and Marine Shells (Unmanufactured)

Examining Figures 2.16 and 2.17 side by side suggests similarities in the upriver shipments of iron ore, steel waste and scrap products and unmanufactured marine shells. Both of these commodity groups traveled upriver very rarely between 1991 and 2010. Twenty and 400 tons of iron ore, steel waste and scrap were transported upriver in 1998 and 2003, respectively (Figure 2.16), while no upriver shipments of marine shells were reported during the twenty year period (Figure 2.17).

Contrary to upriver trends, iron ore, steel waste and scrap products have been shipped downriver regularly (Figure 2.16). As one can notice, since 1995 downriver shipments increased from 2,000 tons to 75,000 tons in 2009. There have not been any interruptions in downriver shipment of iron ore products since 1995; however, there was a slight decrease and subsequent increase in shipment of these materials from 2000 to 2002 and from 2003 to 2005.

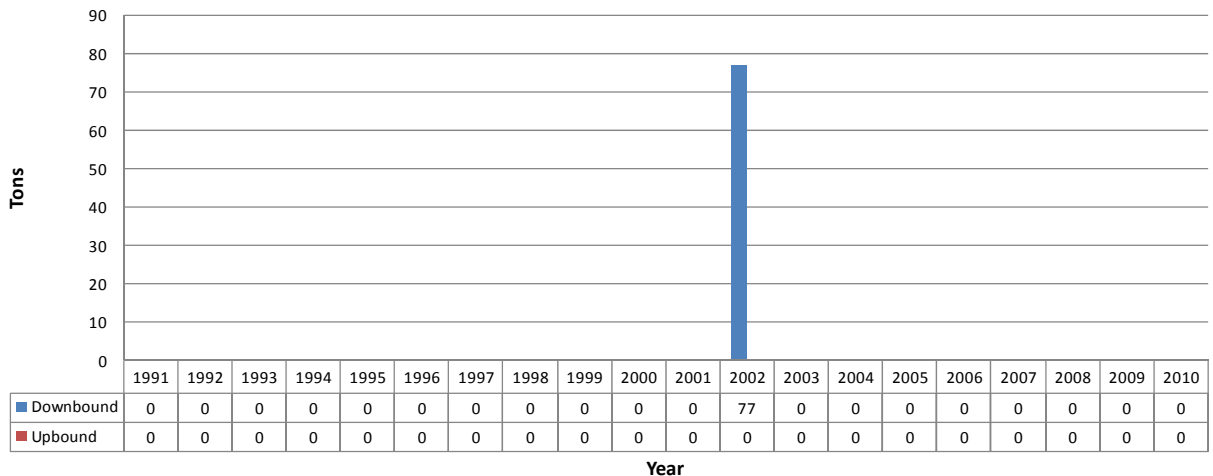
Similar to its lack of upriver movement (Figure 2.17), unmanufactured marine shells were shipped downriver only once during the twenty year period with a tonnage of 75 tons in 2002.

Fig. 2.16 Annual Tonnage of Iron Ore, Steel Waste and Scrap Barged Up and Down River in 1991-2010



Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

Fig. 2.17 Annual Tonnage of Unmanufactured Marine Shells Barged Up and Down River in 1991-2010



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

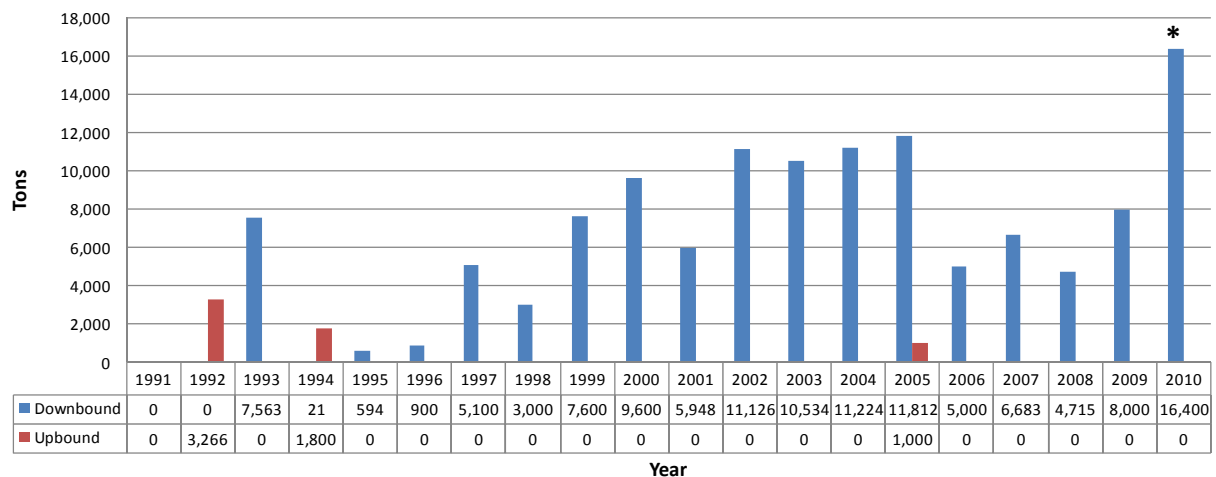
Non-Ferrous Metallic Ores, Waste and Scrap

As Figure 2.18 suggests, only three upriver shipments of non-ferrous metallic ores, waste and scrap traveled from Bonneville during 1991-2010. The highest upriver shipment occurred in 1992 at 3,500 tons and the lowest occurred in 2005 with 1,000 tons.

Downriver transportation of non-ferrous metals, however, increased rather steadily since 1994 after a brief but drastic decrease of 7,500 tons from 1993 to 1994. The lowest estimate of

downriver shipment during the twenty year period occurred in 1994 when only 20 tons were transported. Since then, the downriver tonnage of this commodity has increased, recovering from downfalls in 1998, 2001 and 2006-2009 reaching the highest level of shipment of 16,000 tons in 2010 (January-June). No downriver shipments of non-ferrous metallic ores, waste and scrap were made from 1991 to 1992.

Fig. 2.18 Annual Tonnage of Non-Ferrous Metallic Ores, Waste and Scrap Barged Up and Down River in 1991-2010



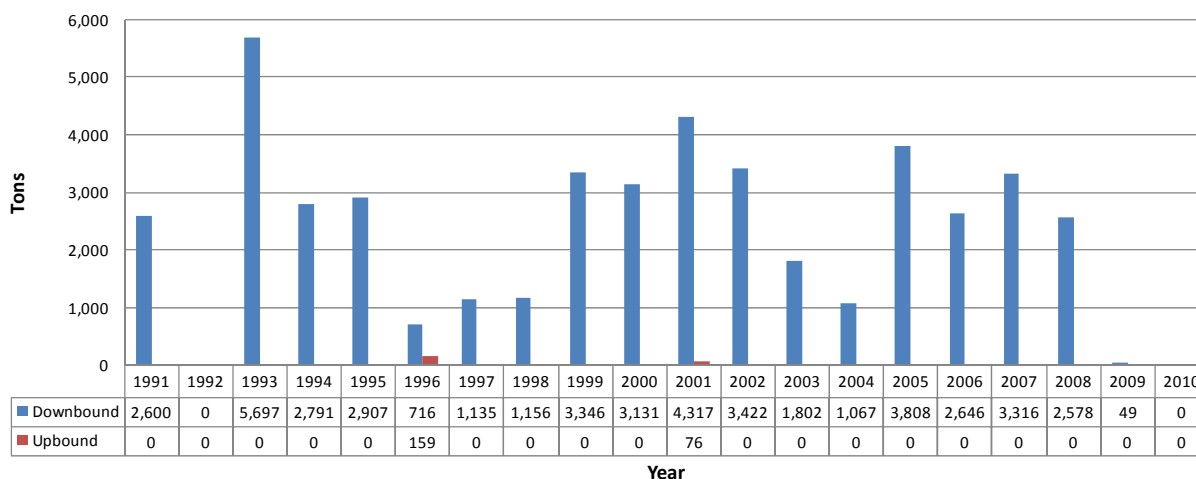
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

Dry and Liquid Sulfur, Clay and Salt

Dry and liquid sulfur, clay and salt have mainly been barged downriver. Yet, the shipment pattern downriver is not monotonous, but rather has progressed with both rises and falls during the twenty year period (Figure 2.19). The highest downriver estimate of about 6,000 tons was reported in 1993. The lowest tonnage of only 50 tons was shipped downriver in 2009 while no shipments were reported in 1992 and 2010 (January-June).

Upriver shipments of sulfur, clay and salt products demonstrated a more irregular pattern than downriver shipments. Low tonnages of these products were barged up the river only twice over the years 1991 to 2010: 160 tons in 1996 and 75 tons in 2001.

Fig. 2.19 Annual Tonnage of Dry and Liquid Sulfur, Clay and Salt Barged Up and Down River in 1991-2010



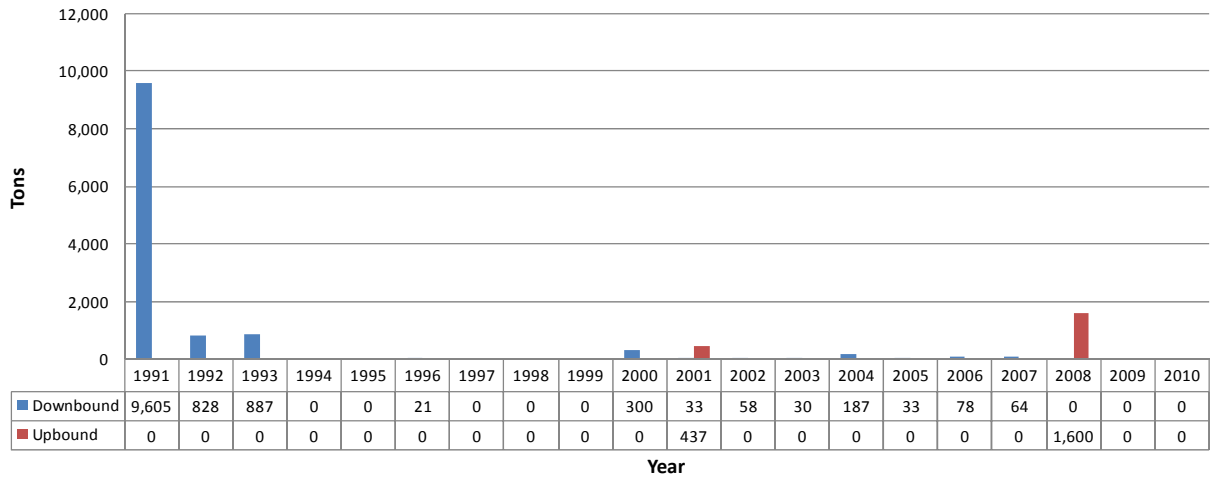
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Primary Manufactured Products

Primary manufactured products travel downriver more frequently than upriver (Figure 2.20). According to Table 2.1, over the twenty year period shipments downriver totaled 12,000 while upriver shipments totaled only 2,000.

Upriver shipments of primary manufactured products were reported only twice, once in 2001 (450 tons) and once in 2008 (1,500 tons). On the contrary, downriver shipments were reported regularly throughout the 1991-1993 and 2000-2007 periods. These shipments occurred somewhat sporadically, however. No shipments were reported in 1994, 1995, from 1997 to 1999 and from 2008 to 2010. Downriver shipments of primary manufactured products reached their highest level in 1991 at 9,500 tons followed by two years of shipments averaging 850 tons. In 2000, the level of downriver shipments increased to 300 tons, yet downriver transport dropped significantly the following year and remained stable from 2001 to 2007 at an average volume of 70 tons annually.

Fig. 2.20 Annual Tonnage of Primary Manufactured Goods Barged Up and Down River in 1991-2010



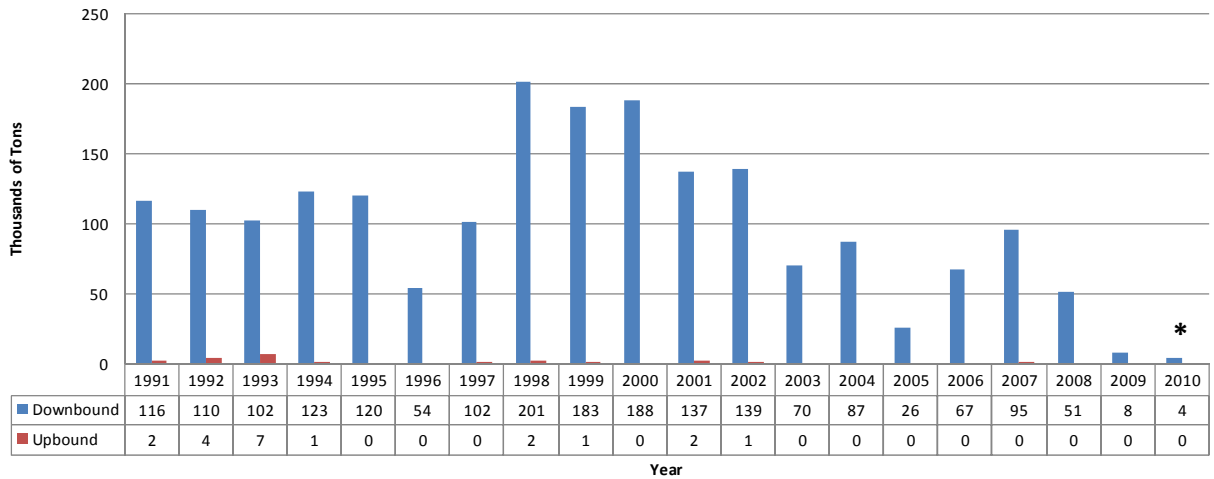
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Paper and Allied Products

Upriver shipment patterns of paper and allied products have been inconsistent and with interruptions (Figure 2.21). The highest tonnage of these products barged up river was in 1993 at a volume of about 7,000 tons, whereas the lowest tonnage was shipped in 1997 at a volume of only 100 tons. Shipments ranged from 750 tons to 7,000 tons during the 1991-1994 period and 100 tons to 2,000 tons during the 1997 to 2002 period. A single shipment of 100 tons of paper and allied products was made during the 2003-2010 period. No upriver shipments were made in 1995, 1996, 2000, 2003-2006 and 2008-2010.

Unlike the low volume of paper and allied products shipped upriver, the quantity of these products barged downriver rates seventh highest in downriver shipments at a total tonnage of about two million tons from 1991 to 2010 (Table 2.1). Downriver shipments have gradually increased and decreased over the twenty year period. Beginning in 1991, shipments averaging 115,000 tons moved downriver until 1995 then dropped briefly in 1996 and 1997 and peaked in 1998 at a quantity of 200,000 tons. Following 1998, downriver shipments of paper and allied products decreased steadily reaching a low of 8,000 tons in 2009.

Fig. 2.21 Annual Tonnage of Paper and Allied Products Barged Up and Down River in 1991-2010



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

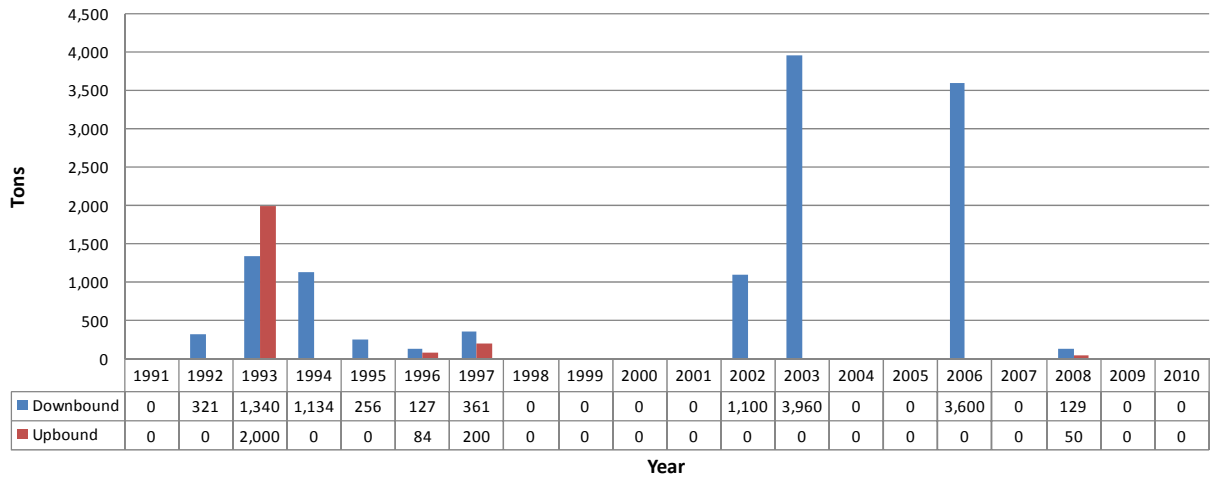
*Indicates that 2010 data consists of the months January through June

Building Cement and Concrete, Lime and Glass

One can observe quite an irregular pattern in the shipment of building cement, concrete, lime and glass (Figure 2.22). While both down and upriver shipment patterns are erratic, it is easy to observe that there is a substantially higher tonnage traveling downriver than upriver. No shipments in either direction were reported in 1991, 1998-2001, 2004-2005, 2007 or 2009-2010.

From 1992 to 1993 downriver shipments of building cement and other materials increased from 300 tons to 1,500 tons then decreased to a low of 125 tons in 1996. After a four year interruption of shipments, building cement, concrete, lime and glass were again barged down the river in 2002-2003 at a much higher level. The highest level of tonnage shipped in 1991-2010 was reported in 2003 at a volume of about 4,000 tons. Shipments downriver occurred again in 2006 at a tonnage of 3,500 tons and in 2008 at a tonnage of 150. Upriver shipments were reported only in 1993, 1996, 1997 and 2008 at amounts of 2,000, 100, 200 and 50 tons, respectively.

Fig. 2.22 Annual Tonnage of Building Cement and Concrete, Lime and Glass Barged Up and Down River in 1991-2010

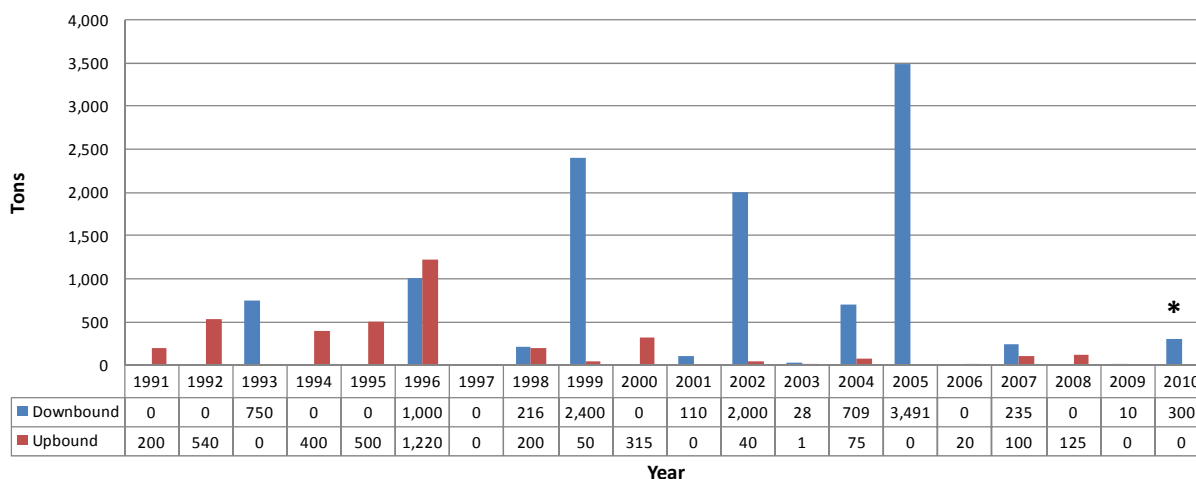


Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Primary Iron and Steel Products

The quantity of primary iron and steel products shipped downriver is three times the amount transported upriver, at respective total tonnages of 11,000 and 4,000 during the twenty year period (Table 2.1 and Table 2.2). From 1991 to 1996, upriver shipments increased from 200 tons to a high of 1,000 tons in 1996. Since 1998, upriver shipments of iron and steel products were quite low, ranging between one ton in 2003 to 300 tons in 2000 (Figure 2.23). Downriver shipments of these products were also erratic with the highest tonnages reported to have traveled in 1999 and 2005 at volumes of 2,500 and 3,500 tons, respectively. No shipments were reported in either direction in 1997.

Fig. 2.23 Annual Tonnage of Primary Iron and Steel Products Barged Up and Down River in 1991-2010



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

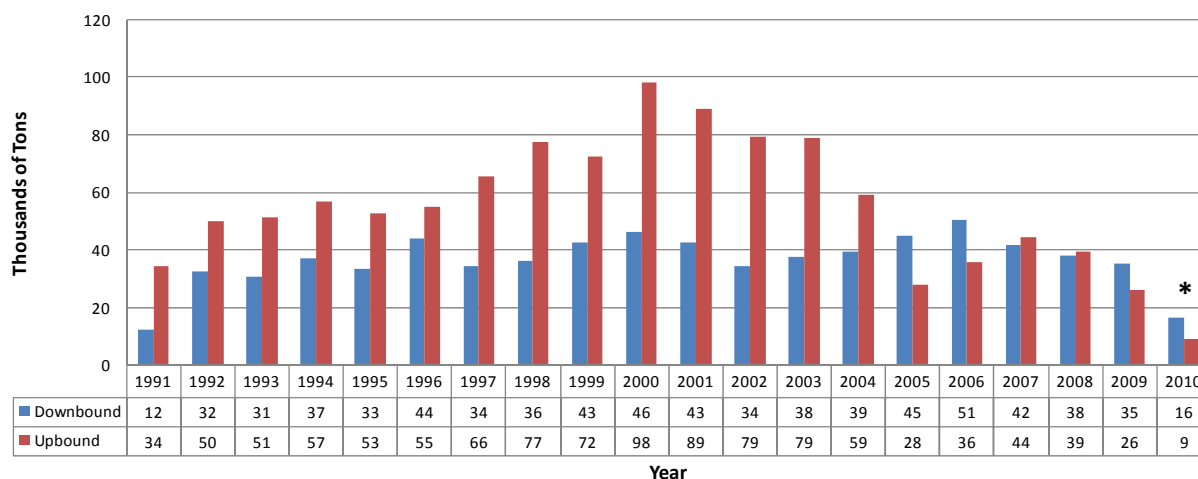
*Indicates that 2010 data consists of the months January through June

Primary Non-Ferrous Metallic Products and Fabricated Metal Products

Throughout 1991-2010, downriver shipments of primary non-ferrous metallic products moved in a wave like pattern, rising and falling three separate times, none of which were sharp movements. In fact, during the twenty year period, the annual downriver tonnage of non-ferrous and fabricated metallic products ranged between about 30,000 and 46,000 tons and reached a high of 51,000 tons in 2006 and a low of 12,000 tons in 1991 (Figure 2.24).

In regards to upriver shipments of these products, there was almost a linear increasing trend in the total tonnage shipped each year between 1991 and 2000. Beginning in 1991, shipment volume increased each year, aside from a 4,000 ton dip in 1995 and a 5,000 ton dip in 1999. Tonnage shipped upriver again increased in 2000 and was at its highest at a volume of about 100,000 tons. However, from 2000 to 2004, total annual tonnage of primary non-ferrous metallic and fabricated metal products shipped upriver followed a linear decreasing trend. In 2003 the annual tonnage estimate was about 80,000 tons, nearly the same as the 2002 shipments. From 2005 to 2010, upriver shipments rose and fell, but at a much smaller volume than in previous years, hitting a low of 9,000 tons in 2010 (January-June).

Fig. 2.24 Annual Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Up and Down River in 1991-2010



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

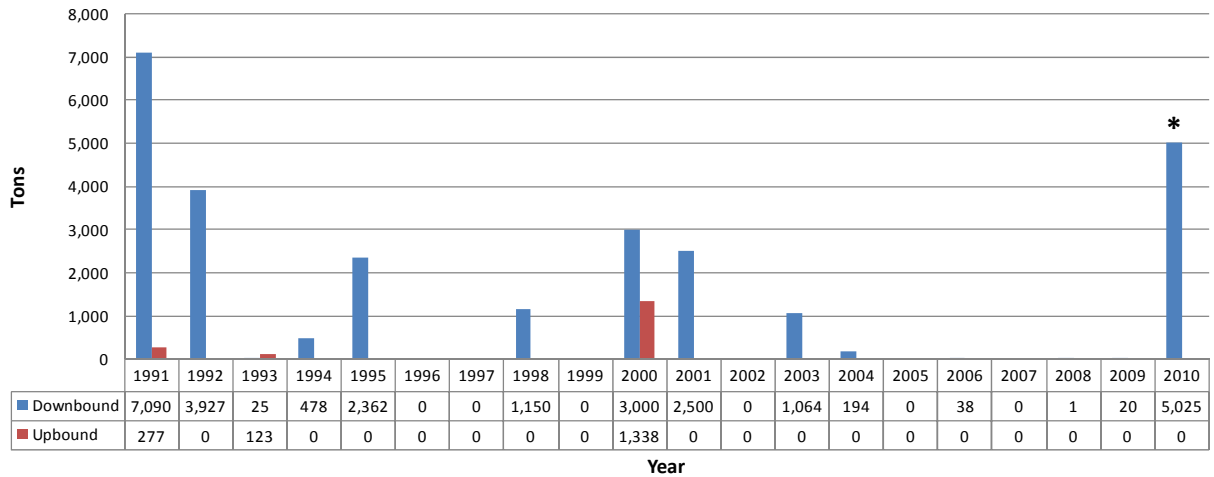
*Indicates that 2010 data consists of the months January through June

Primary Wood Products, Veneer and Plywood

During the 1991-2010 period about 27,000 tons of primary wood products, veneer and plywood traveled down the Columbia-Snake River System. Upriver shipments of these commodities were about 6 percent of downriver shipments. Three upriver shipments of 275, 125 and 1,500 tons were reported in 1991, 1993 and 2000 (Figure 2.25).

Downriver shipments of primary wood products were quite inconsistent with no shipments reported in 1996-1997, 1999, 2002, 2005 and 2007. In 1991, the data indicate the highest tonnage of primary wood products was transported downriver (7,000 tons). Comparable downriver shipments ranging between 2,500 and 5,000 tons were made in 1992, 1995, 2000, 2001 and 2010 (January-June). Low tonnage shipments of 1 ton and 20 tons were made in 2008 and 2009.

Fig. 2.25 Annual Tonnage of Primary Wood Products, Veneer and Plywood Barged Up and Down River in 1991-2010



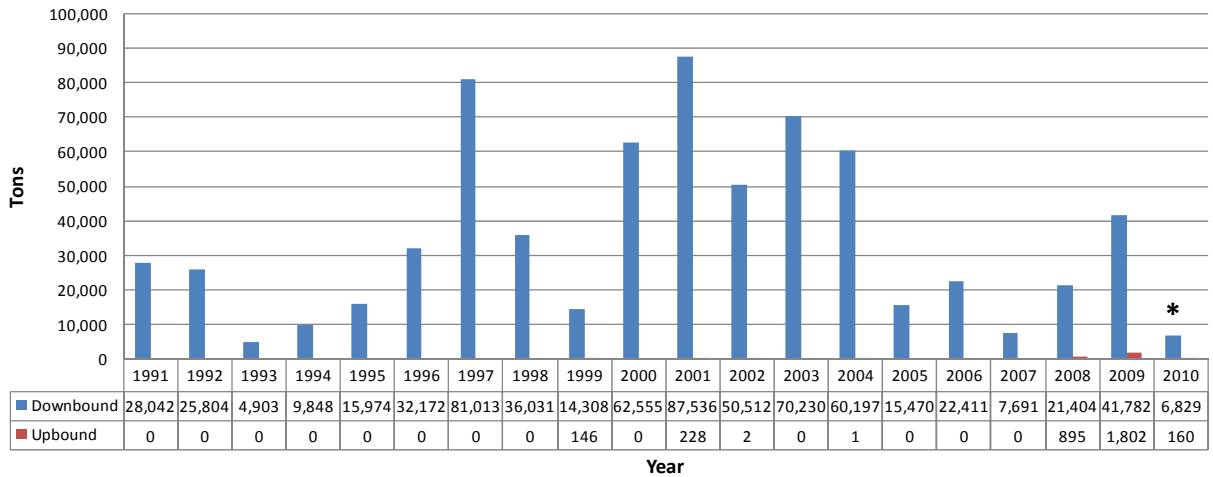
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

*Indicates that 2010 data consists of the months January through June

Food and Farm Products

While food and farm products rarely travel upriver – from 1999 to 2010, seven shipments were made ranging from 1 ton in 2004 to 2,000 tons in 2009 – they traveled downriver consistently each year (Figure 2.26). The pattern of these downriver shipments is irregular, however. Almost 700,000 tons of food and farm products traveled down the river during the twenty year period, with intermittent increases and decreases each year. The highest tonnages were shipped in 1997 and 2001, 80,000 and 88,000 tons, respectively. The lowest tonnage of food and farm products barged downriver was reported in 1993 at 5,000 tons.

Fig. 2.26 Annual Tonnage of Food and Farm Products Barged Up and Down River in 1991-2010

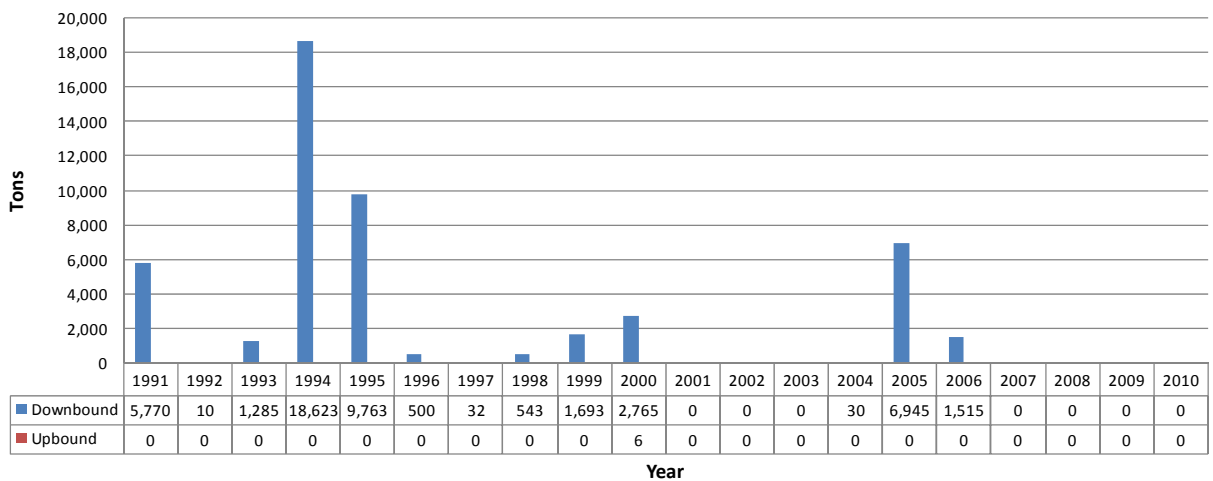


Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

Fresh Fish and Other Marine Products

Upriver shipments of fish and marine products were reported only in 2000 at a quantity of 6 tons. Downriver shipments were sporadic and inconsistent. The lowest tonnages barged downriver traveled in 1992 and 2004 at a rate of only 10 tons and 30 tons, respectively, whereas the highest tonnage of 19,000 tons was moved in 1994 (Figure 2.27). No shipments in the downriver direction were made from 2001-2003 and 2007-2010.

Fig. 2.27 Annual Tonnage of Fresh Fish and Other Marine Products Barged Up and Down River in 1991-2010



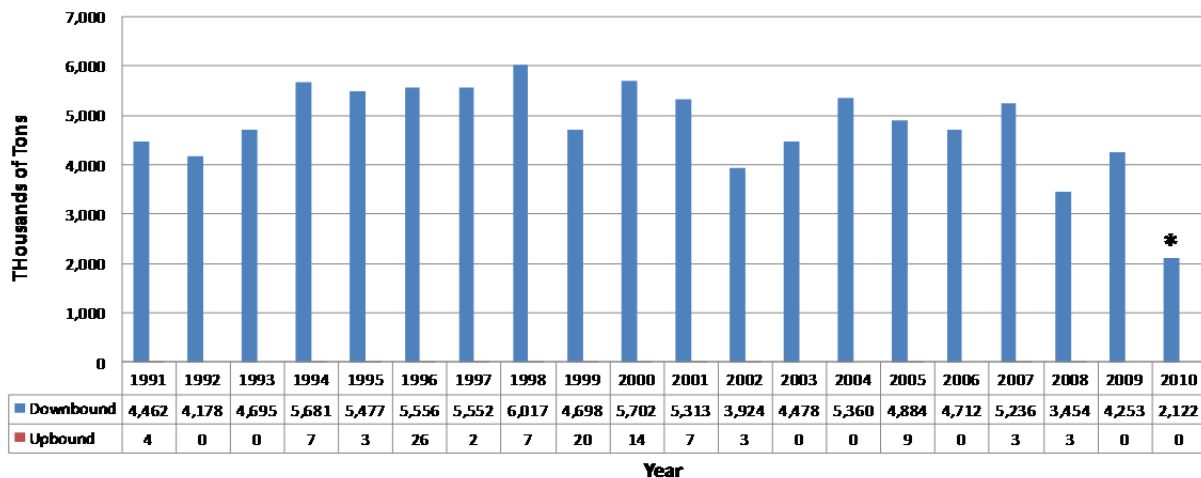
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Wheat

As mentioned at the beginning of this report, around 70 percent of the total tonnage of all commodities barged downriver is wheat. According to Table 2.1, total wheat shipments neared 96 million tons between 1991 and 2010. There was relatively higher tonnage traveling downriver early in the study period at a steady rate of 5.5 to 6 million tons each year between 1994 and 1998 (Figure 2.28). Prior to 1994, wheat shipments moving downriver averaged 4.5 million tons each. From 1999 to 2003, the annual tonnage of wheat transported downriver decreased somewhat, then rose to 5 million tons again from 2004 to 2007. The lowest annual estimate for the twenty year period was reported in 2008; only 3.5 million tons were shipped compared to the highest estimate of 6 million tons reported in 1998.

Upriver shipments of wheat are minor and are generally irregular. Table 2.2 shows that less than 106,000 tons were transported upriver between 1991 and 2010. No wheat was reported to travel upriver from Bonneville in 1992, 1993, 2003, 2004, 2006, 2009 and 2010 (January-June). Upriver shipments reached a high of 26,000 tons in 1996 and a low of 2,000 tons in 1997.

Fig. 2.28 Annual Tonnage of Wheat Barged Up and Down River in 1991-2010



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

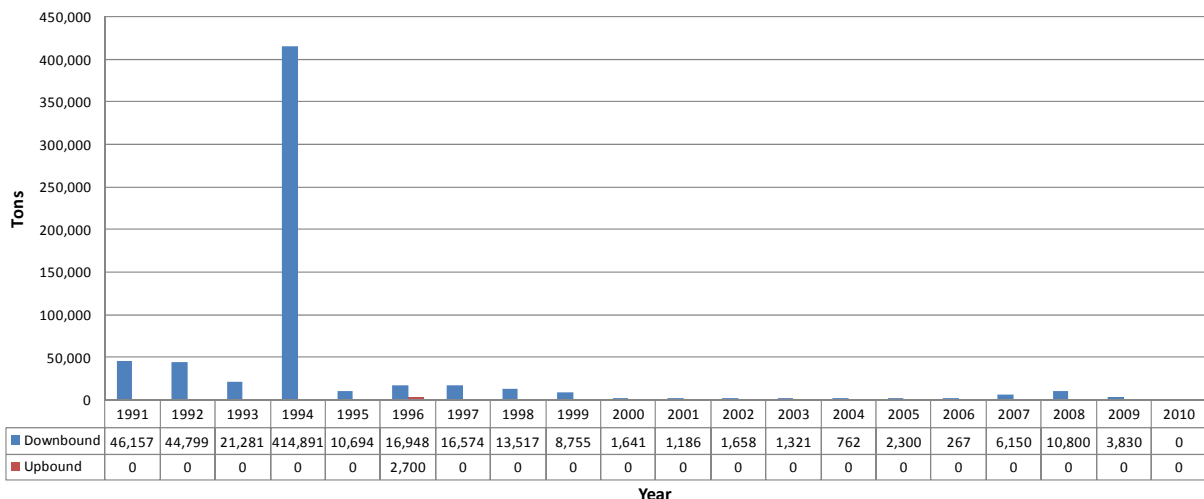
*Indicates that 2010 data consists of the months January through June

Corn

Corn travels almost exclusively downriver. The only upriver shipment reported between 1991 and 2010 occurred in 1996 at a volume of 3,000 tons (Figure 2.29). While there were no regular shipments of corn transported downriver during the 1991-2010 period, one can observe a decreasing trend occurring from 1991 to 2001 with the exception of the highest tonnage of corn, 415,000 tons, shipped in 1994. The lowest amount of annual tonnage, 300 tons, was

observed in 2006 (Figure 2.29). Downriver shipment of corn remained low after 1999 when tonnage dropped by 7,000 tons.

Fig. 2.29 Annual Tonnage of Corn Barged Up and Down River in 1991-2010



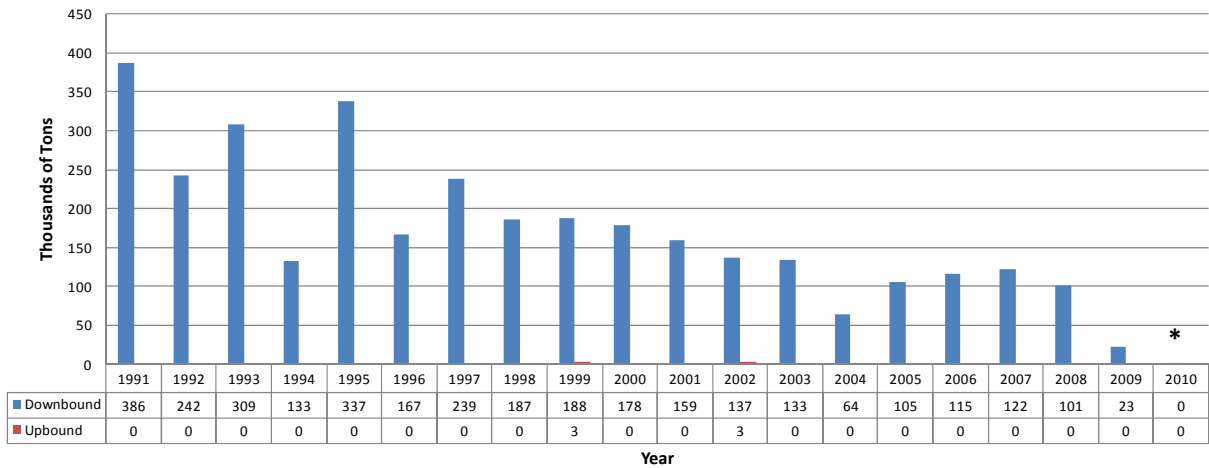
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Rye, Barley, Rice, Sorghum and Oats

Rye, barley, rice, sorghum and oats were the fourth highest tonnage commodity moved downriver during the study period. Between 1991 and 2010, the total tonnage of these commodities traveling downriver exceeded 3.3 million tons, whereas in comparison, their upriver shipments for the same period summed to only 6,300 tons. Yet, the downriver shipments of these grain products have followed a decreasing trend since their highest annual tonnage of about 385,000 tons reported in 1991. By 2009 downriver shipments decreased to 25,000 tons (Figure 2.30).

Upriver shipments were reported only in 1999 and 2002, averaging 3,000 tons each year.

Fig. 2.30 Annual Tonnage of Rye, Barley, Rice, Sorghum and Oats Barged Up and Down River in 1991-2010



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

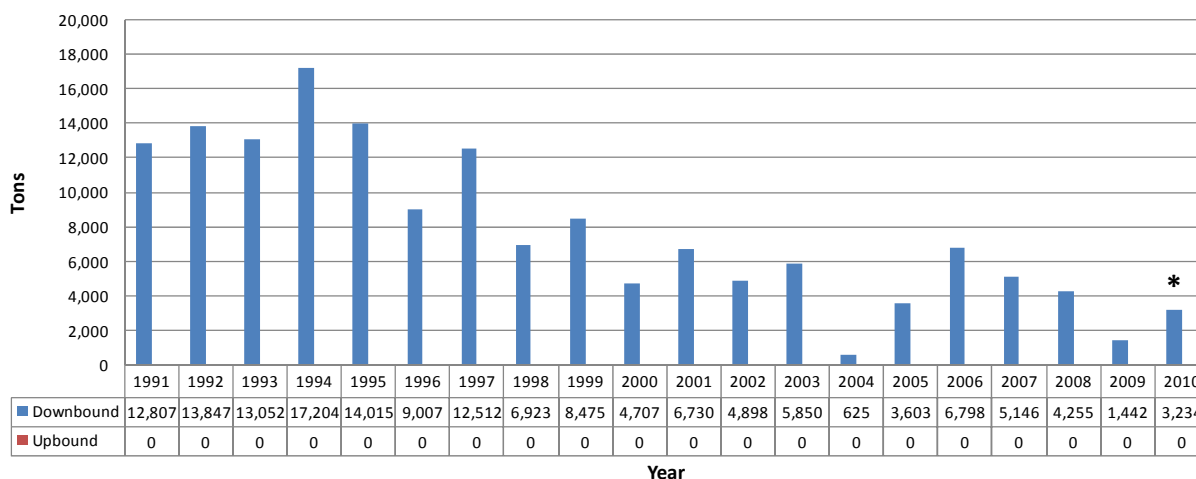
*Indicates that 2010 data consists of the months January through June

Oilseeds – Soybean, Flaxseed and Others

Similar to movement of corn, oilseeds – soybean, flaxseed and others travel predominantly downriver. In fact, no oilseed products were barged upriver through Bonneville Lock and Dam between 1991 and 2010 (Figure 2.31).

On the other hand, downriver shipments were reported regularly throughout the twenty year period. In general, downriver movements have decreased since 1994 when the highest annual tonnage of 17,000 tons was reported. By 2010 (January-June), the total annual tonnage barged downriver decreased to about 19 percent of 1994 levels (Figure 2.31).

**Fig. 2.31 Annual Tonnage of Oilseeds - Soybean, Flaxseed and Others
Barged Up and Down River in 1991-2010**



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

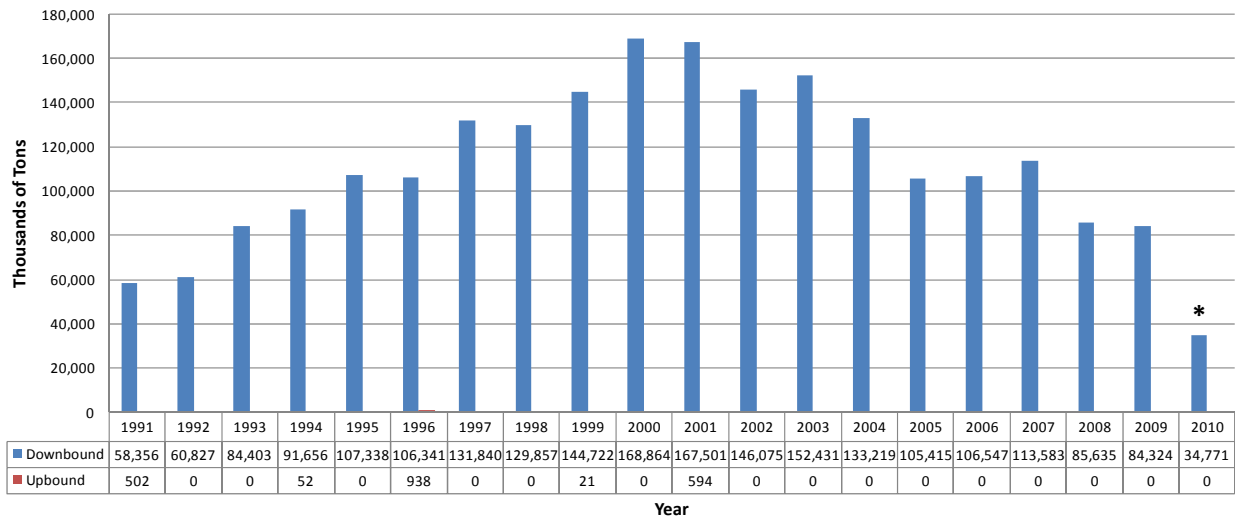
*Indicates that 2010 data consists of the months January through June

Vegetable Products

Vegetable products are the fifth highest tonnage commodity moved downriver, totaling 2.2 million tons shipped during the study period. These products also rarely travel upriver (Figure 2.32). During the twenty year period, the highest tonnage was barged upriver in 1996 at a quantity of 1,000 tons. Upriver shipments were also reported in 1991, 1994, 1999 and 2001 with a mere 20 tons shipped in 1999.

Downriver shipments steadily increased from 1991 to 2000. Tonnage shipped increased from 58,000 tons in 1991 to a high of 170,000 tons in 2000. After 2000, a decreasing trend is evident (Figure 2.32) and downriver shipments reach a low of 35,000 tons in 2010 (January-June). However, 2002 and 2005 tonnages are lower than 2003 and 2006, respectively, making the decreasing trend from 2000 to 2010 inconsistent.

Fig. 2.32 Annual Tonnage of Vegetable Products Barged Up and Down River in 1991-2010



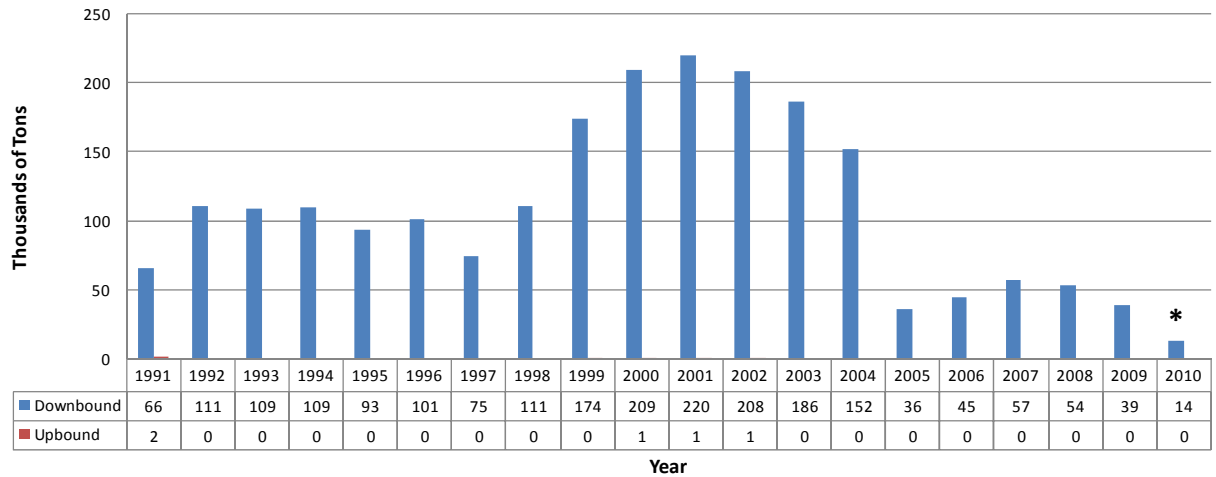
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

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

Over two million tons of animal feed, grain mill products, flour and other processed grains were barged down river between 1991 and 2010. During 1991 to 1998, the downriver shipments varied from around 65,000 to 110,000 tons (Figure 2.33). In 1999, shipments downriver increased to 175,000 tons and continued to climb until reaching a high of 220,000 tons in 2001. From 2001 to 2004, downriver shipments of animal feed, grain mill products, flour and other processed grains declined in a linear pattern. In 2005, downriver movements dropped dramatically to 36,000 tons and have averaged 45,000 tons each year until hitting a low in 2010 (January-June) of 14,000 tons.

Upriver shipments of animal feed products were reported only in 1991 and from 1999 to 2002. The highest level of tonnage was barged in 1991 at a volume of 1,500 tons and the lowest was barged in 1999 at a volume of 450 tons. In 2000, the annual tonnage barged upriver increased over twice as much as 1999 levels and remained rather consistent through 2002.

Fig. 2.33 Annual Tonnage of Animal Feed, Grain Mill Products, Flour and Other Processed Grains Barged Up and Down River in 1991-2010



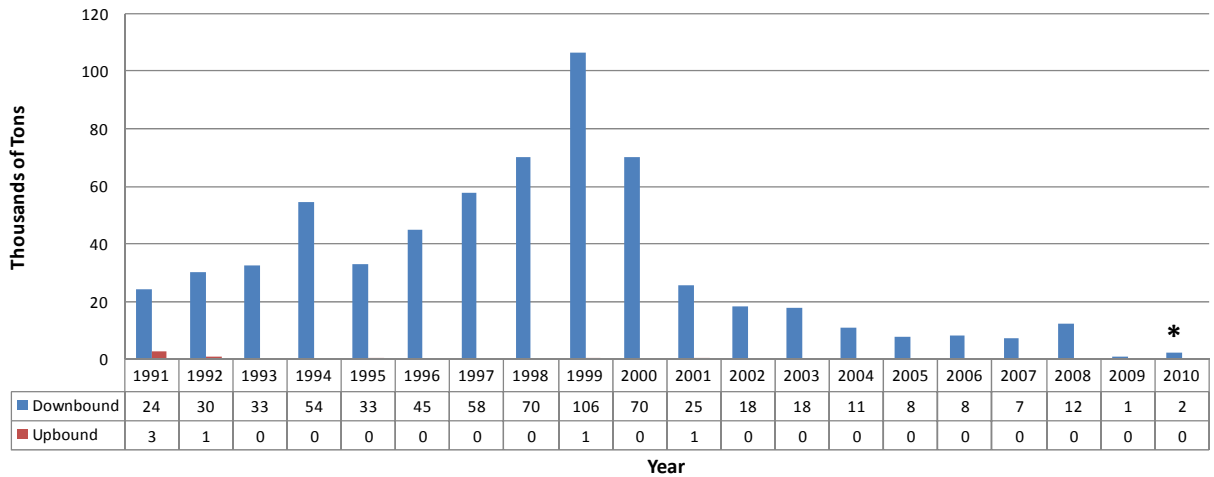
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

Other Agricultural Products (Including Food and Kindred Products)

Other agricultural products were also barged mostly downriver. From 1991 to 1999, the annual tonnage shipped downriver increased from 25,000 tons to 105,000 tons, with volumes increasing steadily each year with the exception of a spike in tonnage of 20,000 tons in 1994. In 2000, however, there was a significant decline in tonnage barged which set in motion a decreasing trend that remained consistent through 2010 (January-June), when the tonnage transported downriver dropped to only 2,500 tons.

Upriver shipments were sporadic and occurred in very low tonnage amounts. Throughout the twenty year period, other agricultural products were only shipped 1991, 1992, 1995, 1999 and 2001 at rates of 3,000, 1,000, 70, 600 and 500 tons, respectively (Figure 2.34).

Fig. 2.34 Annual Tonnage of Other Agricultural Products (Including Food and Kindred Products) Barged Up and Down River in 1991-2010



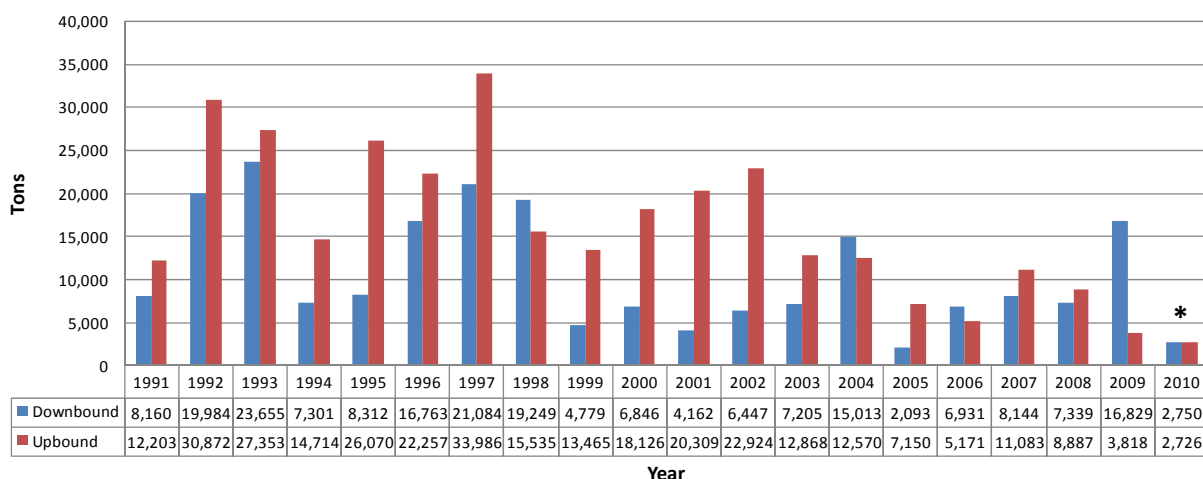
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

*Indicates that 2010 data consists of the months January through June

All Manufactured Equipment and Machinery

Quite interesting are the shipment patterns for all manufactured equipment and machinery products (Figure 2.35). As one can see, during the 1991-1993 the 1994-1997 periods, shipment tonnages in both directions increased. Downriver tonnage was the highest in 1993 at 25,000 tons and upriver barged tonnage was the highest in 1997 at 35,000 tons. From 1997, upriver shipments dropped to 13,000 tons in 1999, then steadily increased to 23,000 tons in 2002, and since then moved irregularly with shipments ranging from 3,000 tons to 13,000 tons. Since 1998, downriver shipments have also moved erratically ranging from a low of 2,000 tons to 17,000 tons.

Fig. 2.35 Annual Tonnage of All Manufactured Equipment and Machinery Barged Up and Down River in 1991-2010



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

*Indicates that 2010 data consists of the months January through June

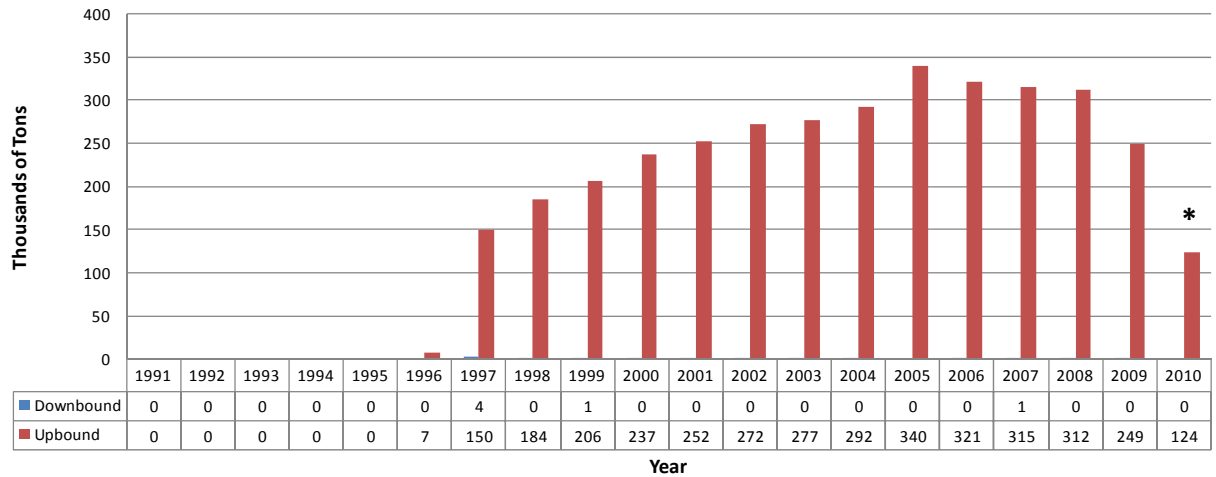
Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water

Waste materials, garbage, landfill, sewage sludge and waste water predominantly travel upriver. In fact, waste products are the third highest commodity tonnage moved upriver, totaling 3.5 million tons shipped during the study period. While shipment of these materials was negligible in 1996 (Figure 2.36), one can observe a clear and consistent increasing shipment pattern beginning in 1997. This increasing trend has been almost linear since 1997, and the highest estimate of tonnage shipped is reported for 2005 at 340,000 tons. Since 2005, upriver shipments of waste material, garbage, landfill, sewage sludge and waste water decreased to 125,000 tons in 2010 (January-June).

Downriver shipments of waste materials have been insignificant when compared to upriver movement. The highest downriver estimates were reported in 1997 and 1999 with a tonnage of 3,500 and 1,000, respectively. Low amounts of less than 100 tons were reported to travel downriver in 1998, 2000, 2001 and 2002.

Note: the barging of waste materials, garbage, landfill, sewage sludge and waste water did not begin until 1996 hence the lack of movement in both directions from 1991 to 1995. No downriver shipments were reported in 2005 or 2010.

Fig. 2.36 Annual Tonnage of Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water Barged Up and Down River in 1991-2010



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

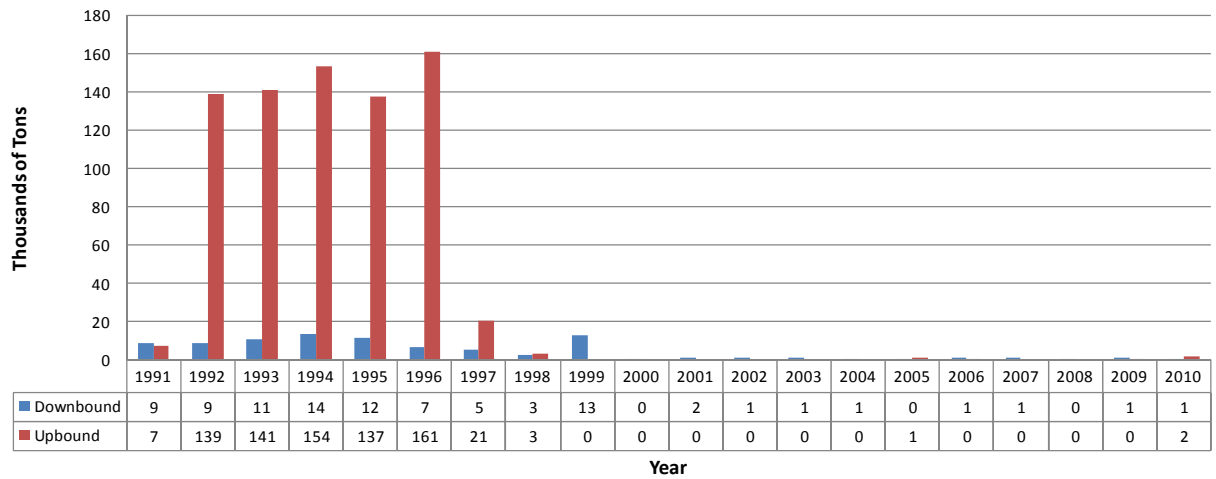
*Indicates that 2010 data consists of the months January through June

Commodities Unknown

Commodities labeled unknown were transported in an irregular pattern. Upriver shipments were extremely high during from 1992 to 1996 and reached a record high of 160,000 tons in 1996. One can notice a rapidly decreasing trend since 1996 in upriver shipments (Figure 2.38); upriver tonnage went from 160,000 tons in 1996 to 21,000 tons in 1997 and to 3,000 tons in 1998. No upriver shipments were reported for the 1999-2004 and 2007-2008 periods.

Downriver shipments, which have been made in much lower volume, followed a steadily declining pattern from 1994 to 1998. The total annual tonnage of unknown commodities barged downriver was estimated to be the highest during the twenty year period in 1994 with a value of 14,000 tons. In 2000 that downriver estimate dropped about 50 times to 250 tons, increasing insignificantly to an average of 1000 tons during the 2001-2004 period.

Fig. 2.37 Annual Tonnage of Commodities Unknown Barged Up and Down River in 1991-2010

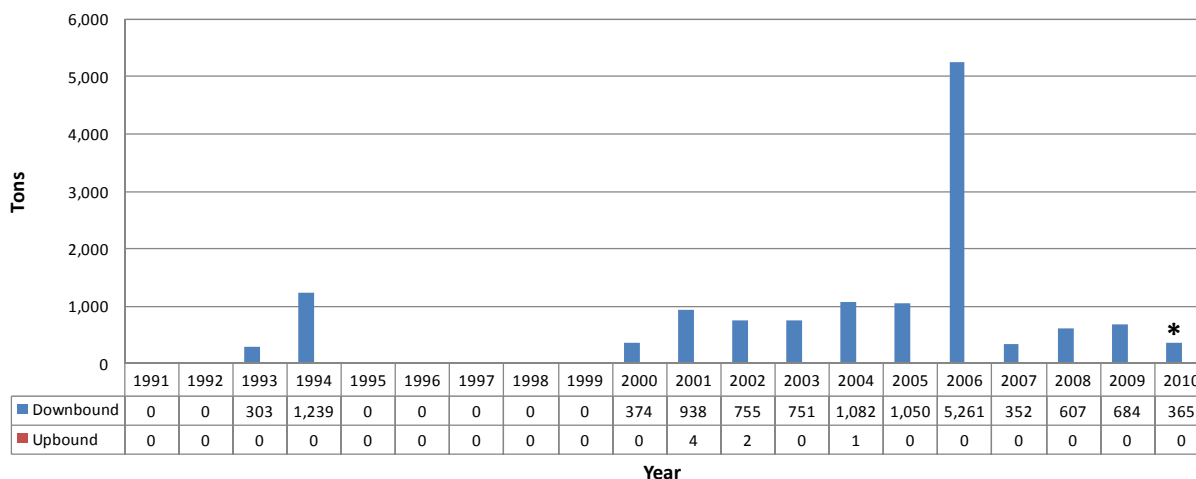


Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

Juvenile Salmonid

Between 1991 and 2010, juvenile salmonid (salmon and steelhead fin), one of the locally designated commodities discussed in the introduction, was not barged in either direction between 1991-1992 and 1995-1999 (Figure 2.38). Juvenile salmonid were also not shipped upriver from 2005 to 2010. Upriver shipments were negligible during the study period with a high of 4 tons in 2001 and a low of 1 ton in 2004. Total downriver tonnage during this study period was about 14,000 tons, whereas upriver shipment was around 7 tons. As one can notice, tonnage shipped downriver increased over the 1993-1994 and 2000-2001 periods but remained stable from 2002 to 2003 and 2004 to 2005. The highest shipment downriver occurred in 2006 at 5,000 tons and the lowest shipment downriver occurred in 1993 at 300 tons.

Fig. 2.38 Annual Tonnage of Juvenile Salmonid (Salmon and Steelhead Fin) Barged Up and Down River in 1991-2010



Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports
 *Indicates that 2010 data consists of the months January through June

2.2 Annual Wheat and Total Tonnages Moving Downriver

Since wheat makes up 70 percent of the total annual tonnage moving downriver, the authors decided to take a closer look at the annual trends for wheat and total tonnage moving downriver. When annual wheat and annual total tonnage shipments are isolated from other commodities, a clear trend is identifiable; annual wheat and total tonnages moving downriver have decreased over the last ten years of the twenty year period (Figures 2.1 and 2.28).

By taking a closer look at annual tonnages of wheat during the twenty year period (Table 2.3), the trend becomes more obvious. From 1991 to 1993 annual wheat tonnages ranged from 4.2 million to 4.7 million tons, averaging out to 4.45 million tons per year moving downriver. Then in 1994, wheat tonnages moving downriver jumped to 5.7 million tons, 1 million more than the previous year. Wheat shipments remained at this level through 1997 but jumped again to 6 million in 1998; this is the year in which annual wheat shipments reached their peak for the twenty year period (Table 2.3).

In 1999, annual wheat shipments declined to 4.7 million tons. This sharp decline in wheat tonnages was followed by a sharp increase to 5.7 million tons in 2000. Shipments of wheat remained high through 2001 but were followed by two years (2002 and 2003) of tonnages below 4.5 million. Tonnage levels for wheat returned to about 5.4 million in 2004 followed by two years (2005 and 2006) of annual tonnages of about 4.75 million (Table 2.3). Wheat shipments in 2007 reached 5.2 million tons, which was the last year in which shipments exceeded 5 million tons.

In 2008, annual shipments of wheat drastically decreased to 3.5 million tons, dropping by almost two million tons. This decline was the largest over the twenty year period. Wheat shipments then increased from 2008 to 2009 by about 800,000 tons. For the months January through June of 2010, wheat shipments reached over two million tons (Table 2.3). If this tonnage for the six month period mentioned (January – June 2010) were to be repeated for the months of July through December, total annual tonnage for 2010 would be 4,244,262 tons.

Total annual tonnages moving downriver follow the same pattern as annual wheat shipments.

The same story is told in Table 2.4 and Figure 2.39. The researchers have chosen to look at the averages for annual wheat shipments moving downriver in five year periods. Those periods include 1991-1995, 1996-2000, 2001-2005 and 2006-2010. An average for 2006-2009 is also included since 2010 only contains data from January to June. The average for annual wheat shipments from 1991 to 1995 is about 4.9 million tons (Table 2.4). Average annual tonnages for wheat moving downriver then increase to 5.5 million for 1996-2000. This time period includes the twenty year-high of six million tons in 1998. Averages then decrease to 4.8 million tons in 2001-2005 dropping below the average annual wheat tonnage for the 1991-1995 period. From 2006-2009, averages drop even further to 4.4 million tons. This quick rise and then fall is also captured in the averages for total tonnage shipped downriver for the four, five year periods.

Table 2.3 Annual Wheat and Total Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010										
Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Wheat	4,461,688	4,177,675	4,695,413	5,680,845	5,477,144	5,555,625	5,552,094	6,017,319	4,698,433	5,702,494
Total	7,021,050	6,444,707	7,233,188	8,302,379	7,749,124	7,324,887	7,866,260	8,369,857	7,180,553	8,221,105
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Wheat	5,312,597	3,923,953	4,478,235	5,359,988	4,884,451	4,712,151	5,236,245	3,453,526	4,253,201	2,122,131
Total	7,925,508	6,288,914	6,556,068	7,191,187	6,910,057	6,676,339	7,285,489	6,054,799	5,280,671	2,914,149

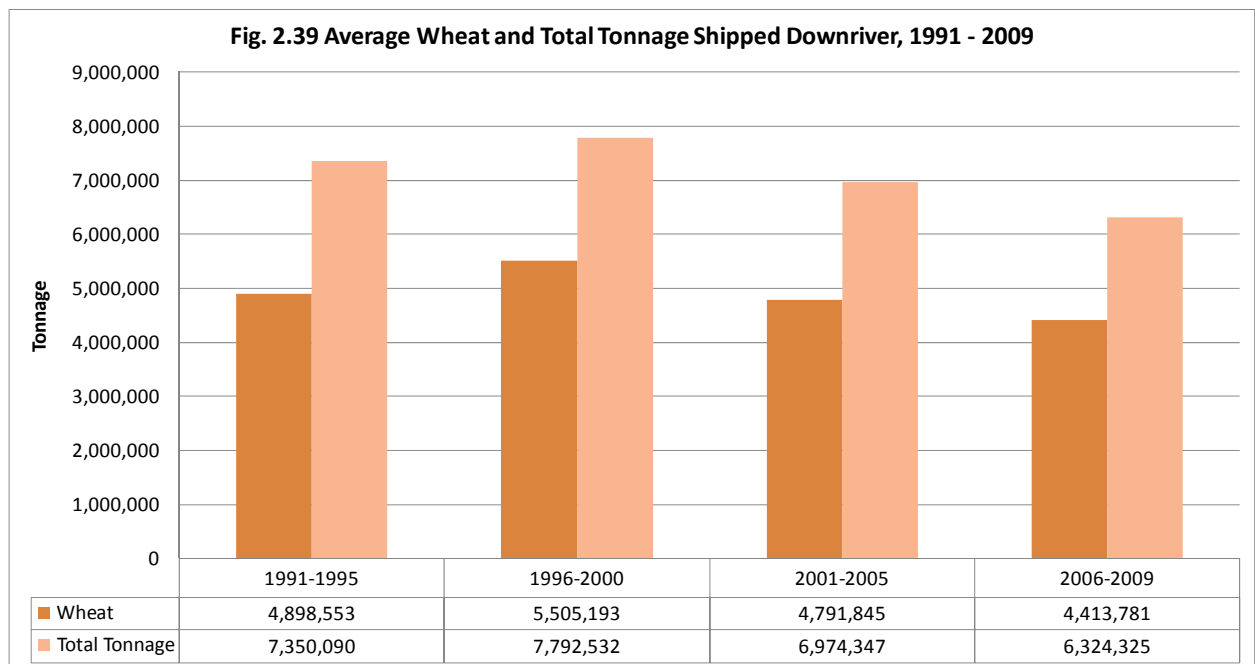
Source: U.S. Army Corps of Engineers Monthly Lock Tonnage Reports

Note: 2010 data consists of the months January through June.

Table 2.4 Average Annual Wheat and Total Tonnage Shipped Downriver on the Columbia-Snake River, 1991-2010					
Averages	1991-1995	1996-2000	2001-2005	2006-2009	2006-2010
Wheat	4,898,553	5,505,193	4,791,845	4,413,781	3,955,451
Total	7,350,090	7,792,532	6,974,347	6,324,325	5,642,289

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

Note: 2010 data consists of the months January through June.



3. Upriver and Downriver Movements of Major Commodities: Seasonal Effects

The shipment of some commodities (i.e. agricultural commodities) is determined by various seasonal effects or by local, regional and international demands (i.e. need for construction materials, fuel, gasoline, etc). Because of this, the following section aims to examine some of the seasonal trends in the shipment of the highest volume commodities.

Reports on these seasonal effects were constructed based on the upriver and downriver shipment trends of the highest volume commodities through the Bonneville Lock and Dam.

Total annual tonnage between 1991 and June 2010 was averaged monthly over the twenty year period to construct a standard year. 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 June 2010.

Major commodities moving downriver include:

- Wheat
- Forest products, lumber, logs and woodchips
- Sand, gravel and stone; limestone flux and calcareous stone; phosphate rock
- Rye, barley, rice, sorghum and oats combined with corn
- Vegetable products combine with other agricultural products and animal feed, grain mill products, flour and other processed grain
- Paper and allied products

Major commodities moving upriver include:

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

For each commodity, the monthly average was calculated for the 1991 through June 2010 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 twenty year period including any '0' values. Extreme values or outliers were replaced with monthly averages excluding the month in which the outlier occurred. A total of 12 observations (0.4 percent) have been replaced with their corresponding annual average values.

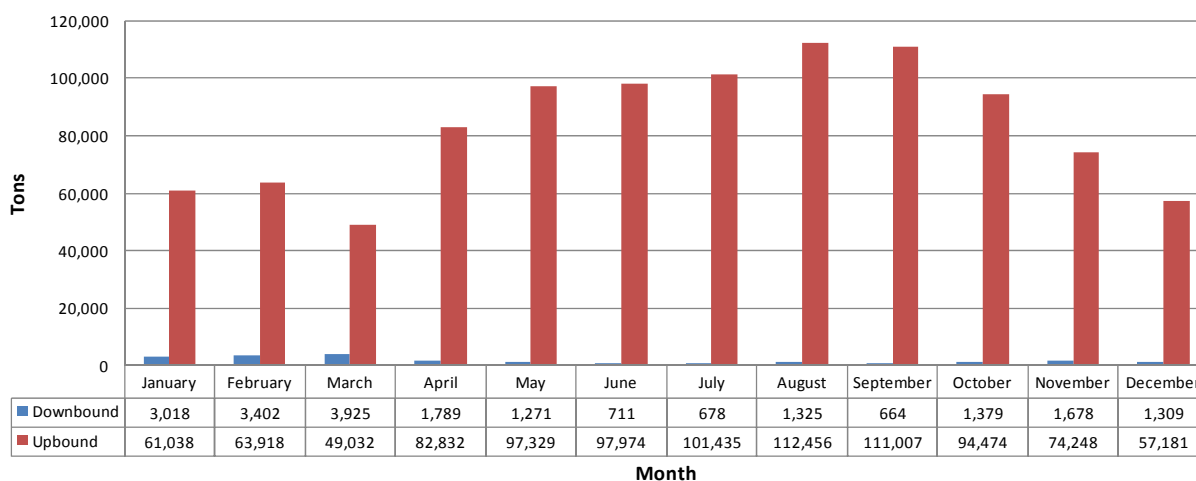
3.1. Major Commodities: Seasonal Effects

Gasoline, Jet Fuel and Kerosene

Upriver shipments of gasoline, jet fuel and kerosene products were relatively low from January to March (Figure 3.1) but began to increase in April during spring planting season when farmers need gasoline for their equipment and machinery. Shipments reached the highest upriver tonnage level during July, August and September, yet gradually decreased to a lower estimate of 57,000 tons in December when the fall harvest season ended. This trend has been consistent for over 20 years as indicated by previous analyses of Columbia-Snake River shipments (see EWITS Research Report #12, 1996).

Because gasoline, jet fuel and kerosene products were the highest volume commodity moving upriver over the twenty year period, downriver shipments of gasoline, jet fuel and kerosene products were two percent of upriver volumes. Downriver shipments also trended in the opposite direction than upriver movements. From January to July (with the exception of year-high shipments in February and March of 3,500 to 4,000 tons), one can notice a decrease in the overall level of tonnage shipped downriver. The year-low for downriver shipments occurred in September at 664 tons. Following September, shipments trended up for downriver tonnage reaching 2,000 tons in November.

Fig. 3.1 Average Monthly Tonnage of Gasoline, Jet Fuel and Kerosene Barged Up and Down River in 1991-2010



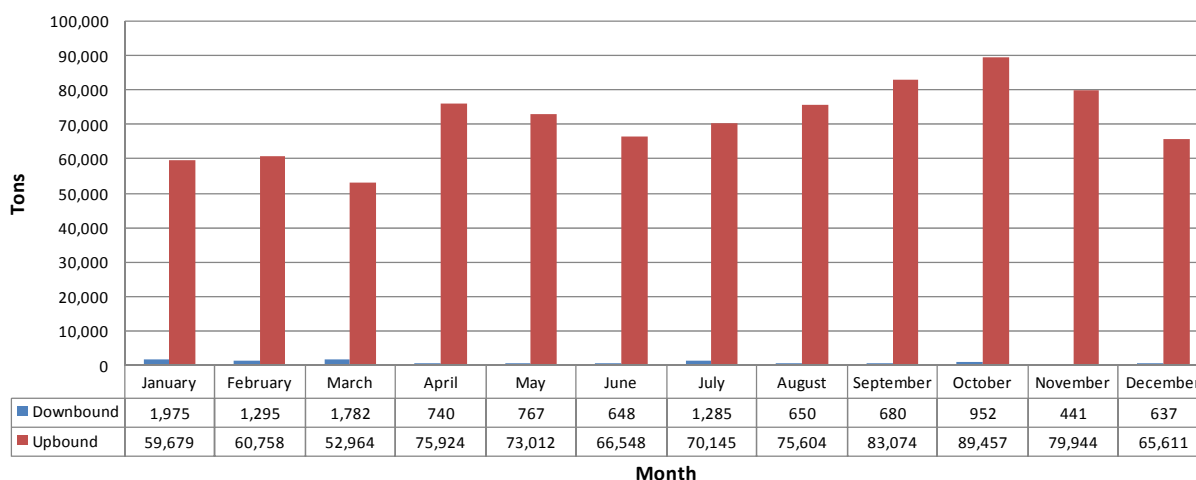
Distillate, Residual and Other Fuel Oils, Lubricating Oils and Grease

As one can see in Figure 3.2, the upriver shipments of distillate, residual and other fuel oils average 58,000 tons monthly from January to March with a year-low in March of 53,000 tons. In the following months, upriver shipments increased (with some minimal summer downshifts)

and reached the year's highest estimate of 89,500 tons in October. The upriver shipments again decreased in November and December and remained low through March.

Examining downriver shipments of distillate and other fuel oils, one can notice a stable pattern in the level of tonnage barged between January and March. In these three months, downriver shipment volumes averaged 1,700 tons including the year-high of 2,000 tons in January. Downriver tonnage decreased in April and low movements continued until a large increase in July. From August to December, shipments moving downriver averaged 670 tons, much lower in volume than the January-March period and the high in July.

Fig. 3.2 Average Monthly Tonnage of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases Barged Up and Down River in 1991-2010

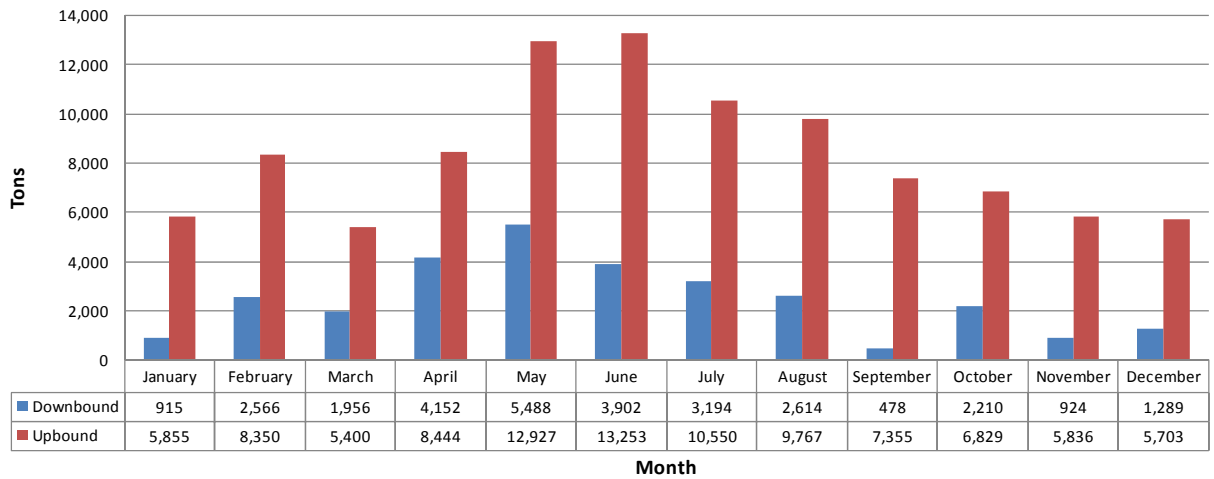


Fertilizer – Nitrogenous, Potassic, Phosphatic and Others

Because it is the fourth highest tonnage commodity shipped upriver during the twenty year period (Table 2.2), it should not be surprising that, on average, the monthly shipments of fertilizer products are at least three times higher upriver than downriver (Figure 3.3). Upriver shipments greatly increased during the April, May and June months (highs averaged 13,000 tons per month in May and June) due to the spring planting season and then declined in July. Shipment tonnages from July on declined from as high as 10,500 tons to as low as 5,800 tons in November, December, January and March.

Downriver shipments demonstrated three patterns (Figure 3.3): 1) between January and May there was a variable escalating pattern in the tonnage barged downriver; 2) from May through September, shipments started at their highest estimates of 5,500 tons in May and subsequently decreased; and 3) after a year-low in September of 500 tons, downriver shipments again jumped to a higher level of shipment in October and then continued to decrease through January.

Fig. 3.3 Average Monthly Tonnage of Fertilizer - Nitrogenous, Potassic, Phosphatic and Others Barged Up and Down River in 1991-2010

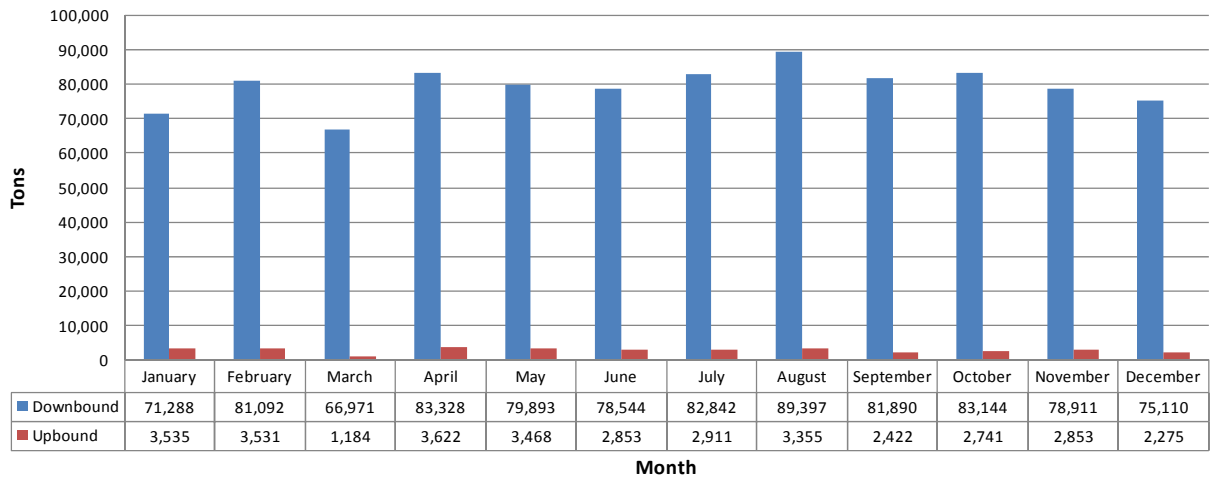


Forest Products, Lumber, Logs and Woodchips

Downriver transportation of forest products demonstrated a less varied shipment pattern than upriver shipment (Figure 3.4). It makes sense that monthly downriver shipments would remain at consistent levels during the twenty year study period as forest products were the second highest commodity shipped downriver (Table 2.1). Throughout the year, downriver shipments ranged from 67,000 to 89,000 tons. The lowest tonnages (between 67,000 and 71,000 tons) were shipped in January and March, rising slightly in February. In April, shipments downriver increased and maintained tonnages over 80,000 tons through September, peaking in August with a shipment volume of 89,000 tons.

Upriver shipments of forest products averaged a tonnage of 3,300 during the January-February and April-August months. Beginning in September, however, shipments upriver decreased and then consistently rose in tonnage until November. Figure 3.4 shows that shipments upriver were lowest in March at 1,200 tons followed by a year-high in April at 3,600 tons.

Fig. 3.4 Average Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up and Down River in 1991-2010

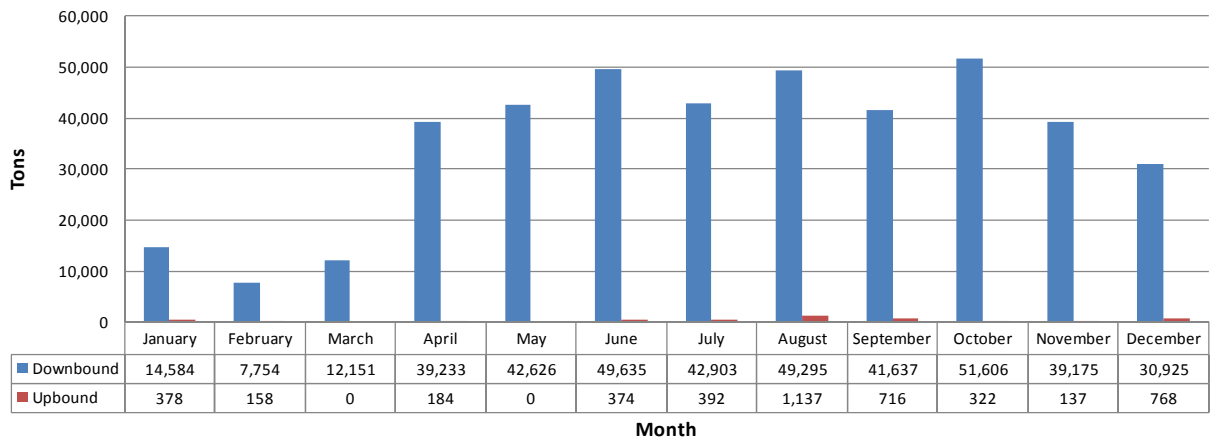


Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock

Figure 3.5 reflects that downriver tonnage of sand, gravel and other stone materials were relatively high between April and November. The highest shipments were reported in June and October at about 50,000 tons despite the fact that shipment levels were lower between these high shipping months. Downriver shipments of these materials declined steadily after the high in October through February when they reached a low of 7,800 tons. Between the months of January and March, downriver shipments of sand, gravel and other stone materials were relatively low with tonnages of 8,000 to 14,500.

Upriver shipments of sand, gravel and stone materials occurred with interruptions during the typical year. The highest volume shipments were barged during August, September and December, ranging from 700 to 1,100 tons. February, April and November had the lowest shipments of about 160 tons. No shipments of sand, gravel and stone occurred upriver in March and May.

Fig. 3.5 Average Monthly Tonnage of Sand, Gravel, Stone, Limestone Flux, Calcareous Stone and Phosphate Rock Barged Up and Down River in 1991-2010

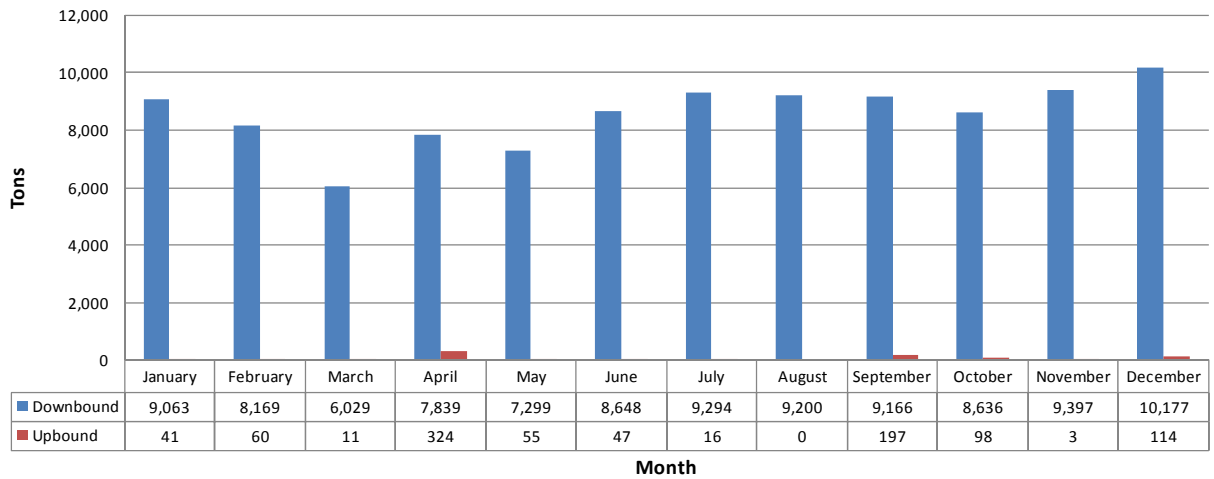


Paper and Allied Products

Figure 3.6 shows that there were also some seasonal trends in downriver shipment of paper and allied products even though these trends did not hold true for upriver transportation of the same commodities. Upriver shipments occurred in very low tonnages with interruptions during a typical year. The highest volume shipment was barged in April at a tonnage of 320 and the lowest was barged in November at a tonnage of less than 5. Other monthly tonnages ranged from 10 to almost 200 tons. Paper and allied products were not shipped in August.

Downriver shipments of paper and allied products were relatively stable during the year, ranging from 6,000 tons to 10,200 tons each month. Downriver tonnages reached year-highs in November and December of around 9,400-10,200 tons (Figure 3.6). Compared to December, the level of tonnage shipped between January and March was relatively low; one can notice a decreasing trend during these months as tonnages fell to 6,000 tons in March. After March, downriver shipments of paper and allied products experience a trend upwards from the year-low in March to a stable 9,200 tons during the months July-September with the exception of a slight drop from April to May.

Fig. 3.6 Average Monthly Tonnage of Paper and Allied Products Barged Up and Down River in 1991-2010

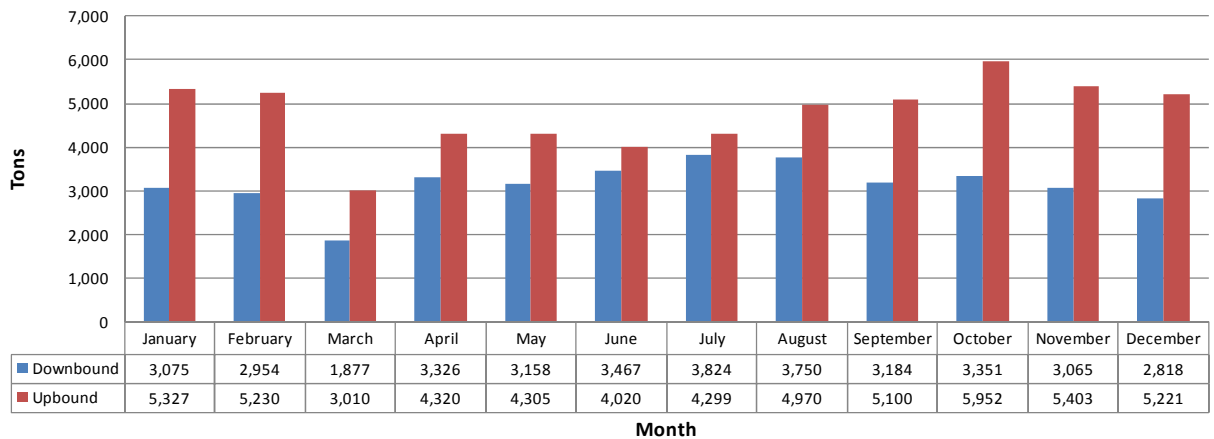


Primary Non-Ferrous Metallic Products and Fabricated Metal Products

Trends reflected in downriver and upriver shipments of primary non-ferrous metallic products were relatively similar. Downriver shipments were fairly stable throughout the average year ranging from a year-low in March of 1,900 tons to a year-high in July of 3,800 tons (Figure 3.7). Downriver shipments of these commodities increased during the March through July months, with the exception of a decrease from April to May, and decreased from July through December, with the exception of an increase from September to October.

Upriver shipments seemed to fluctuate more than downriver shipments of primary non-ferrous metallic products. From January to February, movements upriver remained stable at about 5,300 tons. Then in March, upriver shipments reached a year-low of 3,000 tons. The April-July period experienced steady upriver shipments of about 4,200 tons followed by an increasing trend from June to October where shipments upriver reached a year-high of 6,000 tons. After October, upriver shipments of primary non-ferrous metallic products decreased through the end of the year.

Fig. 3.7 Average Monthly Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Up and Down River in 1991-2010

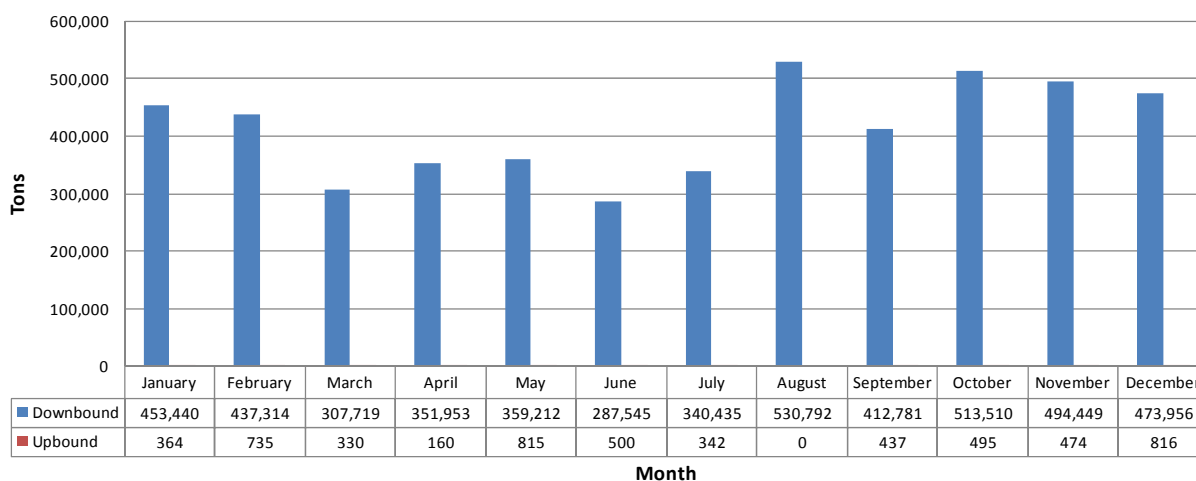


Wheat

Shipments of wheat comprised about 70 percent of total downriver shipments and less than one percent of total upriver transportation as figured during the twenty year study. On that note, one can observe a more identifiable pattern in downriver shipments than in those made upriver. Average monthly estimates for downriver travel were relatively low in the first half of the year from March to July, ranging between 290,000 and 350,000 tons (Figure 3.8). Following summer harvest, downriver shipments increased drastically in August to 531,000 tons and remained high until February, ranging from 440,000 to 515,000 tons with the exception of September when wheat shipments dropped to 410,000 tons.

Upriver shipments experienced several rises and falls although at a much lower scale. The lowest monthly estimate was reported in April at 160 tons, preceded by the next lowest estimate in March at 330 tons. Generally speaking, there was an increased level of tonnage shipped upriver during the fall months (September-December), corresponding with harvest months. These tonnages averaged between 440 and 820 tons. However, February, May and June experienced relatively high upriver shipments ranging from 500 to 820 tons (Figure 3.8). In August, no upriver shipments of wheat were made.

Fig. 3.8 Average Monthly Tonnage of Wheat Barged Up and Down River in 1991-2010



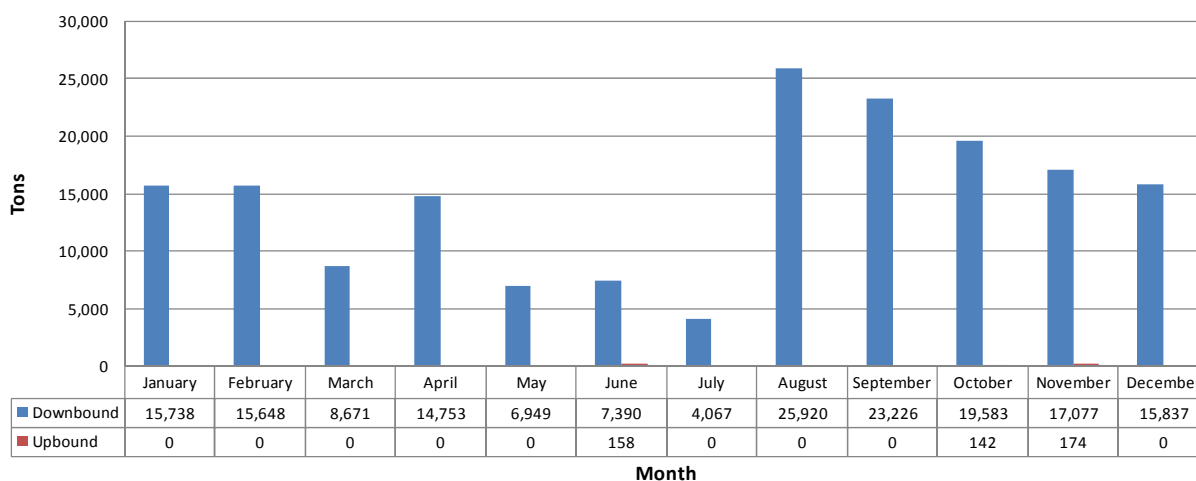
Corn, Rye, Barley, Rice, Sorghum and Oats

It is easy to identify a distinct seasonal pattern for corn and rye, barley, rice, sorghum and oats. As one can observe in Figure 3.9, downriver shipments of corn and grains decreased from January through July falling to a year-low of 4,000 tons in July. This trend is excluding the sharp increase in shipments from March to April and the slight increase from May to June in which shipments moving downriver reached tonnages of 15,000 and 7,400 tons, respectively. Shipments moving downriver increased drastically from a year-low in July to a year-high in August reaching 26,000 tons. Tonnages subsequently decreased through February to 15,600 tons.

In a typical year, corn and grains were only shipped upriver during the months of June, October and November at quantities of about 160 tons.

Note: the commodities corn and rye, barley, rice, sorghum and oats have been combined into one commodity for Figure 3.9.

Fig. 3.9 Average Monthly Tonnage of Corn, Rye, Barley, Rice, Sorghum and Oats Barged Up and Down River in 1991-2010



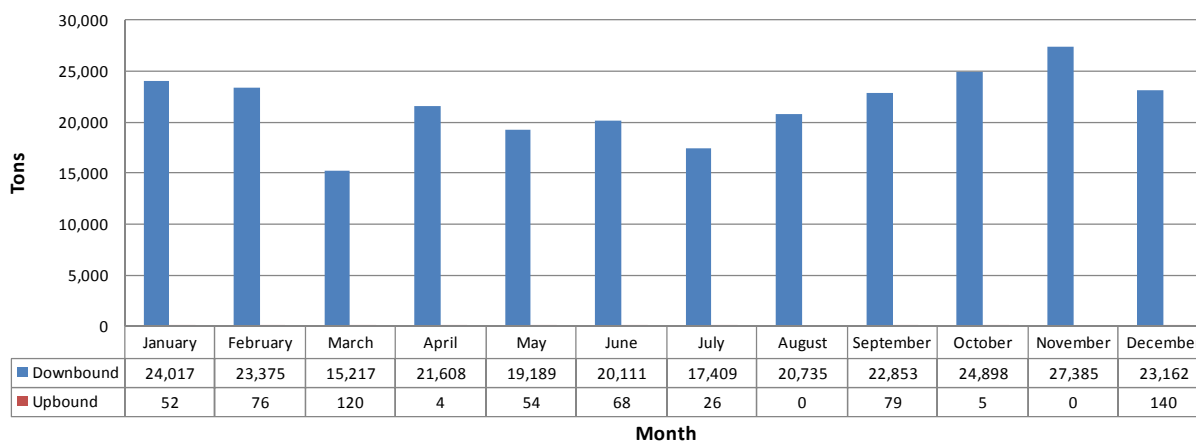
Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grains and Other Agricultural Products

Upriver shipments of vegetable products, animal feed and grain mill products and other agricultural products were insignificant and exhibit no particular pattern. In a typical year, barges carrying vegetables, grain mill products and other agricultural products did not travel upriver in August or November. Throughout the rest of the year, upriver shipments ranged from a year-low of 4 tons in April to a year-high of 140 tons in December (Figure 3.10). The year-low was preceded by a high of 120 tons and the year-high was preceded by a no shipment month, hence showing the random nature of upriver shipments of these products.

Downriver shipments of vegetable products, grain mill products and other agricultural products were much more consistent and were lowest in late spring and early summer with an average of 20,000 tons; in March, these shipments were the year's lowest at 15,000 tons. Shipment tonnages increased steadily from July through November, when the monthly estimate hit 27,000 tons, the highest during the year (Figure 3.10). In fact, there was almost a linear increase in downriver tonnage shipped between July and November. Tonnage traveling downriver dropped to around 23,000 tons in December and decreased from 24,000 tons in January through March.

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 3.10.

Fig. 3.10 Average Monthly Tonnage of Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processing Grains and Other Agricultural Products Barged Up and Down River in 1991-2010

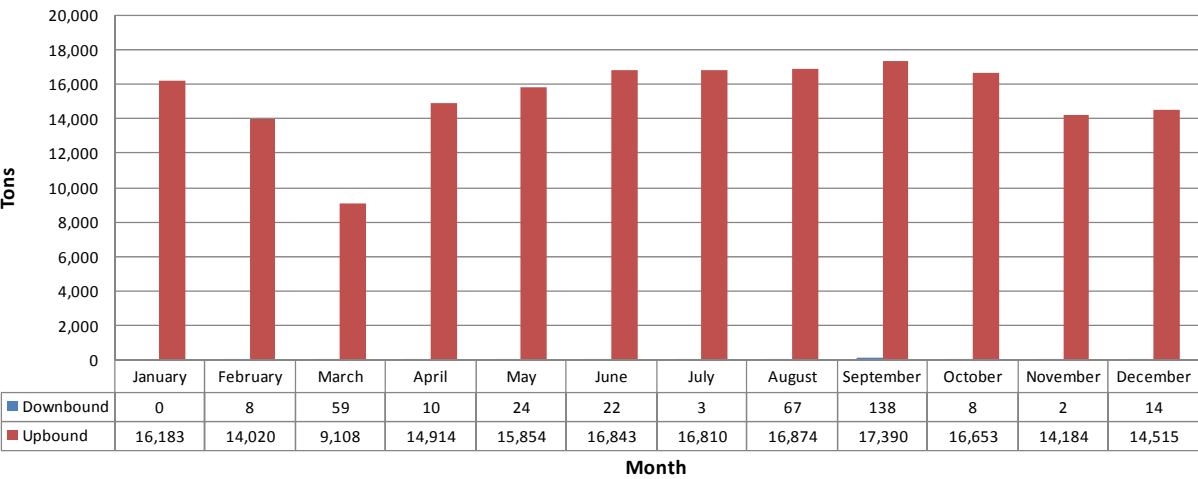


Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water

Waste material, garbage, landfill and sewage were transported upriver more often than downriver (Figure 3.11). Upriver shipments of these commodities were the lowest in March, with shipments of around 9,100 tons. From April to June, however, one can notice a nearly linear increase in the tonnage barged upriver as the shipments increased from around 15,000 to 17,000 tons. This rising trend continues, although not linearly, through September when upriver tonnage reaches a year-high of 17,500 tons. Following the September high, upriver shipments decreased slowly through November's shipments of 14,000 tons and then increase through January.

Compared to upriver movements, downriver shipments were made in small, insignificant quantities from February to December, ranging from 2 tons in November to 140 tons in September. No downriver shipments were made in January.

Fig. 3.11 Average Monthly Tonnage of Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water Barged Up and Down River in 1991-2010



4. Upriver and Downriver Movements of Major Commodities: 2008-2010

In order to closely study the major commodity movements leading up to the extended lock outage, the researchers have decided to focus on the data for years 2008 through June of 2010. Along with a table comparison of monthly shipments, total tonnage between 2008 and June 2010 has been averaged monthly over the two and a half year period to construct a standard year. By using the 2008-2010 period to form an average year, readers, shippers and policy makers can develop a good understanding of what is currently moving up and down the Columbia-Snake River System prior to the extended lock outage and possibly hypothesize how particular commodities will be affected during the lock outage.

Reports on this specific time period have been constructed based on the upriver and downriver shipment trends of the highest volume commodities through the Bonneville Lock and Dam.

To capture general trends in major commodity movements upriver and downriver, in the following chapter, comparative analyses are provided for each major commodity. 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 2008 and June 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 2008-2010 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 two and a half year period including any '0' values.

4.1. Major Commodities: 2008-2010

Downriver Movements:

Wheat

Monthly downriver movements of wheat from 2008 to June 2010 were highest between the months of August and February, reaching volumes of over half a million tons in February 2010 (Table 4.1). This period of high tonnage movement is typically followed by some of the lowest downriver movement months during an average year, namely March through July. January 2008 exhibited the second largest volume of wheat shipped downriver during the time period at 475,000 tons. As observed in Table 4.1, the lowest shipment occurred in June 2008 at a tonnage of 125,000.

Shipments of wheat comprised about 70 percent of total downriver shipments during the twenty year study and continue this trend in the 2008-2010 period (Table 2.1). On that note, one can observe an identifiable pattern in downriver shipments. Average monthly estimates for downriver travel suggest that wheat shipments were relatively low during the spring and early summer months, possibly due to the spring planting season (Figure 4.1). Spring and early summer months also exhibit a decreasing trend in downriver shipments from a high in February of 403,000 tons to a low in July of 257,000 tons. This decreasing trend includes a large drop from February to a year-low of 254,000 tons in March. Following the decreasing trend through spring planting and early summer is the year-high in August of 427,000 tons. After the year-high during summer harvest, downriver shipments decreased drastically (by about 35 percent) in September and October, then rose to 380,000 tons in November. Wheat shipments moving downriver remained high through February (Figure 4.1).

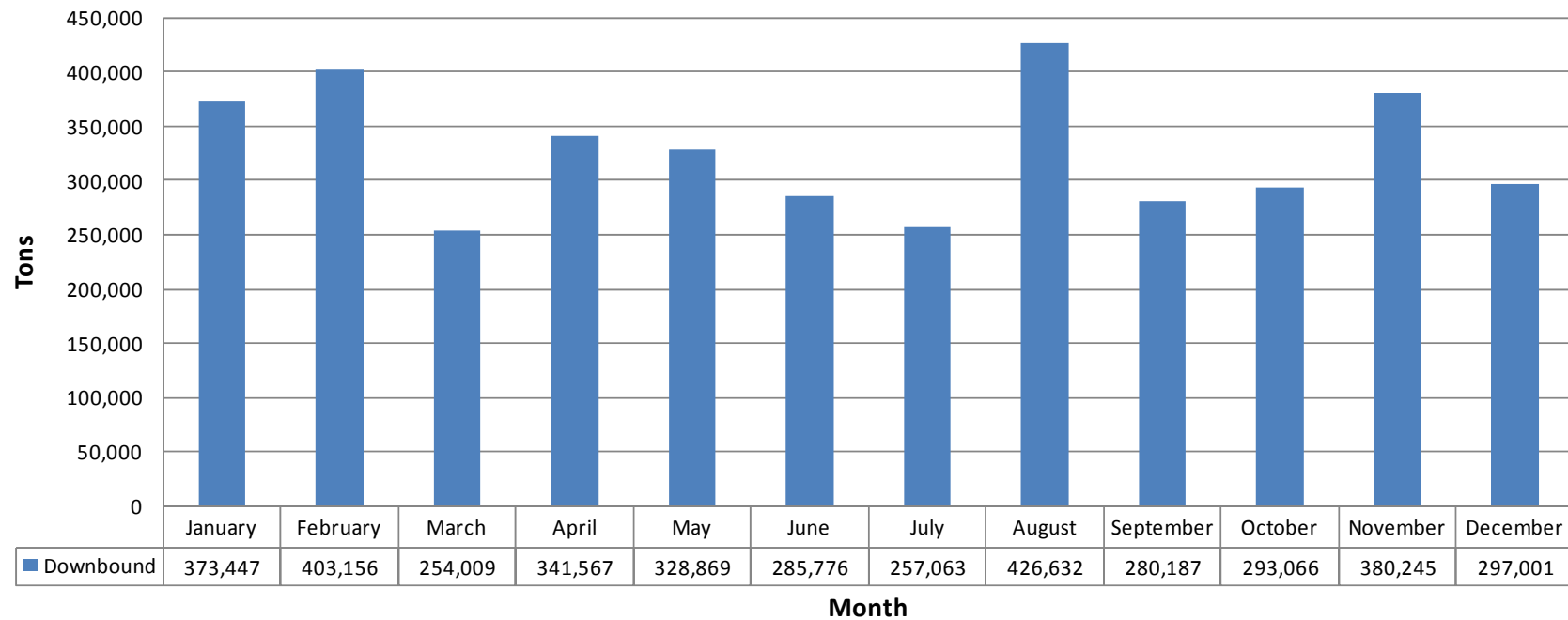
During the four months of the extended lock outage, scheduled for December through March, wheat shipments downriver were quite significant. The second highest shipment for the average year historically occurs in February with a tonnage of 403,000 (Figure 4.1). December and January are also months of high tonnage in which anywhere from 297,000 to 373,000 tons of wheat are moved downriver. March is the month in which the year-low historically occurs with a tonnage of 254,000.

Table 4.1 Downbound Movements of Wheat, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	473,178	314,477	257,914	334,597	238,705	122,982	229,385	465,732	242,657	202,378	315,365	256,156
2009	317,529	370,303	283,614	323,004	409,593	392,445	284,741	387,531	317,717	383,753	445,125	337,846
2010	329,634	524,689	220,500	367,100	338,308	341,900	*	*	*	*	*	*
Average	373,447	403,156	254,009	341,567	328,869	285,776	257,063	426,632	280,187	293,066	380,245	297,001

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

* Indicates No Information

Fig. 4.1 Average Monthly Tonnage of Wheat Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

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

Sand, gravel and stone products did not move downriver from November 2008 through June 2009 with the exception of a small shipment of 25 tons in January 2009 (Table 4.2). Downriver shipments picked back up in July and August 2009 with steady shipments of 8,100 tons. Then in October 2009, after a month of no shipments, downriver shipments of sand, gravel and stone products reached 26,000 tons and 66,000 tons in November. High shipments between 28,000 and 82,000 continued through June 2010 with the exception of no movement in January 2010. It should be noted that an extremely high shipment of one million tons of sand, gravel and stone products was moved in June 2008, just six months before the extreme low of 25 tons (Table 4.2).

Figure 4.2 reflects that downriver tonnage of sand, gravel and other stone materials were relatively high between April and October. The highest shipments were reported in June and October with an average tonnage of 361,000 and 64,000 tons, respectively, despite the fact that shipment levels decreased between these high shipping months. Downriver shipments of these materials declined steadily after October on into January. Tonnages for downriver shipment of sand, gravel and stone products during this time period ranged from 215 to 33,000 tons. As seen in Figure 4.2, downriver shipments reached a year-low of 215 tons in January followed by an increase to a low tonnage of 5,100 tons in February.

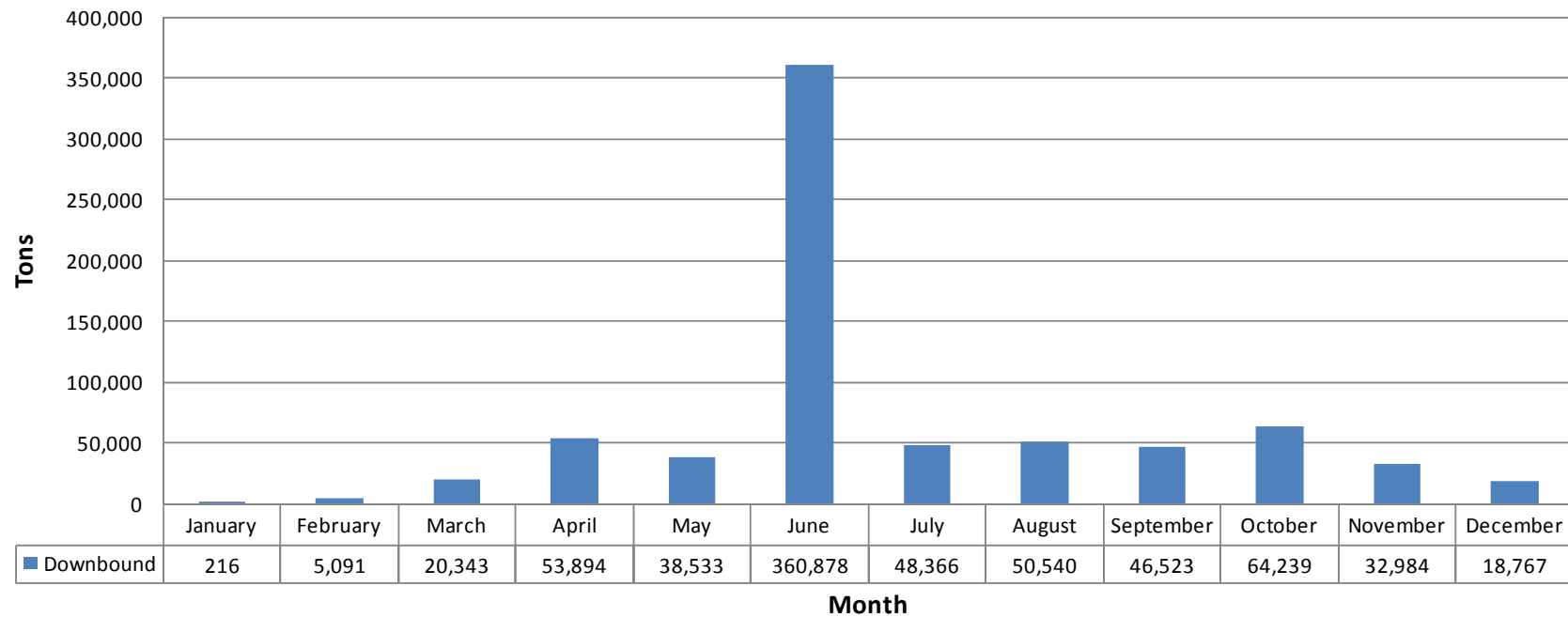
During the four months of the extended lock outage, sand, gravel and stone shipments downriver were insignificant as mentioned above and as compared to other major commodities. During this period, sand, gravel and stone products are not moved in great quantities. In fact, after November, downriver shipments decrease to an average of 215 tons in January (Figure 4.2). After January, small shipments of sand, gravel and stone products are moved downriver during February and March with historical tonnages of 5,100 and 20,000 tons, respectively.

	January	February	March	April	May	June	July	August	September	October	November	December
2008	621	7,274	22,714	93,079	87,171	1,000,655	88,632	92,909	93,045	102,062	0	0
2009	26	0	0	0	0	0	8,100	8,170	0	26,415	65,967	37,533
2010	0	8,000	38,315	68,604	28,427	81,978	*	*	*	*	*	*
Average	216	5,091	20,343	53,894	38,533	360,878	48,366	50,540	46,523	64,239	32,984	18,767

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

* Indicates No Information

Fig. 4.2 Average Monthly Tonnage of Sand, Gravel, Stone; Limestone Flux and Calcareous Stone; Phosphate Rock Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series

Forest Products, Lumber, Logs and Woodchips

Monthly downriver movements of forest products between 2008 and June 2010 were lowest between August 2008 and June 2009, but volumes have greatly increased since then (Table 4.3). June 2010 exhibited the largest volume of forest products shipped downriver during the time period at 75,000 tons. The lowest shipment occurred in April 2009 at a tonnage of 19,000.

In an average year, downriver transportation of forest products demonstrated a varied shipment pattern complete with four waves (Figure 4.3); every other month, shipments rise from the previous month creating an oscillating pattern. Forest products were the second highest commodity shipped downriver from 1991-2010 (Table 2.1) and seem to exhibit the same high volumes per monthly shipment from 2008 to 2010. The first wave, or rise and fall, in downriver shipments occurred during the first three months of the year. January downriver shipments started at 41,000 tons, rose to 52,000 tons in February and dropped to a low 36,000 tons in March. The second smaller wave began with the low in March, barely rose to 42,000 in April and dropped slightly to 39,000 in May. From May to July, shipments rose to 49,000 tons in June and fell to a low of 34,000 tons in July. The final wave lasted from July to December, continually rising (with a small drop in September) to a year-high in October of 52,000 tons. Shipments downriver steadily declined from October through December, in which the year-low of 33,000 tons occurred (Figure 4.3).

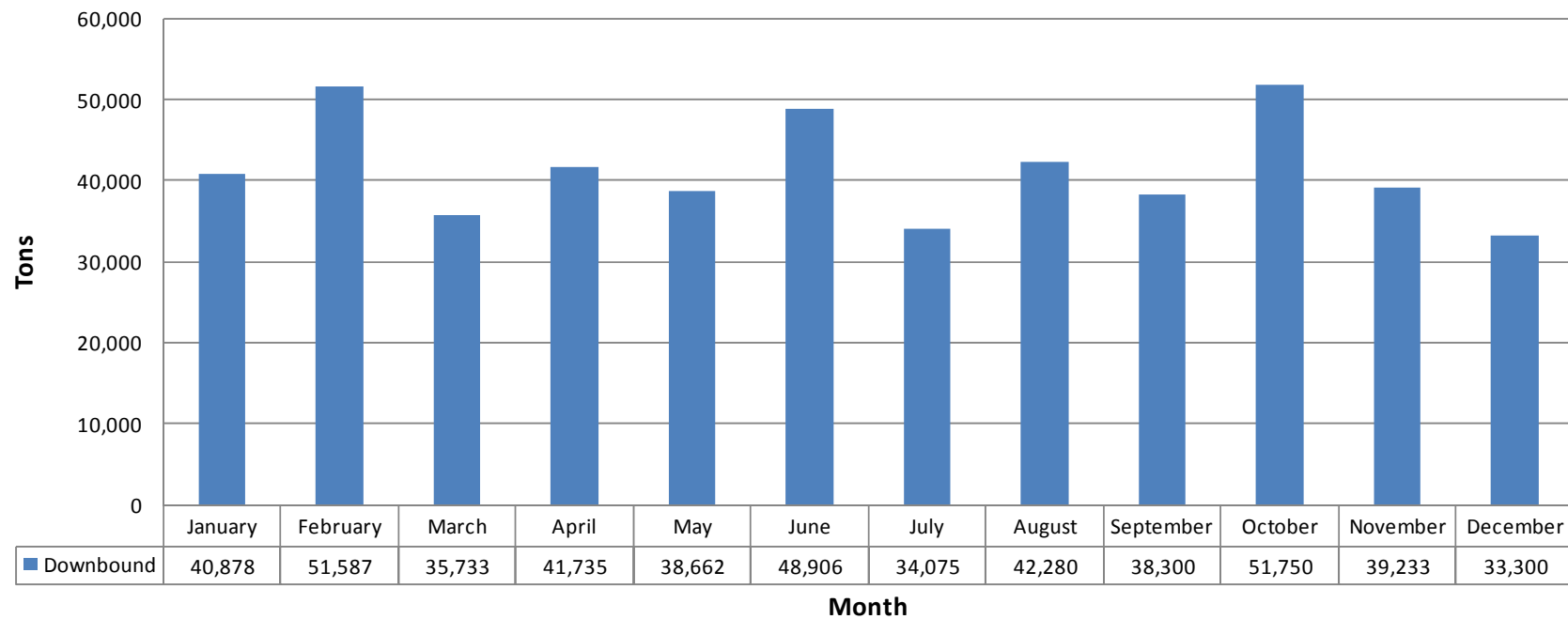
During the four months of the extended lock outage, forest product shipments downriver were significant. The second highest shipment for the average year historically occurs in February with a tonnage of 52,000 (Figure 4.3). January is also a month of high tonnage in which 41,000 tons of forest products are typically moved downriver. December and March are months of very low tonnage; historically, December is a month in which the year-low historically occurs with a tonnage of 33,000 and March is a month in which the third lowest volumes of forest products are moved downriver

Table 4.3 Downbound Movements of Forest Products, Lumber, Logs and Woodchips Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	49,980	43,000	32,100	30,820	43,912	45,901	36,200	36,200	21,800	35,800	33,500	30,900
2009	26,105	42,700	24,400	19,200	22,100	25,471	31,950	48,360	54,800	67,700	44,965	35,700
2010	46,550	69,060	50,699	75,184	49,975	75,347	*	*	*	*	*	*
Average	40,878	51,587	35,733	41,735	38,662	48,906	34,075	42,280	38,300	51,750	39,233	33,300

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

* Indicates No Information

Fig. 4.3 Average Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

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

Monthly downriver movements of vegetable products, animal feed and grain mill products and other agricultural products between 2008 and June 2010 were lowest between October 2008 and December 2008, May 2009 and August 2009 and May and June 2010. In general, volumes have increased since these low tonnage months (Table 4.4). April 2008 exhibited the largest volume of forest products shipped downriver during the time period at 21,500 tons. According to Table 4.4, the lowest shipment occurred in June 2010 at a tonnage of 4,000.

Downriver shipments of vegetable products, grain mill products and other agricultural products were fairly consistent throughout the year except for the first four months of the year (Figure 4.4). Movements flowing downriver were lowest from late spring to late summer; in March, these shipments were the year's lowest at 7,000 tons. During these two seasons, tonnages never rose above 10,500 tons with the exception of the year-high in April of 15,000 tons. Downriver shipment tonnages of vegetable, animal feed and processed grain products increased steadily from June through September, when the monthly estimate hit 12,000 tons. In fact, there was almost a linear increase in downriver tonnage shipped between June and September. Tonnage traveling downriver dropped to around 10,000 tons in November and increased from November through February. Downriver shipments in February reached 14,000 tons and were followed by the year-low in March. Low March shipments were subsequently followed by the year-high in April.

During the four months of the extended lock outage, vegetable, animal feed, grain mill and other agricultural product shipments downriver were very significant. During this period, shipments of vegetable, animal feed, grain mill and other agricultural products increased by more than 2,000 tons from December to January (Figure 4.4). Downriver shipments in January reach an average of 13,000 tons typically; this is the third highest shipment during an average year. January is followed by the second highest shipment in a typical year of 14,000 tons in February. March shipments drop to 7,000 tons which is the lowest estimate for the average year.

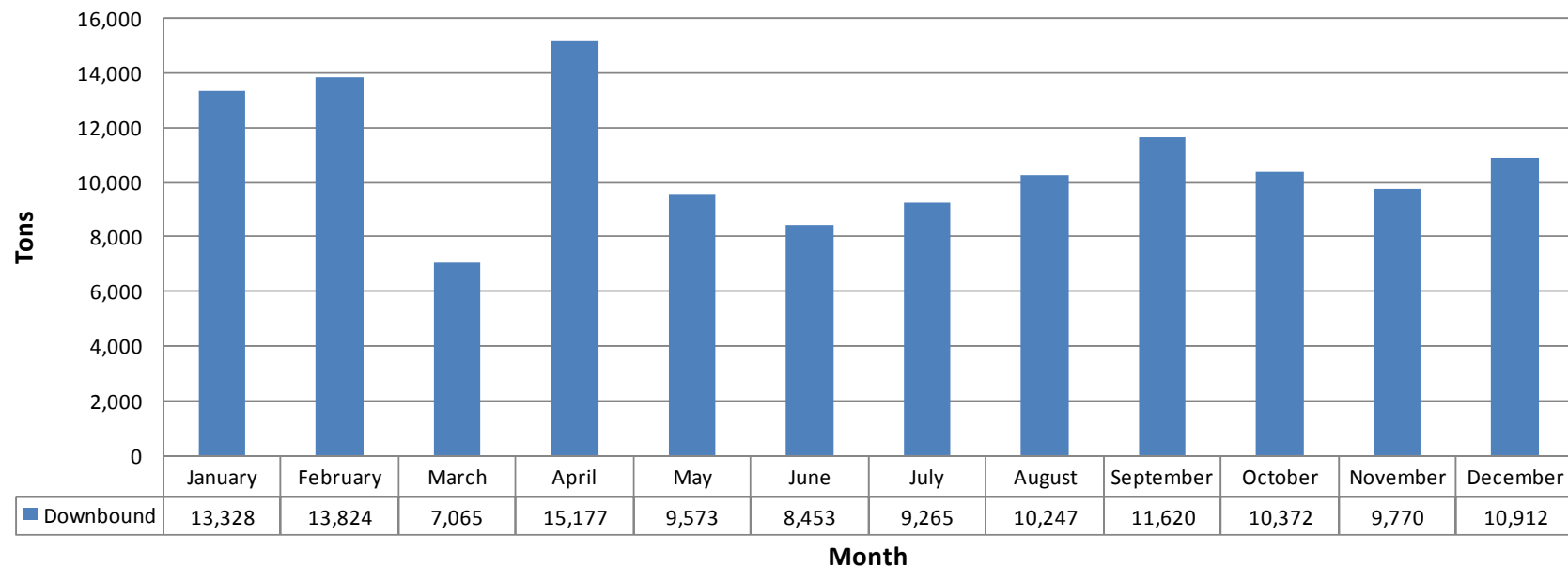
Note: the commodities vegetable products; animal feed, grain mill products, flour and other processing grains; and other agricultural products have been combined into one commodity for Figure and Table 4.4.

	January	February	March	April	May	June	July	August	September	October	November	December
2008	19,539	18,862	5,859	21,453	13,546	13,776	12,339	12,591	10,781	9,276	6,962	6,646
2009	10,326	10,780	7,245	14,020	8,867	7,173	6,190	7,902	12,459	11,468	12,578	15,177
2010	10,118	11,829	8,090	10,059	6,305	4,411	*	*	*	*	*	*
Average	13,328	13,824	7,065	15,177	9,573	8,453	9,265	10,247	11,620	10,372	9,770	10,912

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

* Indicates No Information

Fig. 4.4 Average Monthly Tonnage of Vegetable Products, Animal Feed, Grain Mill Products, Flour and Other Processed Grains and Other Agricultural Products Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Iron Ore, Iron Steel Waste and Scrap

Monthly downriver movements of iron ore products from 2008 to June 2010 were relatively consistent with no large interruptions of its movement besides no shipments in January 2009. The highest volumes moved between May and June 2010 with tonnages of 16,000 and 13,000 tons, respectively (Table 4.5). This increase in overall tonnage followed steady shipments of 6,000 to 10,000 tons from January 2008 to April 2010 with a few exceptions. The lowest volumes of iron ore products moved in February 2008 and March 2009 with tonnages of 2,000 and 400, respectively.

Downriver shipments were fairly inconsistent from October to February, but exhibited a wave pattern from March to September. The increasing-decreasing pattern began with the year-low in March of 3,000 tons (Figure 4.5). Tonnages reached a year-high of 10,000 two months later in May. After May, downriver shipments of iron ore products decreased steadily each month until reaching 6,000 tons in September. Downriver shipments of these commodities then increased to 9,000 tons in October followed by a drop of 4,000 tons into November and an increase to 7,000 tons in December. January and February exhibited stable tonnages of around 5,000 (Figure 4.5).

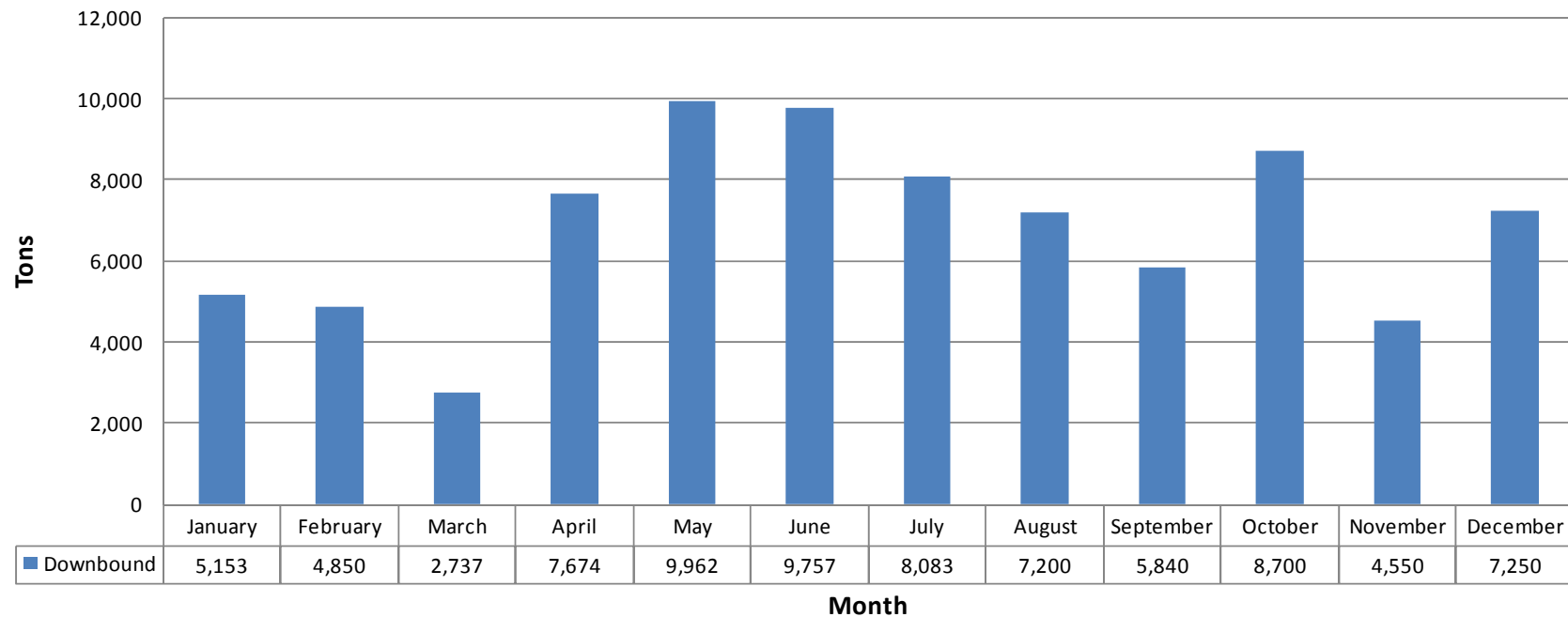
During the four months of the extended lock outage, iron ore, iron steel waste and scrap shipments downriver were insignificant. January, February and March shipments are three of the four lowest shipments for a typical year. December shipments average 7,000 tons, which is well below shipments from April to July and in October. Shipments move in a decreasing pattern from December to March; downriver movements drop from 7,000 tons in December to 3,000 tons in March (Figure 4.5). Downriver movements of iron ore products in March happen to be the lowest monthly estimate for an average year.

Table 4.5 Downbound Movements of Iron Ore, Iron Steel Waste and Scrap, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	7,458	2,129	3,500	6,380	6,386	7,981	6,300	5,800	5,680	9,700	2,400	7,800
2009	0	4,321	410	8,100	7,400	8,440	9,865	8,600	6,000	7,700	6,700	6,700
2010	8,000	8,100	4,300	8,543	16,100	12,850	*	*	*	*	*	*
Average	5,153	4,850	2,737	7,674	9,962	9,757	8,083	7,200	5,840	8,700	4,550	7,250

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

* Indicates No Information

Fig. 4.5 Average Monthly Tonnage of Iron Ore, Iron Steel Waste and Scrap Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Corn, Rye, Barley, Rice, Sorghum and Oats

Downriver shipments of corn, rye, barley, rice, sorghum and oats experienced interruptions and low volumes during the 2008-2010 period (Table 4.6). There were thirteen individual months in which no shipments were made downriver. Five of these no shipment months occurred in the six month period of 2010. Shipments reached a time period low of 200 tons in July of 2008 following a no shipment month in June. Only three months prior, the highest shipment during the 2008-2010 period occurred in April 2008 at a tonnage of over 25,000. Tonnages ranged from 225 to 20,000 tons during the rest of the time period. In general the lowest tonnages occurred between December 2008 and June 2010 in which volumes never exceeded 9,500 tons.

It is easy to identify distinct seasonal patterns for corn and rye, barley, rice, sorghum and oats. As one can observe in Figure 4.6, downriver shipments of corn and grains increased from January to April rising to 8,500 tons in April. Volumes then declined steadily until July when the year-low of 100 tons occurred. Following this extreme low, downriver shipments of corn and grains increased by 4,000 tons into August and again by 5,500 tons into September. Downriver shipments of corn and grain decreased to 1,500 tons in October dropping by 8,000 tons in volume from the previous month. November shipments were highest in volume for the year at a tonnage of 12,500 (Figure 4.6). From November to January, downriver shipments of corn and grains decreased drastically to 2,000 tons.

During the four months of the extended lock outage, corn, rye, barley, rice, sorghum and oats shipments downriver were insignificant as mentioned above and when compared to other major commodities. The fourth highest shipment for the average year historically occurs in December with a tonnage of 6,000 (Figure 4.6). Shipments move in an increasing pattern from January to March; downriver movements rise from 2,000 tons in January to 4,000 tons in March. However, these three months are low when compared to downriver movements during the summer months and November.

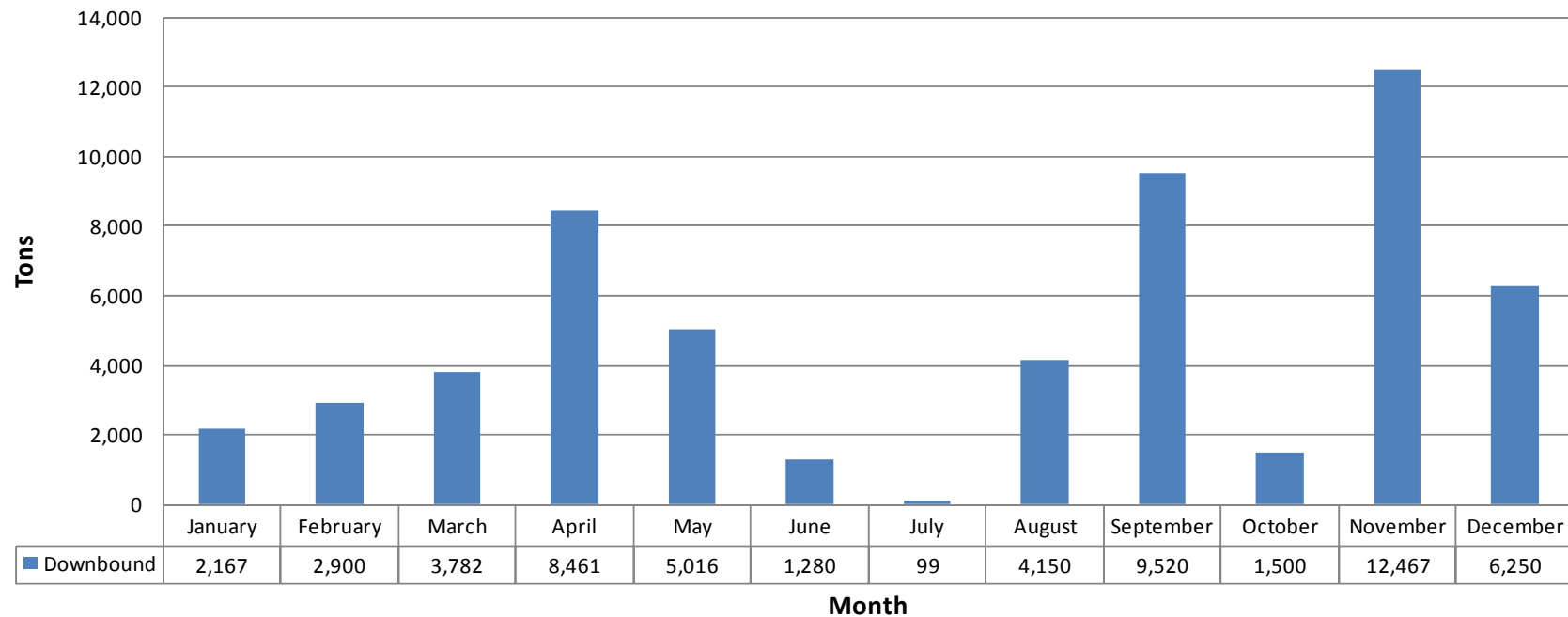
Note: the commodities corn and rye, barley, rice, sorghum and oats have been combined into one commodity for Figure and Table 4.6.

Table 4.6 Downbound Movements of Corn, Rye, Barley, Rice, Sorghum and Oats, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	0	8,700	11,345	25,153	15,047	0	197	6,300	19,040	3,000	19,833	3,100
2009	6,500	0	0	230	0	3,600	0	2,000	0	0	5,100	9,400
2010	0	0	0	0	0	240	*	*	*	*	*	*
Average	2,167	2,900	3,782	8,461	5,016	1,280	99	4,150	9,520	1,500	12,467	6,250

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

* Indicates No Information

Fig. 4.6 Average Monthly Tonnage of Corn, Rye, Barley, Rice, Sorghum and Oats Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Primary Non-Ferrous Metallic Products and Fabricated Metal Products

Monthly downriver movements of primary non-ferrous metallic products and fabricated metal products from 2008 to June 2010 were relatively consistent with no large interruptions of its movement. The highest volumes moved between June and July 2009 with tonnages of 5,000 and 5,500 tons (Table 4.7). This increase in overall tonnage followed some of the lowest estimates of downriver movement during the two and a half year period; March 2009 experienced the lowest downriver tonnage of 1,800 tons. Overall, downriver shipments of primary non-ferrous metallic products and fabricated metal products ranged from 1,800 to 5,500 tons, a relatively small range compared to other major commodities moving downriver.

Downriver shipments were fairly stable throughout the average year ranging from a year-low in March of 2,000 tons to a year-high in July of 4,000 tons (Figure 4.7). Downriver shipments of these commodities increased during the March-July months, steadily increasing by 200 tons from April to June. Volumes then decreased from July through December; shipments during the October-December period were consistently 2,500 tons.

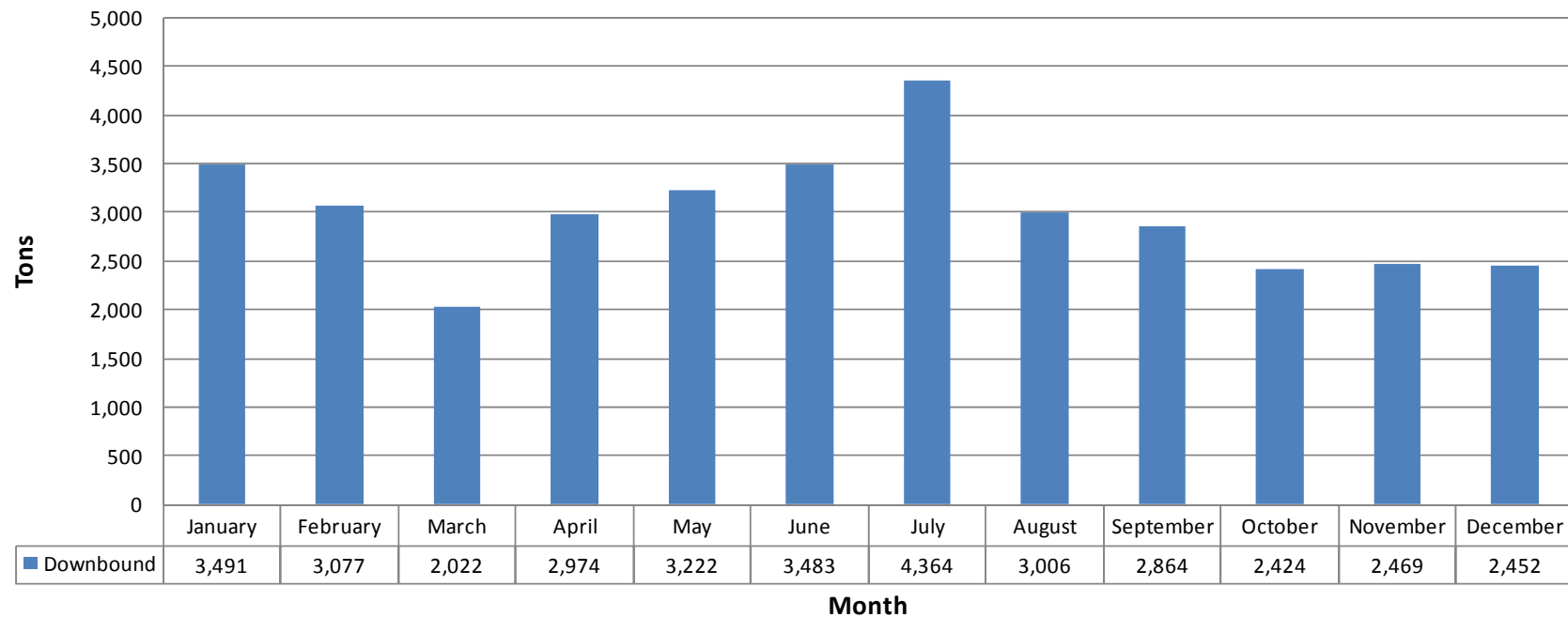
During the four months of the extended lock outage, primary non-ferrous metallic and fabricated metal product shipments downriver were somewhat significant. December shipments are the third lowest in volume for an average year with a tonnage of 2,500. The third lowest estimate is followed by the second highest shipment; for the average year, the second highest shipment historically occurs in January with a tonnage of 3,500 (Figure 4.7). Shipments move in a decreasing pattern from January to March; downriver movements drop from 3,500 tons in January to 2,000 tons in March. Downriver movements of primary non-ferrous metallic and fabricated metal products in March happen to be the lowest monthly estimate for an average year.

Table 4.7 Downbound Movements of Primary Non-Ferrous Metallic Products and Fabricated Metal Products, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	4,203	2,675	2,364	3,640	4,162	3,219	3,213	3,309	2,742	3,047	2,901	2,648
2009	3,540	2,805	1,753	2,743	2,674	4,681	5,514	2,702	2,985	1,800	2,036	2,256
2010	2,731	3,752	1,948	2,540	2,830	2,550	*	*	*	*	*	*
Average	3,491	3,077	2,022	2,974	3,222	3,483	4,364	3,006	2,864	2,424	2,469	2,452

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

* Indicates No Information

Fig. 4.7 Average Monthly Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Down River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Upriver Movements:

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

Distillate, residual and other fuel oils, lubricating oils and greases moved upriver consistently and in large volumes during the time period from 2008 to June 2010 (Table 4.8). Upriver shipments were lowest in December 2008, March 2009, May 2009, October 2009 and from January to March 2010 with steady shipments ranging from 54,000 to 65,000 tons. Then in June 2009, upriver shipments of distillate and fuel oil products reached 85,000 tons followed by two months of shipments volumes of over 89,500 ton. Higher shipments between 66,000 and 89,000 continued through May 2010. It should be noted that an extremely high shipment of 113,000 tons of distillate and fuel oil products was moved in October 2008, just five months before the extreme low of 53,500 tons in March 2009 (Table 4.8).

As one can notice from Figure 4.8, the upriver shipments of distillate, residual and other fuel oils averaged 72,000 tons monthly during the January-March period with a low of 66,000 tons in March. In the following months, upriver shipments generally increased (with some minimal early summer downshifts) and reached the year's highest estimate of 88,500 tons in August. This increasing trend from March to August includes a downshift in upriver movements in May and June to an average of 77,000 tons after a movement of 82,000 tons in April. After the year-high in August, upriver shipments again decreased in October, November and December and remained low through March. This decline includes the year-low upriver shipment of 65,000 tons in December (Figure 4.8).

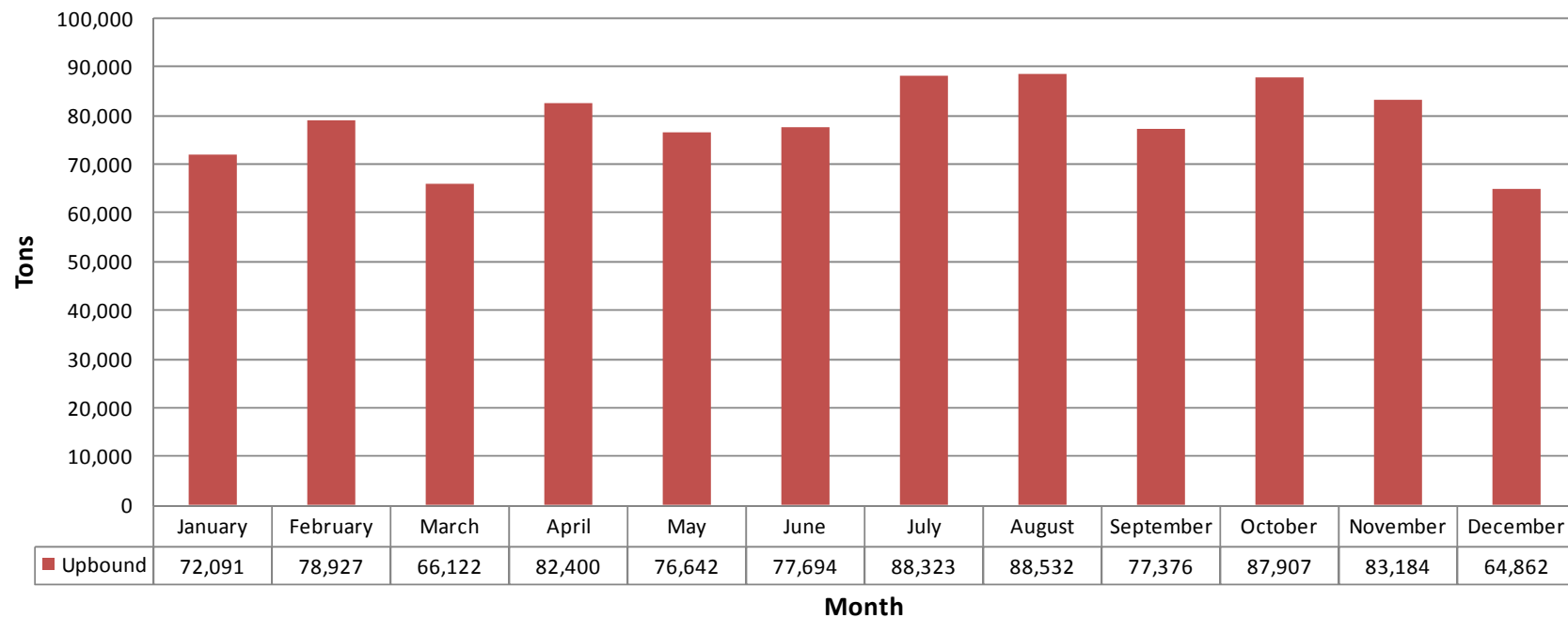
During the four months of the extended lock outage, distillate, residual and other fuel oil shipments upriver were quite significant in volume although some of the lowest shipments for the average year. In December, the lowest monthly estimate for distillate, residual and other fuel oil shipments occurred with an average of 65,000 tons (Figure 4.8). From December to February, upriver shipments increased from 65,000 tons to 79,000 tons, a steady increase of about 6,000 tons each month. From February to March, upriver shipments of distillate, residual and other fuel oils decreased by 13,000 tons to 66,000 tons in March, the second lowest estimate for the average year.

Table 4.8 Upbound Movements of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	74,692	95,302	84,287	82,150	75,688	82,258	87,146	87,088	84,991	113,202	81,212	56,035
2009	78,148	79,107	53,551	77,798	64,941	85,194	89,500	89,976	69,761	62,611	85,155	73,688
2010	63,434	62,371	60,528	87,253	89,296	65,629	*	*	*	*	*	*
Average	72,091	78,927	66,122	82,400	76,642	77,694	88,323	88,532	77,376	87,907	83,184	64,862

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

* Indicates No Information

Fig. 4.8 Average Monthly Tonnage of Distillate, Residual and Other Fuel Oils, Lubricating Oils and Greases Barged Up River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Gasoline, Jet Fuel and Kerosene

Monthly upriver movements of gasoline, jet fuel and kerosene from 2008 to June 2010 were highest between May 2009 and May 2010, reaching volumes of over 99,000 tons in May 2010 (Table 4.9). August and September 2008 were also extremely high with tonnages of 95,000 and 98,000 tons, respectively. These high tonnage periods also include one of the lowest estimates of upriver movements between 2008 and June 2010; in March 2010, volumes dropped to 38,000 tons followed by a high tonnage of 86,000 in April. May 2010 exhibited the largest volume of gasoline, jet fuel and kerosene shipped upriver during the time period at 99,500 tons; the lowest shipment occurred in April 2008 at a tonnage of 37,000 (Table 4.9).

Upriver shipments of gasoline, jet fuel and kerosene products were relatively low from October to March (Figure 4.9) but began to increase in April during spring planting season when farmers need gasoline for their equipment and machinery. Shipments reached the highest upriver tonnage level during May, August and September. A year-high occurred in May with a tonnage of 94,000. Upriver shipments of gasoline, jet fuel and kerosene products then decrease to a steady average of 89,000 tons from July to September. Averages then dropped to below 65,000 tons into October and again into November and December. From January to March, upriver shipments ranged from 41,000 to 64,000 tons per month reaching a year-low in March of 40,500 tons. This trend has been consistent for over 20 years as indicated by previous analyses of Columbia-Snake River shipments (see EWITS Research Report #12, 1996).

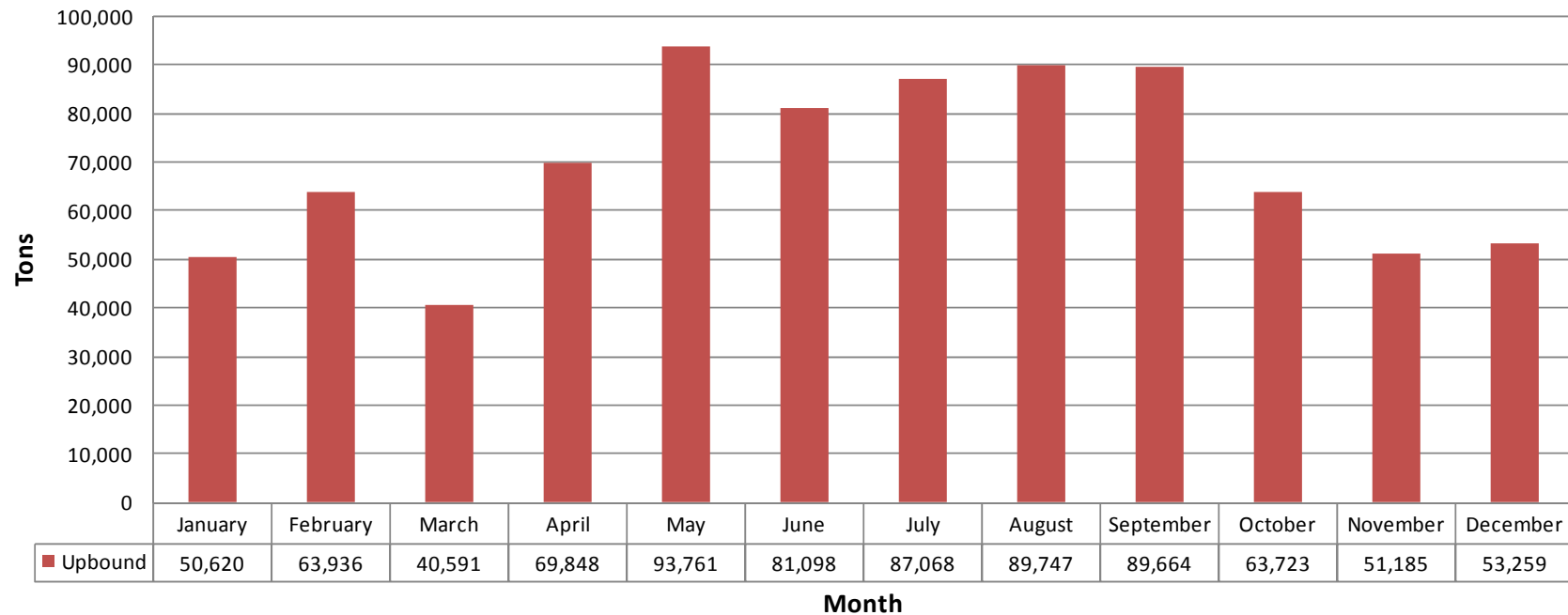
During the four months of the extended lock outage, gasoline, jet fuel and kerosene shipments upriver were very significant in volume, but were some of the lowest for an average year. During this period, upriver shipments increased by more than 10,000 tons from December to February (Figure 4.9). December shipments averaged 53,000 tons, the fourth lowest monthly estimate for the typical year. Shipments of gasoline, jet fuel and kerosene moving up river then decreased to 51,000 tons in January. After a rise of over 13,000 tons into February, upriver shipments dropped to the year-low of 41,000 tons in March. It is important to note that these four months include three of the four lowest monthly estimates for an average year of upriver shipments of gasoline, jet fuel and kerosene.

Table 4.9 Upbound Movements of Gasoline, Jet Fuel and Kerosene Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	40,764	63,616	37,126	57,564	89,345	81,579	85,522	95,093	97,643	62,416	50,571	55,536
2009	65,886	62,474	46,961	66,072	92,493	95,194	88,614	84,400	81,684	65,029	51,799	50,982
2010	45,210	65,719	37,687	85,907	99,444	66,521	*	*	*	*	*	*
Average	50,620	63,936	40,591	69,848	93,761	81,098	87,068	89,747	89,664	63,723	51,185	53,259

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

* Indicates No Information

Fig. 4.9 Average Monthly Tonnage of Gasoline, Jet Fuel and Kerosene Barged Up River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

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

Monthly upriver movements of waste material, garbage, landfill, sewage sludge and waste water between 2008 and June 2010 were lowest overall between March 2009 and March 2010, but volumes have increased since then (Table 4.10). Shipments have ranged between 14,000 and 30,000 tons during the two and a half year period with shipments currently reaching volumes of 23,000 tons (June 2010). October 2008 exhibited the largest volume of waste material shipped upriver during the time period at 29,500 tons. The lowest shipment occurred a year later in October 2009 with a tonnage of 14,000 tons (Table 4.10).

Upriver shipments of these commodities were the lowest in March, with shipments of around 16,000 tons. From April to August, however, one can notice a nearly linear increase in the tonnage barged upriver as the shipments increased from around 22,000 to 27,000 tons. This rising trend continues, although not linearly, through September when upriver tonnage reaches a year-high of 30,000 tons. Following the September high, upriver shipments decreased slowly through December's shipments of 20,000 tons. Upriver movements from October to December are some of the lowest of the year averaging 21,000 tons after the year-highs during the summer months.

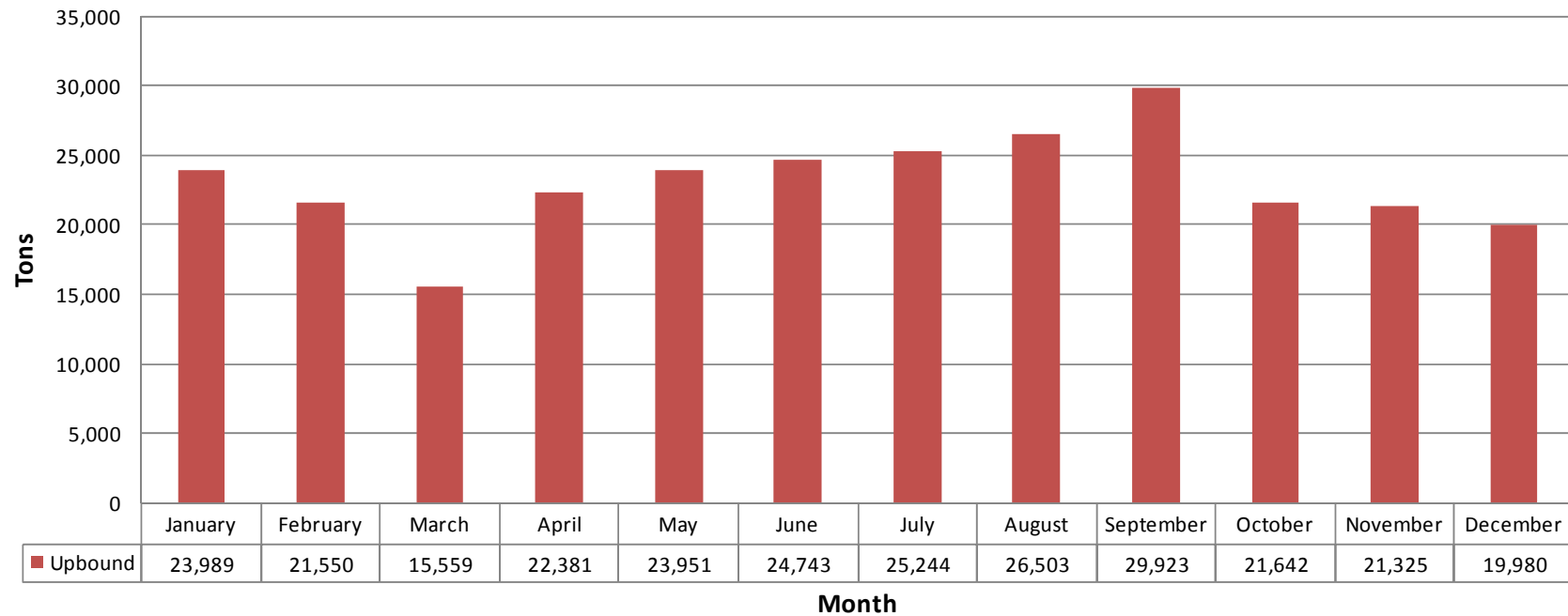
During the four months of the extended lock outage, waste material shipments upriver were significant in volume when compared to other commodities, but not significant in volume when compared to other months of waste material shipments. December shipments are the second lowest volume for an average year with a tonnage of 20,000. The second lowest estimate is followed by a shipment of 24,000 tons of waste material in January, a 4,000 ton increase (Figure 4.10). Shipments move in a decreasing pattern from January to March; upriver movements drop from 24,000 tons in January to 16,000 tons in March, a 33 percent decrease in volume. Upriver movements of waste materials in March happen to be the lowest monthly estimate for an average year.

Table 4.10 Upbound Movements of Waste Material; Garbage, Landfill, Sewage Sludge and Waste Water, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	26,137	23,386	16,536	25,088	25,718	27,036	26,928	29,065	37,234	29,591	25,017	20,691
2009	23,434	22,060	14,817	20,760	23,414	24,183	23,559	23,941	22,612	13,692	17,633	19,269
2010	22,395	19,204	15,323	21,296	22,721	23,011	*	*	*	*	*	*
Average	23,989	21,550	15,559	22,381	23,951	24,743	25,244	26,503	29,923	21,642	21,325	19,980

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

* Indicates No Information

Fig. 4.10 Average Monthly Tonnage of Waste Material; Garbage, Landfill, Sewage Sludge and Waste Water Barged Up River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Forest Products, Lumber, Logs and Woodchips

Upriver shipments of forest products experienced interruptions and low volumes during the 2008-2010 period (Table 4.11). There were two months in which no shipments were made upriver. Shipments reached a time period low of 1,500 tons in December of 2009 following a shipment of 7,500 tons in November 2009. Only ten months prior, the highest shipment upriver during the 2008-2010 period occurred in January 2009 at a tonnage of 17,000. Tonnages ranged from 2,000 to 14,000 tons during the rest of the time period.

Shipments of forest products upriver were fairly consistent during the typical year except for lows in March and December and an unusual high in July. As one can observe in Figure 4.11, upriver shipments of forest products decreased from 8,000 tons in January to 2,000 tons in March, the year-low. Volumes shipped upriver then increased from May to July; July experienced the highest shipment of the year at 11,500 tons. Following this extreme high, upriver shipments of forest products decreased by 5,000 tons into August and remained at about 6,000 tons into September. Upriver shipments increased to 8,000 tons for October and November. December shipments were second lowest in volume for the year at a tonnage of 3,000 (Figure 4.11).

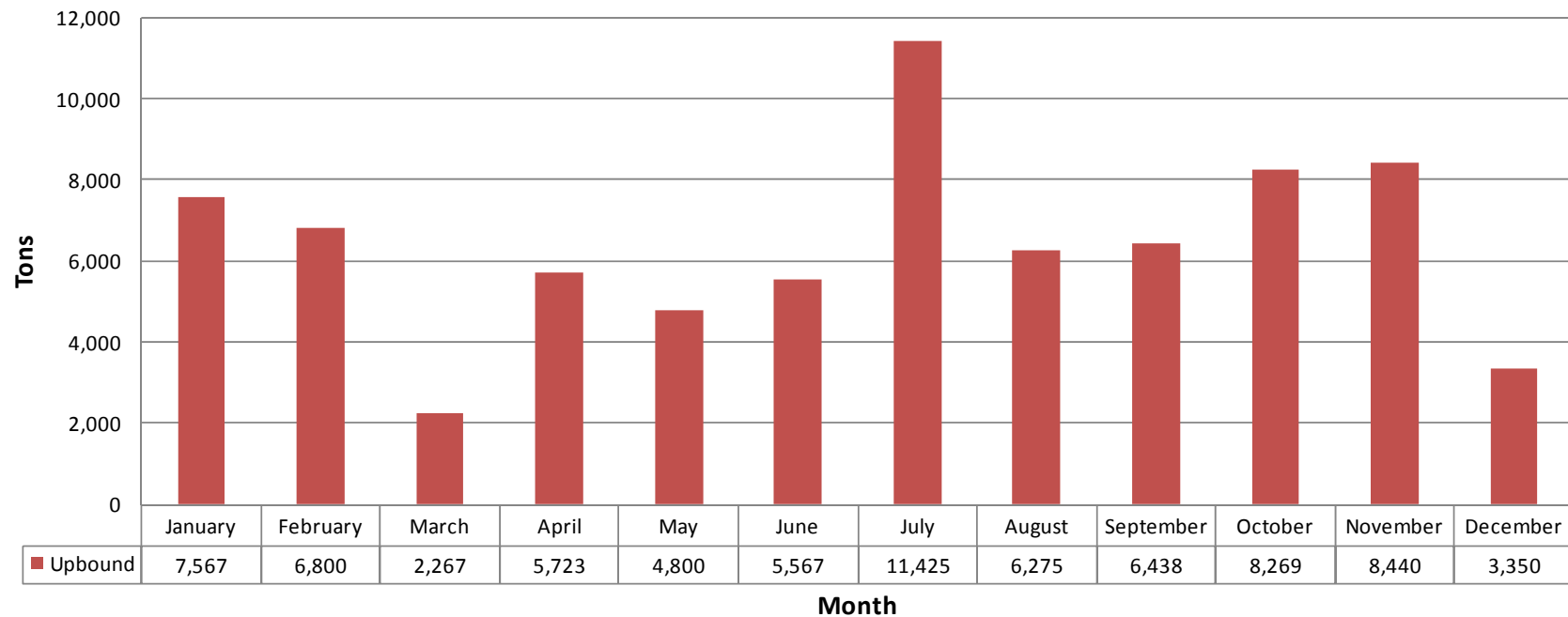
During the four months of the extended lock outage, forest product shipments upriver were insignificant when compared to other major commodities. The second lowest shipment for the average year historically occurs in December with a tonnage of 3,000 (Figure 4.11). Shipments move in a decreasing pattern from January to March; upriver movements drop from 8,000 tons in January to 2,000 tons in March. January and February shipments are about average over the typical year, but December and March shipments are unusually low when compared to other shipping estimates within and outside of this commodity.

Table 4.11 Upbound Movements of Forest Products, Lumber, Logs and Woodchips, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	2,500	3,400	5,000	7,500	2,500	3,400	15,950	10,750	9,675	11,937	9,580	5,100
2009	16,800	13,600	1,800	9,670	10,100	9,800	6,900	1,800	3,200	4,600	7,300	1,600
2010	3,400	3,400	0	0	1,800	3,500	*	*	*	*	*	*
Average	7,567	6,800	2,267	5,723	4,800	5,567	11,425	6,275	6,438	8,269	8,440	3,350

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

* Indicates No Information

Fig. 4.11 Average Monthly Tonnage of Forest Products, Lumber, Logs and Woodchips Barged Up River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series

Fertilizer – Nitrogenous, Potassic, Phosphatic and Others

Upriver shipments of fertilizer (nitrogenous, potassic, phosphatic and others) experienced interruptions and low volumes during the 2008-2010 period (Table 4.12). There were three months in which no shipments of fertilizer were made upriver: January, September and November 2008. Shipments were highest in the year 2008 (the year in which the three no shipments occurred) with volume tonnages ranging from 3,000 to 15,000 tons. After 2008, upriver shipments did not rise above 7,100 tons. Volumes reached a time period low of 1,500 tons in March 2010 following a higher shipment of 7,000 tons in January. Two years prior, the highest shipment during the 2008-2010 period occurred in March 2008 at a tonnage of about 15,000.

Monthly shipments of fertilizer products were sporadic and yielded almost no pattern. The only obvious trend is the decline in upriver shipments from a year-high in May of 7,000 tons to a year-low of 2,000 tons in September (Figure 4.12). The year-high in May was likely due to the spring planting season. This decreasing trend from May to September was relatively steady with a sharp decrease from August to September of 2,500 tons. Upriver shipments quadrupled from September to October possibly due to the fall planting season (e.g. winter wheat); tonnages jumped from around 2,000 tons to almost 7,000 tons. In November, upriver shipments greatly decreased again to around 2,000 tons and rose to 4,500 tons in December. From January to March, upriver shipments of fertilizer increased to 6,500 tons in March as farmers geared up for spring planting season. After a winter high in March, shipments decreased in April to 3,000 tons.

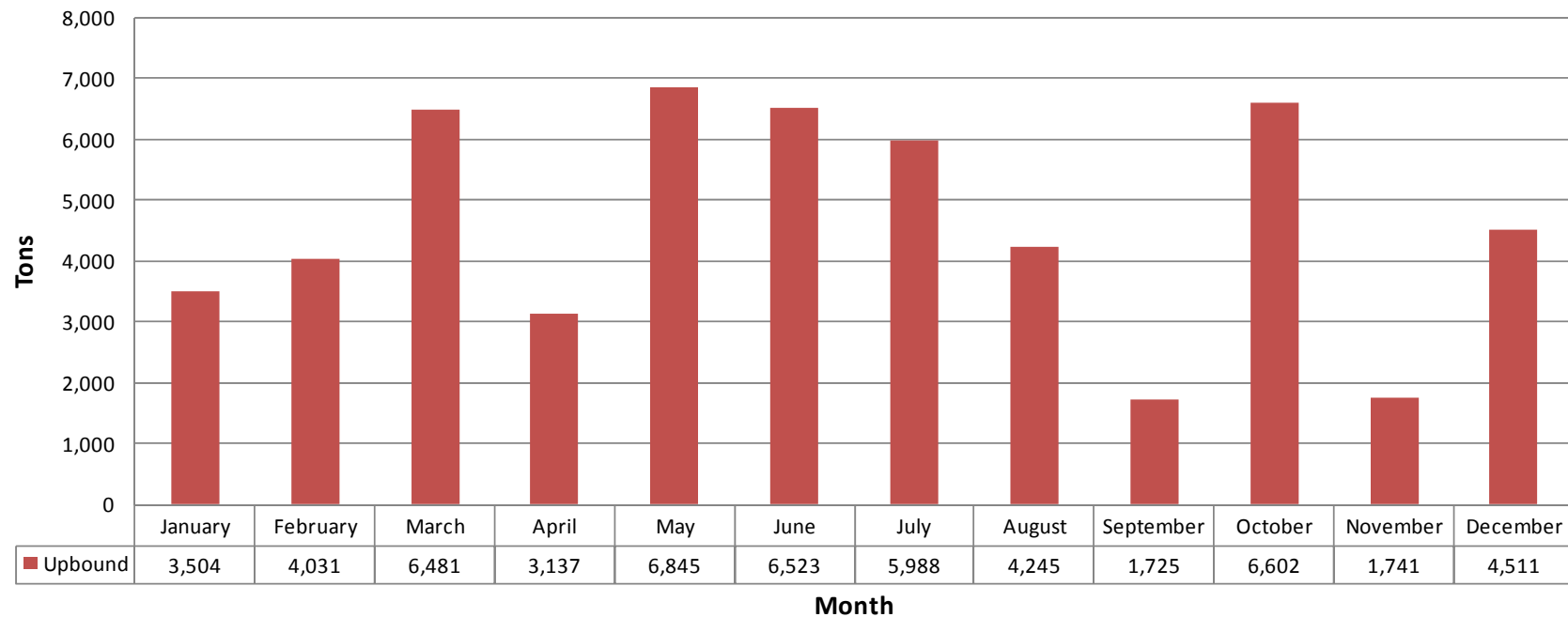
During the four months of the extended lock outage, fertilizer shipments upriver were somewhat significant. December shipments for an average year had a volume of 4,500 tons. Shipments moving upriver drop by 1,000 tons from December to January (Figure 4.12). Shipments move in an increasing pattern from January to March; upriver movements rise from 3,500 tons in January to 6,500 tons in March. Upriver movements of fertilizer in March happen to be the third highest monthly estimate for an average year. This is unusual as most of the other major commodities moving up and downriver experience the average year's lowest estimate during this month.

	January	February	March	April	May	June	July	August	September	October	November	December
2008	0	5,511	14,944	2,950	6,498	9,662	6,437	5,984	0	9,086	0	5,496
2009	3,513	3,018	3,000	3,471	6,976	6,386	5,538	2,505	3,450	4,118	3,482	3,525
2010	7,000	3,563	1,500	2,991	7,061	3,520	*	*	*	*	*	*
Average	3,504	4,031	6,481	3,137	6,845	6,523	5,988	4,245	1,725	6,602	1,741	4,511

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

* Indicates No Information

Fig. 4.12 Average Monthly Tonnage of Fertilizer-Nitrogenous, Potassic, Phosphatic and Others Barged Up River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

Primary Non-Ferrous Metallic Products and Fabricated Metal Products

Monthly upriver movements of primary non-ferrous metallic products and fabricated metal products from 2008 to June 2010 were relatively consistent with only two larger interruptions of its movement (March 2009 and March 2010). The highest volumes moved between January 2008 and January 2009 with tonnages ranging between 1,500 and 6,000 tons (Table 4.13). This increase in overall tonnage followed some of the lowest estimates of upriver movement during the two and a half year period; March 2010 experienced the lowest upriver tonnage of 650 tons. Overall, upriver shipments of primary non-ferrous metallic products and fabricated metal products ranged from 700 to 6,000 tons, a relatively small range compared to other major commodities moving upriver.

Upriver shipments seemed to fluctuate less than downriver shipments of primary non-ferrous metallic products (Figures 4.7 and 4.13). January shipments were the year's highest at 4,000 tons of upriver movement. From February to December, movements upriver remained stable ranging from 2,000 to 3,000 tons (Figure 4.13). In March, upriver shipments of primary non-ferrous metallic products reached a year-low of 2,000 tons. In general, upriver volumes increased from March to December although tonnages did not increase more than 200 tons at a time. From November through January, one can notice a sharper increasing trend from a low of 2,000 tons to the year-high of 4,000 tons.

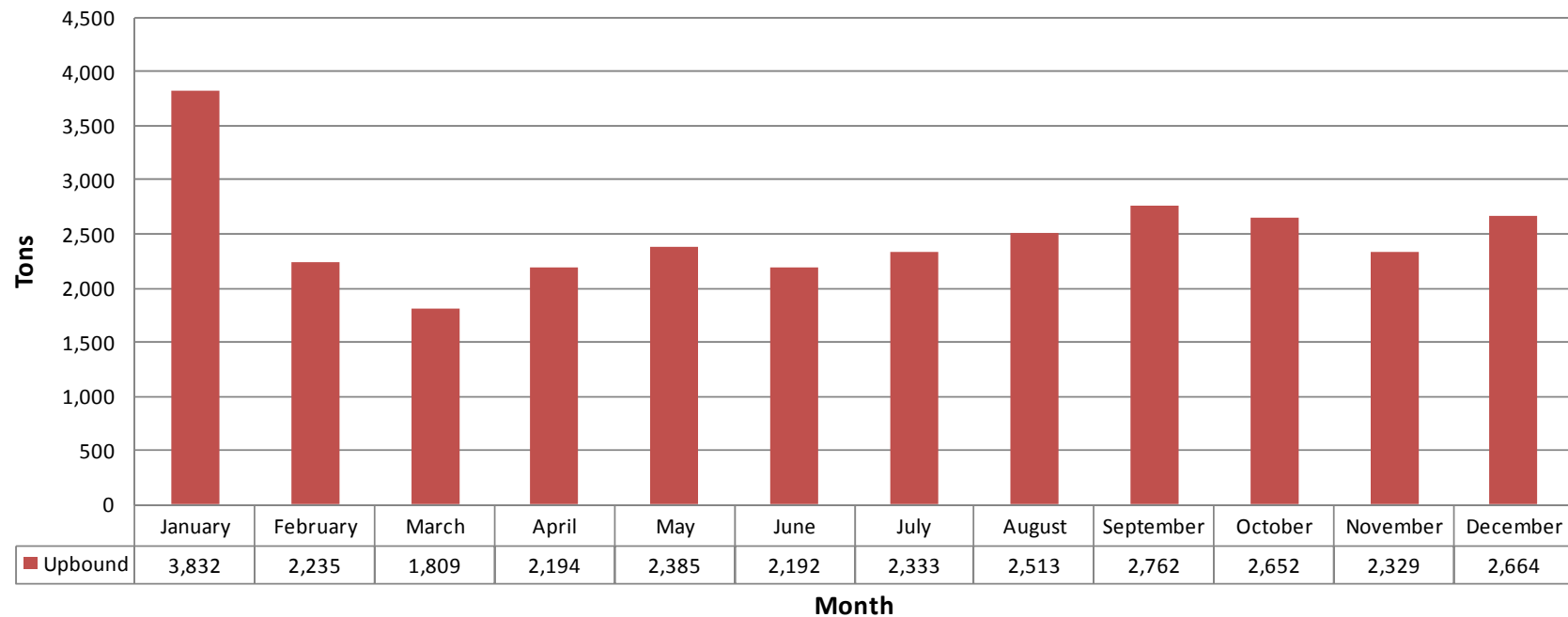
During the four months of the extended lock outage, primary non-ferrous metallic and fabricated metal product shipments upriver were not significant. However, these four months of upriver shipments of primary non-ferrous metallic products were important and significant when compared to other months. Two of the three highest monthly estimates for a typical year are included in this time period (December-March). December shipments are the third highest volume for an average year with a tonnage of 2,700. The third highest estimate is followed by the second highest shipment; for the average year, this historically occurs in January with a tonnage of 3,800 (Figure 4.12). Shipments move in a decreasing pattern from January to March; upriver movements drop from 3,800 tons in January to 1,800 tons in March. Upriver movements of primary non-ferrous metallic and fabricated metal products in March happen to be the lowest monthly estimate for an average year.

Table 4.13 Upbound Movements of Primary Non-Ferrous Metallic Products and Fabricated Metal Products, Through Bonneville, 2008-2010												
	January	February	March	April	May	June	July	August	September	October	November	December
2008	5,728	3,266	3,952	2,402	4,589	1,977	2,759	3,339	3,810	1,465	2,420	3,479
2009	3,734	1,762	824	1,875	1,417	3,252	1,907	1,687	1,713	3,839	2,237	1,849
2010	2,033	1,676	650	2,306	1,150	1,348	*	*	*	*	*	*
Average	3,832	2,235	1,809	2,194	2,385	2,192	2,333	2,513	2,762	2,652	2,329	2,664

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

* Indicates No Information

Fig. 4.13 Average Monthly Tonnage of Primary Non-Ferrous Metallic Products and Fabricated Metal Products Barged Up River in 2008-2010



Note: July-December averages do not include 2010 data as June 2010 is the last month of data in the series.

5. Upriver and Downriver Movements during the Four Months of the Extended Lock Outage

To further study the major commodity movements during the extended lock outage, the researchers have decided to focus on the data for just the months of December through March for years 2008 through 2010. A table comparison of monthly shipments, total tonnage and percentages have been averaged monthly over the two and a half year period for December through March to construct a standard time period in which the extended lock outage will occur. By using data from December to March to form an average time period, readers, shippers and policy makers can develop a good understanding of what has currently moved up and down the Columbia-Snake River System during the extended lock outage months and possibly hypothesize how particular commodities will be affected during the outage.

Reports on this specific time period have been constructed based on the upriver and downriver shipment trends of the highest volume commodities through the Bonneville Lock and Dam.

For each commodity, the monthly average was calculated for 2008-2010 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 two and a half year period including any '0' values.

5.1. Upriver and Downriver Movements

Downriver Movements:

During the months of December through March, 1.7 million tons of commodities typically travel downriver through Bonneville Lock and Dam (Table 5.1, page 94). Wheat; forest products; vegetable products, animal feed and other agricultural products; sand, gravel and stone products; iron ore products; corn, rye, barley, rice, sorghum and oats; and primary non-ferrous metallic products comprise 97 percent of all tonnage shipped downriver from December to March. Among the 1.7 million tons shipped during these four months, about 392,000 tons of commodities ship downriver in December, 452,000 tons in January, 500,000 tons in February and 339,000 tons in March.

Within the month of December, wheat shipments make up about 76 percent of all downriver shipments at a tonnage of 297,000 (Table 5.1, page 94). Forest products make up 8.5 percent of all December shipments at 33,000 tons; sand, gravel and stone make up five percent of all December shipments at 19,000 tons; and vegetable products, animal feed and other agricultural products make up three percent of all December shipments at 11,000 tons. Iron ore products, primary non-ferrous metallic products and corn, rye, barley, rice, sorghum and oats individually make up less than two percent of December tonnage.

During a typical January, wheat shipments comprise about 83 percent of all shipments at a tonnage of 373,000, which is 75,000 tons more than the previous month. Forest products make up nine percent of all January shipments at a tonnage of 41,000 and vegetable products, animal feed and other agricultural products make up three percent at a tonnage of 13,000. All other major commodities (sand, gravel and stone products; iron ore products; primary non-ferrous metallic products; and corn, rye, barley, rice, sorghum and oats) individually make up less than 1.5 percent of all January movements.

Within the month of February, wheat shipments comprise about 81 percent of all shipments at a tonnage of 403,000, which is 40,000 tons more than the previous month. Forest products make up ten percent at a tonnage of 52,000 and vegetable products, animal feed and other agricultural products make up three percent of all February shipments at a tonnage of 14,000. All other major commodities (sand, gravel and stone products; iron ore products; primary non-ferrous metallic products; and corn, rye, barley, rice, sorghum and oats) individually make up less than one percent of all February movements.

Finally, during a standard March, wheat shipments comprise about 75 percent of all shipments at a tonnage of 254,000, which is 149,000 tons less than the previous month. Forest products make up 11 percent at a tonnage of 36,000; sand, gravel and stone products make up six percent at a tonnage of 20,000; and vegetable products, animal feed and other agricultural products make up two percent of all March shipments at a tonnage of 7,000. All other major commodities (iron ore products, primary non-ferrous metallic products and corn, rye, barley, rice, sorghum and oats) individually make up less than 1.5 percent of all March shipments.

Upriver Movements:

During the months of December through March, 631,000 tons of commodities typically travel upriver through Bonneville Lock and Dam (Table 5.2, page 94). Distillate fuel oils, gasoline products, waste materials, forest products, fertilizer and primary non-ferrous metallic products comprise 98 percent of all tonnage shipped upriver from December to March. Among the 631,000 tons shipped during these four months, about 153,000 tons ship upriver in December, 162,000 tons in January, 181,000 tons in February and 134,000 tons in March.

Within the month of December, distillate fuel oil shipments make up about 42 percent of all upriver shipments at a tonnage of 65,000 (Table 5.2, page 94). Gasoline products make up 35 percent of all December shipments at 53,000 tons and waste materials make up 13 percent at 20,000 tons. Fertilizer, forest products and primary non-ferrous metallic products individually make up less than three percent of December tonnage.

During a typical January, distillate fuel oil shipments comprise about 44 percent of all upriver shipments at a tonnage of 72,000. Gasoline products make up 31 percent of all January shipments at a tonnage of 51,000, waste materials make up 15 percent at a tonnage of 24,000 and forest products make up 5 percent at 8,000 tons. All other major commodities (fertilizer

and primary non-ferrous metallic products) individually make up less than 2.5 percent of all January movements.

Within the month of February, distillate fuel oil shipments comprise about 44 percent of all shipments at a tonnage of 79,000. Gasoline products make up 35 percent of all February shipments at a tonnage of 64,000, forest products make up four percent at a tonnage of 7,000 and waste materials make up 12 percent at a tonnage of 22,000. All other major commodities (fertilizer and primary non-ferrous metallic products) individually make up less than 2.5 percent of all February movements.

Finally, during a standard March, distillate fuel oil shipments comprise about 49 percent of all upriver shipments at a tonnage of 66,000. Gasoline products make up 30 percent of all March shipments at a tonnage of 41,000, waste materials make up 12 percent at a tonnage of 16,000 and fertilizer makes up five percent at a tonnage of 6,000. All other major commodities (forest products and primary non-ferrous metallic products) individually make up less than two percent of all March shipments.

Table 5.1 Average Down Bound Movements Through Bonneville, 2008-2010										
Commodity by Ton	Month									
	December		January		February		March		Total	
	Tonnage	Percent	Tonnage	Percent	Tonnage	Percent	Tonnage	Percent	Tonnage	Percent
Forest Products, Lumber, Logs and Woodchips	33,300	8.49	40,878	9.04	51,587	10.32	35,733	10.53	161,498	9.59
Sand, Gravel and Stone	18,767	4.79	216	0.05	5,091	1.02	20,343	5.99	44,417	2.64
Iron Ore, Iron Steel Waste and Scrap	7,250	1.85	5,153	1.14	4,850	0.97	2,737	0.81	19,989	1.19
Primary Non-Ferrous Metallic Products	2,452	0.63	3,491	0.77	3,077	0.62	2,022	0.60	11,042	0.66
Wheat	297,001	75.74	373,447	82.60	403,156	80.64	254,009	74.84	1,327,614	78.86
Corn, Rye, Barley, Rice, Sorghum and Oats	6,250	1.59	2,167	0.48	2,900	0.58	3,782	1.11	15,098	0.90
Vegetable Products, Animal Feed and Other Agricultural Products	10,912	2.78	13,328	2.95	13,824	2.77	7,065	2.08	45,128	2.68
Other Minor (27) Commodities	16,217	4.14	13,408	2.97	15,435	3.09	13,697	4.04	58,758	3.49
Total	392,148	100.00	452,088	100.00	499,921	100.00	339,387	100.00	1,683,543	100.00

Note: December average does not include 2010 data as June 2010 is the last month of data in the series.

Table 5.2 Average Up Bound Movements Through Bonneville, 2008-2010										
Commodity by Ton	Month									
	December		January		February		March		Total	
	Tonnage	Percent	Tonnage	Percent	Tonnage	Percent	Tonnage	Percent	Tonnage	Percent
Gasoline, Jet Fuel, and Kerosene	53,259	34.75	50,620	31.16	63,936	35.29	40,591	30.21	208,407	33.01
Distillate, Residual and Other Fuel Oils	64,862	42.32	72,091	44.38	78,927	43.56	66,122	49.21	282,002	44.67
Fertilizer (Nitrogenous, Potassic, Phosphoric)	4,511	2.94	3,504	2.16	4,031	2.22	6,481	4.82	18,527	2.93
Forest Products, Lumber, Logs and Woodchips	3,350	2.19	7,567	4.66	6,800	3.75	2,267	1.69	19,983	3.17
Primary Non-Ferrous Metallic Products	2,664	1.74	3,832	2.36	2,235	1.23	1,809	1.35	10,539	1.67
Waste Material, Garbage, Landfill, Sewage Sludge and Waste Water	19,980	13.04	23,989	14.77	21,550	11.89	15,559	11.58	81,077	12.84
Other Minor (31) Commodities	4,649	3.03	856	0.53	3,692	2.04	1,550	1.15	10,746	1.70
Total	153,274	100.00	162,459	100.00	181,170	100.00	134,379	100.00	631,281	100.00

Note: December average does not include 2010 data as June 2010 is the last month of data in the series.

Summary

The preceding analysis identified some general trends of commodity movements along the Columbia-Snake River System. These trends were analyzed based on the total tonnage shipped during the period from 1991 to 2010, the typical monthly tonnage of major commodities calculated by averaging monthly shipment amounts over the twenty year period and the typical monthly tonnage of major commodities calculated by averaging monthly shipment amounts over a two and a half year period (2008-2010).

As noted in previous chapters, about three times more total tonnage travels downriver than upriver. Wheat; forest products, lumber, logs and woodchips; sand, gravel, stone, limestone flux, calcareous stone and phosphate rock; rye, barley, rice, sorghum and oats; vegetable products; animal feed, grain mill products, flour and other processed grains; and paper and allied products are the commodity groupings that travel most often and in the greatest amounts downriver from 1991 to June 2010. It is interesting to note that these commodities are of an agricultural nature and generally not of man-made materials.

Industrial commodities, such as gasoline, jet fuel and kerosene; distillate, residual and other fuel oils, lubricating oils and greases; waste material, garbage, landfill, sewage sludge and waste water; fertilizer – nitrogenous, potassic, phosphatic and others; and primary non-ferrous metallic and fabricated metal products most often and in the most amounts travel upriver.

Since about three times more tonnage traveled downriver than upriver from 1991 to June 2010, a large number of empty barges traveled back upriver to be repositioned for future downriver movements. Accordingly, more than three times more empty barges traveled upriver than downriver. It should be noted that annual wheat and total tonnages have decreased the last ten years of the twenty year study. Wheat and total tonnages reached their peaks in 1998 and have since declined with a few inconsistencies over the last ten years.

When looking at seasonal effects of the major commodities listed above for 1991 through June 2010, one can notice that the agricultural and natural products (wheat; forest products; corn; rye, barley, rice, sorghum and oats; vegetable products; animal feed, grain mill products, flour and other processing grains; and other agricultural products) move downriver in the highest volumes in the late summer and fall. The highest tonnage within a typical year of other natural products (sand, gravel, stone, limestone flux, calcareous stone and phosphate rock and paper and allied products) moves downriver from October to December.

On average, during the 1991-2010 time period most industrial commodities (gasoline, jet fuel and kerosene; distillate, residual and other fuel oils, lubricating oils and greases; waste material, garbage, landfill, sewage sludge and waste water; and primary non-ferrous metallic and fabricated metal products) move upriver in the largest volumes during the late summer and fall. Fertilizer (nitrogenous, potassic, phosphatic and others), however, move upriver in May and June in the largest tonnages. This is due to the spring planting season.

During the months of December through March, 1.7 million tons of commodities typically travel downriver. Wheat; forest products; vegetable products, animal feed and other agricultural products; sand, gravel and stone products; iron ore products; corn, rye, barley, rice, sorghum and oats; and primary non-ferrous metallic products comprise 97 percent of all tonnage shipped downriver from December to March. Among the 1.7 million tons shipped during these four months, about 392,000 tons of commodities ship downriver in December, 452,000 tons in January, 500,000 tons in February and 339,000 tons in March.

Within the months of December, January, February and March, wheat shipments make up, on average, about 79 percent of all downriver shipments. Forest products make up, on average, 10 percent of all downriver shipments and sand, gravel and stone make up about three percent.

During the months of December through March, 631,000 tons of commodities typically travel upriver. Distillate fuel oils, gasoline products, waste materials, forest products, fertilizer and primary non-ferrous metallic products comprise 98 percent of all tonnage shipped upriver from December to March. Among the 631,000 tons shipped during these four months, about 153,000 tons ship upriver in December, 162,000 tons in January, 181,000 tons in February and 134,000 tons in March.

Within the month of December, January, February and March, distillate fuel oil shipments make up about 45 percent of all upriver shipments. Gasoline products make up 33 percent of all upriver shipments and waste materials make up 13 percent.

Appendix A: Annual Up and Down Bound Tonnage through Bonneville Lock and Dam

Table A.1 Up Bound Movements Through Bonneville, 1991													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	*	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	*	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	*	3,429	0	8,334	0	0	0	2,205	2,218	0	4,655	0	20,841
Crude Petroleum	*	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	*	23,542	13,994	32,057	36,688	43,467	50,859	59,722	57,874	29,784	40,421	30,179	418,587
Distillate, Residual and Other Fuel Oils	*	39,151	28,000	52,861	52,903	38,885	30,227	40,175	49,664	55,325	49,287	51,267	487,745
Petroleum Pitches, Asphalt, and Naptha	*	2,320	1,758	1,508	0	2,332	11,673	4,443	1,478	1,777	0	0	27,289
Chemicals and Related Products (General)	*	0	3,350	2,500	1,750	1,750	1,450	1,750	0	0	0	0	12,550
Fertilizer (Nitrogenous, Potassic, Phosphoric)	*	2,150	7,400	4,250	12,100	213,770	13,756	9,600	4,600	0	2,500	9,550	279,676
Organic Industrial Chemicals	*	1,700	1,112	1,750	4,150	1,750	895	1,000	4,050	1,700	2,000	875	20,982
Crude Materials and Inedibles, Except Fuels	*	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	*	0	0	1,468	7,150	528	613	507	1,366	387	2,270	0	14,289
Pulp and Waste Products	*	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	*	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	*	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	*	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	*	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	*	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	*	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	*	1,062	210	0	0	800	0	0	174	0	0	0	2,246
Building Cement and Concrete; Lime; Glass	*	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	*	0	0	0	0	0	0	0	0	0	0	200	200
Primary Non-Ferrous Metal Products	*	1,840	2,384	4,851	1,493	2,009	2,622	3,509	3,308	4,137	3,776	4,332	34,261
Primary Wood Products; Veneer; Plywood	*	0	277	0	0	0	0	0	0	0	0	0	277
Food and Farm Products (General)	*	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	*	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	*	3,600	0	0	0	0	0	0	0	0	0	0	3,600
Corn	*	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	*	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	*	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	*	0	0	0	0	0	502	0	0	0	0	0	502
Animal Feed, Grain Mill Products, Flour	*	1,513	0	0	0	0	0	0	0	0	0	0	1,513
Other Agricultural Products, Including Food	*	0	0	0	0	224	0	0	0	0	0	2,600	2,824
Barged Fish	*	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	*	1,352	0	281	80	900	193	4,640	2,068	0	477	2,212	12,203
Waste Material (Garbage, Landfill, Sewage)	*	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	*	2,700	4,500	0	0	0	0	0	0	0	0	250	7,450
Total	0	84,359	62,985	109,860	116,314	306,415	112,790	127,551	126,800	93,110	105,386	101,465	1,347,035

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

* Indicates No Information

Table A.2 Down Bound Movements Through Bonneville, 1991													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	*	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	*	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	*	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	*	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	*	20,845	24,623	0	6,518	0	3,040	1,573	0	7,535	9,366	4,494	77,994
Distillate, Residual and Other Fuel Oils	*	0	11,198	0	0	9,580	6,345	2,214	0	5,920	0	2,070	37,327
Petroleum Pitches, Asphalt, and Naptha	*	0	0	0	0	1,895	0	0	0	0	0	0	1,895
Chemicals and Related Products (General)	*	0	0	0	3,009	0	0	0	0	0	0	0	3,009
Fertilizer (Nitrogenous, Potassic, Phosphoric)	*	0	0	0	8,481	12,138	0	8,487	910	0	0	0	30,016
Organic Industrial Chemicals	*	0	0	0	0	0	0	0	0	0	0	0	0
Crude Materials and Inedibles, Except Fuels	*	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	*	151,199	152,210	155,831	150,786	133,982	120,221	144,790	94,968	135,313	138,024	131,471	1,508,795
Pulp and Waste Products	*	1,000	0	1,300	3,300	80,000	3,300	4,300	1,800	6,600	781	6,102	108,483
Sand, Gravel, Stone, and Crushed Rock	*	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	*	0	0	65	0	0	0	0	0	0	0	0	65
Marine Shells (Unmanufactured)	*	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	*	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	*	0	0	2,600	0	0	0	0	0	0	0	0	2,600
Primary Manufactured Goods	*	0	0	9,605	0	0	0	0	0	0	0	0	9,605
Paper and Allied Products	*	12,392	13,557	0	10,641	8,923	15,589	16,564	12,696	7,358	10,464	7,906	116,090
Building Cement and Concrete; Lime; Glass	*	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	*	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	*	3,377	2,416	365	704	0	3	212	0	1,008	3,944	116	12,145
Primary Wood Products; Veneer; Plywood	*	1,090	6,000	0	0	0	0	0	0	0	0	0	7,090
Food and Farm Products (General)	*	0	3,016	1,980	902	0	2,752	2,189	2,761	7,255	1,141	6,046	28,042
Fresh Fish and Other Marine Products	*	0	0	3,654	2,027	57	32	0	0	0	0	0	5,770
Wheat	*	531,229	528,324	275,028	384,162	248,269	232,761	477,781	340,592	395,699	495,167	552,676	4,461,688
Corn	*	3,000	3,800	0	0	0	0	0	0	8,217	16,700	14,440	46,157
Rye, Barley, Rice, Sorghum, Oats	*	1,609	400	3,000	8,726	0	4,530	77,480	55,325	58,131	116,087	61,041	386,329
Oilseeds (Soybean, Flaxseed, and Others)	*	0	3,271	421	126	0	763	800	751	610	415	5,650	12,807
Vegetable Products	*	2,830	2,874	4,507	2,584	1,402	3,650	6,775	7,590	6,805	11,764	7,575	58,356
Animal Feed, Grain Mill Products, Flour	*	4,643	3,153	150	1,490	6,058	6,310	15,854	9,723	4,048	8,297	5,892	65,618
Other Agricultural Products, Including Food	*	3,572	0	870	2,773	2,496	1,430	4,039	4,797	3,132	44	964	24,117
Barged Fish	*	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	*	203	0	1,969	0	718	0	4,500	270	0	500	0	8,160
Waste Material (Garbage, Landfill, Sewage)	*	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	*	232	3,153	320	44	12	1,144	2,998	0	76	233	680	8,892
Total	0	737,221	757,995	461,665	586,273	505,530	401,870	770,556	532,183	647,707	812,927	807,123	7,021,050

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

* Indicates No Information

Table A.3 Up Bound Movements Through Bonneville, 1992													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	*	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	*	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	*	0	2,323	0	0	1,411	0	3,734
Crude Petroleum	0	0	0	0	0	*	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	26,902	24,211	17,896	36,158	49,330	*	89,497	59,102	98,101	73,665	47,648	44,684	567,194
Distillate, Residual and Other Fuel Oils	44,738	37,983	43,274	44,664	52,158	*	47,702	33,849	79,984	78,013	68,423	69,456	600,244
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	2,662	*	1,481	0	0	3,343	2,300	1,576	11,362
Chemicals and Related Products (General)	0	0	0	1,800	3,377	*	0	0	0	2,200	0	0	7,377
Fertilizer (Nitrogenous, Potassic, Phosphoric)	1,800	0	9,550	3,400	21,900	*	14,025	9,400	14,600	20,800	21,600	15,900	132,975
Organic Industrial Chemicals	0	1,750	2,800	2,400	875	*	0	0	1,750	13,800	0	2,000	25,375
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	*	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	250	0	201	513	393	*	344	432	528	189	1,404	144	4,398
Pulp and Waste Products	0	0	1,000	1,210	1,213	*	2,440	0	3,805	1,856	244,043	4,886	260,453
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	*	0	0	0	217,217	0	234,059	451,276
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	*	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	*	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	1,120	0	0	0	0	*	0	0	0	2,146	0	0	3,266
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	*	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	*	0	0	0	0	0	0	0
Paper and Allied Products	60	0	0	0	200	*	0	0	0	1,800	54	1,397	3,511
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	*	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	*	0	0	0	0	540	0	540
Primary Non-Ferrous Metal Products	5,519	8,814	673	2,569	4,849	*	5,492	4,786	4,591	4,626	4,595	3,439	49,953
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	*	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	*	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	*	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	*	0	0	0	0	0	0	0
Corn	0	0	0	0	0	*	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	*	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	*	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	*	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	*	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	979	0	0	0	0	*	0	0	0	0	0	0	979
Barged Fish	0	0	0	0	0	*	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	18,197	4,550	1,100	2,050	20	*	0	0	2,005	2,700	0	250	30,872
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	*	0	0	0	0	0	0	0
Commodity Unknown	12,248	13,158	6,979	14,366	12,346	*	14,346	10,634	12,659	23,425	10,519	8,344	139,024
Total	111,813	90,466	83,473	109,130	149,323	0	175,327	120,526	218,023	445,780	402,537	386,135	2,292,533

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

* Indicates No Information

Table A.4 Down Bound Movements Through Bonneville, 1992													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	*	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	*	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	*	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	*	0	0	1,420	0	0	0	1,420
Gasoline, Jet Fuel, and Kerosene	18,823	19,509	33,164	18,664	11,526	*	2,975	0	0	0	0	3,144	107,805
Distillate, Residual and Other Fuel Oils	7,743	6,462	7,669	3,499	3,009	*	5,710	3,703	0	0	0	3,408	41,203
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	*	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	*	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	4,999	1,000	2,500	17,325	*	3,403	6,064	0	0	0	7,117	42,408
Organic Industrial Chemicals	0	0	0	0	5,419	*	0	0	0	0	0	2,700	8,119
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	*	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	126,419	111,276	69,731	133,229	137,204	*	128,719	101,021	140,079	129,608	131,857	115,760	1,324,903
Pulp and Waste Products	3,000	5,300	4,800	900	2,276	*	0	0	1,800	1,700	0	0	19,776
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	*	0	0	0	5,185	9,754	1,500	16,439
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	*	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	*	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	*	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	*	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	828	*	0	0	0	0	0	0	828
Paper and Allied Products	10,124	5,448	0	19,135	8,976	*	15,882	8,321	8,719	7,701	11,099	14,347	109,752
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	*	0	0	0	0	321	0	321
Primary Iron and Steel Products	0	0	0	0	0	*	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	2,621	2,350	2,157	2,138	2,394	*	3,507	1,725	3,545	4,154	4,329	3,448	32,368
Primary Wood Products; Veneer; Plywood	3,927	0	0	0	0	*	0	0	0	0	0	0	3,927
Food and Farm Products (General)	3,550	6,064	1,500	2,197	2,771	*	0	1,800	1,200	2,898	3,649	175	25,804
Fresh Fish and Other Marine Products	0	0	0	0	0	*	10	0	0	0	0	0	10
Wheat	445,891	470,903	224,884	430,545	259,615	*	527,598	363,574	298,818	366,825	406,034	382,988	4,177,675
Corn	20	11,557	3,000	8,980	2,800	*	0	0	0	12,276	6,040	126	44,799
Rye, Barley, Rice, Sorghum, Oats	104,006	2,500	4,000	62,539	2,211	*	8,789	15,400	7,710	2,500	0	32,457	242,112
Oilseeds (Soybean, Flaxseed, and Others)	2,500	0	0	466	3,389	*	2,286	0	1,907	2,790	509	0	13,847
Vegetable Products	5,111	2,565	1,835	9,284	0	*	9,776	3,618	6,040	9,568	5,315	7,715	60,827
Animal Feed, Grain Mill Products, Flour	10,655	9,125	5,642	6,714	8,760	*	18,902	7,002	11,259	10,901	14,458	7,574	110,992
Other Agricultural Products, Including Food	954	6,866	1,007	2,346	4,476	*	3,967	3,684	3,848	435	511	2,278	30,372
Barged Fish	0	0	0	0	0	*	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	430	4,928	3,960	228	2,750	*	0	1,500	17	611	0	5,560	19,984
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	*	0	0	0	0	0	0	0
Commodity Unknown	159	255	20	592	6	*	413	1,252	1,000	3,549	1,203	567	9,016
Total	745,933	670,107	364,369	703,956	475,735	0	731,937	518,664	487,362	560,701	595,079	590,864	6,444,707

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

* Indicates No Information

Table A.5 Up Bound Movements Through Bonneville, 1993													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	1,785	0	0	0	0	1,785
Crude Petroleum	0	0	0	0	0	900	0	0	0	0	0	0	900
Gasoline, Jet Fuel, and Kerosene	30,825	49,461	37,459	75,629	77,511	95,416	94,684	63,391	103,520	94,072	59,600	54,823	836,391
Distillate, Residual and Other Fuel Oils	53,476	35,197	38,954	71,726	54,347	53,428	51,442	71,569	649,554	100,129	105,290	0	1,285,112
Petroleum Pitches, Asphalt, and Naptha	5,387	4,445	0	0	10,740	5,700	2,250	0	8,084	1,483	10,967	9,305	58,361
Chemicals and Related Products (General)	2,400	0	0	0	0	0	0	0	0	1,250	0	1,800	5,450
Fertilizer (Nitrogenous, Potassic, Phosphoric)	9,400	21,100	9,400	16,800	14,500	18,600	31,345	39,900	19,000	14,150	9,400	15,325	218,920
Organic Industrial Chemicals	4,150	8,800	1,500	3,600	0	0	5,450	0	1,800	1,858	0	372	27,530
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	162	0	0	397	162	735	133	292	287	41	0	297	2,506
Pulp and Waste Products	1,100	0	0	1,977	8,528	4,485	0	4,408	3,277	2,950	0	1,770	28,495
Sand, Gravel, Stone, and Crushed Rock	54,136	39,304	0	0	0	0	0	0	0	0	0	0	93,440
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	6,000	202	87	300	0	59	0	0	46	6,694
Building Cement and Concrete; Lime; Glass	2,000	0	0	0	0	0	0	0	0	0	0	0	2,000
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	4,240	6,966	1,128	2,749	4,160	2,910	3,590	7,071	3,606	5,781	4,285	4,696	51,182
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	23	60	40	123
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	4,600	6,540	973	2,370	0	100	4,150	2,100	2,000	4,220	50	250	27,353
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	11,804	12,235	5,516	12,715	0	15,890	20,729	10,652	12,497	13,441	12,771	13,076	141,326
Total	183,680	184,048	94,930	193,963	170,150	198,251	214,073	201,168	803,684	239,398	202,423	101,800	2,787,568

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

Table A.6 Down Bound Movements Through Bonneville, 1993													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	5,165	0	2,097	0	0	0	0	1,300	0	0	1,303	0	9,865
Distillate, Residual and Other Fuel Oils	2,992	0	0	0	0	0	7,656	0	0	0	4,424	0	15,072
Petroleum Pitches, Asphalt, and Naptha	2,400	0	0	0	0	0	0	0	0	0	0	0	2,400
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	1,500	0	2,229	13,120	9,892	8,404	1,021	5,868	0	0	0	42,034
Organic Industrial Chemicals	0	0	0	0	0	0	20	0	0	48	144	0	212
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	130,093	178,992	105,875	169,496	127,579	129,026	155,973	179,992	148,567	132,529	113,774	126,146	1,698,042
Pulp and Waste Products	1,500	0	1,500	1,080	0	0	0	1,800	0	0	0	0	5,880
Sand, Gravel, Stone, and Crushed Rock	5,000	0	0	0	0	0	0	0	0	0	0	0	5,000
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	4,023	0	0	0	240	0	3,300	0	0	7,563
Sulfur (Liquid and Dry); Clay; Salt	144	380	1,042	463	0	0	22	240	0	0	0	3,406	5,697
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	887	0	887
Paper and Allied Products	13,316	14,257	990	7,205	4,399	10,333	7,371	2,382	12,514	8,949	10,461	10,168	102,345
Building Cement and Concrete; Lime; Glass	0	0	0	169	0	0	0	0	409	0	0	762	1,340
Primary Iron and Steel Products	0	0	0	0	0	750	0	0	0	0	0	0	750
Primary Non-Ferrous Metal Products	1,425	2,067	978	2,382	5,322	2,319	2,814	3,746	3,002	0	1,834	4,925	30,814
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	25	0	0	0	0	25
Food and Farm Products (General)	0	0	0	345	308	98	353	78	171	0	0	3,550	4,903
Fresh Fish and Other Marine Products	0	0	0	56	29	0	0	0	0	0	1,200	0	1,285
Wheat	321,438	306,779	200,356	377,313	390,570	241,313	266,232	704,546	440,473	401,681	382,666	662,046	4,695,413
Corn	109	0	1,402	84	152	156	20	40	220	139	11,660	7,299	21,281
Rye, Barley, Rice, Sorghum, Oats	68,960	78,220	28,655	15,102	10,003	0	7,150	29,202	9,525	70	26,650	35,092	308,629
Oilseeds (Soybean, Flaxseed, and Others)	3,542	0	0	47	0	1,200	2,200	2,156	3,907	0	0	0	13,052
Vegetable Products	2,682	8,863	2,569	7,568	4,178	10,558	6,064	6,302	7,751	10,837	7,911	9,120	84,403
Animal Feed, Grain Mill Products, Flour	6,371	14,526	6,857	13,664	6,935	2,552	5,454	5,616	8,651	14,935	13,005	10,250	108,816
Other Agricultural Products, Including Food	2,792	2,560	2,797	20	2,908	1,978	2,686	2,163	6,477	642	4,589	3,014	32,626
Barged Fish	0	0	0	11	0	0	292	0	0	0	0	0	303
All Manufactured Equipment and Machinery	4,527	34	8,270	1,050	0	82	4,128	77	4,080	1,257	0	150	23,655
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	3,600	276	136	153	0	175	1,695	1,059	1,984	1,167	384	267	10,896
Total	576,056	608,454	363,524	602,460	565,503	410,432	478,534	941,985	653,599	575,554	580,892	876,195	7,233,188

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

Table A.7 Up Bound Movements Through Bonneville, 1994													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	1,440	0	0	0	5,886	1,884	0	2,241	0	0	0	0	11,451
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	48,317	31,241	24,216	73,476	84,034	94,767	80,463	103,187	119,212	83,202	88,614	70,983	901,712
Distillate, Residual and Other Fuel Oils	51,394	44,427	45,092	48,256	46,906	45,057	42,348	41,453	69,969	91,897	67,372	61,037	655,208
Petroleum Pitches, Asphalt, and Naptha	2,590	6,657	7,276	5,857	2,240	0	4,214	10,545	8,472	1,452	6,864	4,380	60,547
Chemicals and Related Products (General)	4,400	0	0	0	0	1,800	0	0	0	1,000	0	0	7,200
Fertilizer (Nitrogenous, Potassic, Phosphoric)	13,400	27,500	7,294	20,676	22,500	40,863	34,500	22,700	6,450	166,000	18,750	7,698	388,331
Organic Industrial Chemicals	1,001	1,750	1,800	1,800	3,810	0	4,590	0	0	0	0	0	14,751
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	225	270	162	493	351	0	3,490	5,643	322	405	364	3,250	14,975
Pulp and Waste Products	0	1,453	0	0	0	0	3,748	3,751	5,945	1,796	9,965	7,814	34,472
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	1,800	0	0	0	1,800
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	22	0	0	0	0	0	0	0	718	740
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	400	0	400
Primary Non-Ferrous Metal Products	4,726	8,880	3,532	4,095	3,502	3,872	5,974	2,893	4,255	5,811	5,299	4,217	57,056
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	500	0	0	0	0	0	0	0	0	0	0	6,300	6,800
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	52	52
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	2,500	1,380	1,400	1,000	0	0	4,000	2,104	1,000	1,057	200	73	14,714
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	15,846	7,900	8,899	16,096	16,851	17,356	14,861	13,514	9,365	15,220	8,900	8,822	153,630
Total	146,339	131,458	99,671	171,771	186,080	205,599	198,188	208,031	226,790	367,840	206,728	175,344	2,323,839

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

Table A.8 Down Bound Movements Through Bonneville, 1994													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	25	0	0	25
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	5,890	3,569	10,366	0	0	0	0	6,231	0	0	0	0	26,056
Distillate, Residual and Other Fuel Oils	4,873	0	1,696	0	4,079	0	0	0	0	0	0	0	10,648
Petroleum Pitches, Asphalt, and Naptha	3,348	0	0	0	0	0	0	0	0	0	0	0	3,348
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	4,336	6,951	17,261	5,021	6,534	0	0	5,411	0	970	46,484
Organic Industrial Chemicals	0	0	23	0	1,543	0	0	0	0	0	0	0	1,566
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	128,317	114,755	110,923	145,299	111,496	111,797	111,973	118,192	138,914	136,768	113,556	147,145	1,489,135
Pulp and Waste Products	0	0	0	118	1,660	1,194	0	0	3,800	1,500	0	0	8,272
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	208	0	0	208
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	21	0	0	21
Sulfur (Liquid and Dry); Clay; Salt	948	120	0	0	0	284	200	0	469	195	223	352	2,791
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	8,571	6,186	9,021	11,622	13,400	11,512	15,751	1,140	11,100	11,075	14,976	8,362	122,716
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	1,134	0	0	1,134
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	3,338	2,590	2,218	4,481	1,508	5,169	2,020	3,538	5,203	2,036	2,850	2,175	37,126
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	146	0	0	168	0	164	0	478
Food and Farm Products (General)	2,022	0	2,149	650	0	429	413	500	2,310	58	0	1,317	9,848
Fresh Fish and Other Marine Products	1,710	0	6,113	0	0	0	0	0	0	0	7,200	3,600	18,623
Wheat	699,792	463,570	384,172	326,908	554,699	339,139	347,965	350,444	484,764	413,469	723,961	591,962	5,680,845
Corn	120	3,317	2,850	3,000	5,403	383,824	20	120	97	6,512	6,622	3,006	414,891
Rye, Barley, Rice, Sorghum, Oats	16,524	36,608	19,242	37,559	0	0	45	0	9,950	0	0	13,150	133,078
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	226	0	0	5,550	9,204	23	0	2,201	0	17,204
Vegetable Products	2,956	7,974	3,683	2,910	8,663	3,680	8,668	8,450	13,185	10,893	13,634	6,960	91,656
Animal Feed, Grain Mill Products, Flour	17,185	16,304	9,707	8,420	10,342	4,206	6,247	12,263	5,572	2,560	9,931	6,656	109,393
Other Agricultural Products, Including Food	3,288	10,619	6,522	5,175	1,011	8,313	3,784	2,669	1,979	1,551	5,149	4,344	54,404
Barged Fish	0	0	0	437	671	85	46	0	0	0	0	0	1,239
All Manufactured Equipment and Machinery	86	3,536	1,000	1,875	20	3	680	0	0	0	0	101	7,301
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	711	1,744	325	2,528	1,407	1,377	1,024	712	1,957	841	700	563	13,889
Total	899,679	670,892	574,346	558,159	733,163	876,179	510,920	513,463	679,491	594,257	901,167	790,663	8,302,379

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

Table A.9 Up Bound Movements Through Bonneville, 1995													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	3,000	0	2,600	4,600	1,651	4,223	0	0	0	2,215	1,583	19,872
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	49,841	54,691	58,957	111,086	116,159	126,881	126,573	149,793	152,859	147,392	111,031	76,037	1,281,300
Distillate, Residual and Other Fuel Oils	58,246	25,459	47,838	58,057	46,695	59,585	51,642	54,729	67,617	74,556	73,496	58,116	676,036
Petroleum Pitches, Asphalt, and Naptha	1,496	15,152	1,370	0	5,140	11,406	8,099	10,447	3,107	0	5,514	8,317	70,048
Chemicals and Related Products (General)	0	0	0	1,750	0	0	1,500	0	0	1,750	1,750	1,750	8,500
Fertilizer (Nitrogenous, Potassic, Phosphoric)	22,800	30,149	9,600	20,150	37,448	17,117	7,300	25,011	21,300	17,600	8,282	21,400	238,157
Organic Industrial Chemicals	0	0	0	0	0	0	3,500	0	0	0	0	0	3,500
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	0	270	27	0	3,343	261	233	216	0	189	0	0	4,539
Pulp and Waste Products	3,316	1,312	0	6,050	4,972	2,128	4,207	9,678	3,700	1,738	4,100	4,060	45,261
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	44	0	44
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	500	0	0	0	0	0	0	0	0	0	0	500
Primary Non-Ferrous Metal Products	4,536	2,773	2,116	4,008	3,112	2,919	3,543	4,267	6,047	5,703	5,000	8,568	52,592
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	1,301	0	0	0	0	1,700	0	0	0	3,001
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	70	0	0	0	0	0	0	0	0	70
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	150	1,300	1,800	0	0	650	0	12,171	3,244	5,755	0	1,000	26,070
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	13,375	12,169	9,481	11,082	12,155	13,044	13,118	7,564	13,837	10,512	10,893	10,252	137,482
Total	153,760	146,775	131,189	216,154	233,624	235,642	223,938	273,876	273,411	265,195	222,325	191,083	2,566,972

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

Table A.10 Down Bound Movements Through Bonneville, 1995													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	5,460	0	800	3,292	0	0	0	0	2,179	0	0	1,948	13,679
Distillate, Residual and Other Fuel Oils	11,511	8,263	0	0	0	0	0	0	0	0	0	0	19,774
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	2,150	0	0	0	0	0	2,150
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	10,298	865	10,247	8,000	11,040	14,786	10,115	950	903	0	3,600	70,804
Organic Industrial Chemicals	0	0	0	0	0	0	23	0	0	0	0	0	23
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	20	0	0	20
Forest Products (Lumber, Logs, Woodchips)	106,812	116,722	91,825	94,804	86,812	127,936	128,092	149,732	139,726	114,766	84,231	62,332	1,303,790
Pulp and Waste Products	0	0	0	0	1,246	3,052	1,248	2,596	1,400	2,500	1,800	3,654	17,496
Sand, Gravel, Stone, and Crushed Rock	3,040	3,000	1,400	2,800	0	1,745	5,000	6,000	5,300	5,024	5,527	2,720	41,556
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	27	0	0	1,002	700	0	0	1,729
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	199	395	0	0	0	594
Sulfur (Liquid and Dry); Clay; Salt	127	284	389	1,143	417	236	0	0	138	59	114	0	2,907
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	12,592	9,718	11,422	6,878	12,442	11,916	8,117	9,706	7,633	7,162	9,191	13,437	120,214
Building Cement and Concrete; Lime; Glass	256	0	0	0	0	0	0	0	0	0	0	0	256
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	2,428	1,602	1,226	2,404	1,620	2,458	3,822	3,339	2,925	7,737	2,320	1,556	33,437
Primary Wood Products; Veneer; Plywood	298	738	314	328	248	322	2	15	0	0	0	97	2,362
Food and Farm Products (General)	1,385	265	0	20	173	0	285	1,939	5,769	1,892	1,880	2,366	15,974
Fresh Fish and Other Marine Products	0	3,050	0	3,500	2,750	0	463	0	0	0	0	0	9,763
Wheat	433,930	531,068	279,078	315,743	269,588	248,935	369,766	549,315	546,913	562,502	695,817	674,489	5,477,144
Corn	80	126	78	61	174	127	44	329	75	212	9,200	188	10,694
Rye, Barley, Rice, Sorghum, Oats	2,500	84,437	15,300	19,380	17,016	6,272	0	71,842	51,700	38,403	9,100	21,278	337,228
Oilseeds (Soybean, Flaxseed, and Others)	0	3,627	178	0	0	0	2,100	4,807	896	120	2,214	73	14,015
Vegetable Products	10,081	8,135	6,385	9,101	7,568	8,199	6,405	8,810	10,329	6,713	14,258	11,354	107,338
Animal Feed, Grain Mill Products, Flour	9,369	5,839	3,039	3,555	6,542	4,870	7,581	13,915	5,391	11,241	13,827	8,183	93,352
Other Agricultural Products, Including Food	1,439	2,302	862	2,587	2,278	2,272	3,082	848	3,077	1,841	5,606	6,775	32,969
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	915	980	1,100	118	2	300	0	102	0	262	0	4,533	8,312
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	1,131	1,418	1,290	475	979	791	586	1,621	400	2,229	224	400	11,544
Total	603,354	791,872	415,551	476,436	417,855	430,498	553,552	835,230	786,198	764,286	855,309	818,983	7,749,124

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

Table A.11 Up Bound Movements Through Bonneville, 1996													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	773	0	0	0	0	6,101	0	0	0	5,688	0	12,562
Crude Petroleum	0	0	0	0	0	0	0	1,485	0	0	0	0	1,485
Gasoline, Jet Fuel, and Kerosene	74,088	55,824	91,592	104,135	113,207	77,412	106,807	143,697	140,028	116,640	83,689	66,283	1,173,402
Distillate, Residual and Other Fuel Oils	54,004	38,999	57,724	78,843	74,258	46,492	65,222	51,262	70,167	65,967	63,660	43,542	710,140
Petroleum Pitches, Asphalt, and Naptha	2,911	5,212	6,572	6,113	8,189	4,505	9,039	5,566	2,876	14,945	7,430	2,900	76,258
Chemicals and Related Products (General)	0	0	0	1,750	0	0	3,200	2,500	1,750	0	4,500	0	13,700
Fertilizer (Nitrogenous, Potassic, Phosphoric)	18,800	2,019	0	2,400	5,496	13,700	6,900	11,400	9,400	2,200	0	0	72,315
Organic Industrial Chemicals	3,600	1,750	1,750	0	0	7,300	4,200	0	1,900	1,750	3,500	1,750	27,500
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	562	200	54	164	54	336	124	0	162	54	246		1,956
Pulp and Waste Products	1,288	0	6,049	1,904	3,668	1,876	3,720	5,648	4,480	8,767	3,760	1,848	43,008
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	159	0	0	159
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	84	0	0	0	0	0	0	0	0	0	84
Primary Iron and Steel Products	0	0	1,220	0	0	0	0	0	0	0	0	0	1,220
Primary Non-Ferrous Metal Products	3,774	1,016	3,831	5,294	2,868	4,725	1,594	5,669	4,761	3,931	7,847	9,749	55,059
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	6,600	0	3,000	0	6,500	0	0	9,413	0	0	25,513
Corn	0	0	0	0	0	0	0	0	0	2,700	0	0	2,700
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	846	0	0	0	0	0	0	92	0	0	938
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	0	3,805	6,030	1,400	620	220	1,951	1,300	4,000	2,061	0	870	22,257
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	3,770	3,592	7,362
Commodity Unknown	13,659	9,847	13,474	15,838	16,257	16,093	15,129	10,459	24,164	10,120	8,380	7,462	160,882
Total	172,686	119,445	195,826	217,841	227,617	172,659	230,487	238,986	263,688	238,799	192,470	137,996	2,408,500

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

Table A.12 Down Bound Movements Through Bonneville, 1996													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	1,654	0	0	1,991	0	6,098	930	0	0	0	10,673
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	2,400	5,029	3,600	7,566	3,214	12,354	4,760	0	0	9,966	5,500	2,010	56,399
Organic Industrial Chemicals	0	20	0	9,910	0	0	0	0	0	0	0	101	10,031
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	60,520	24,774	99,702	83,778	105,266	98,734	114,600	104,777	99,986	96,503	87,669	49,044	1,025,353
Pulp and Waste Products	49	0	2,830	71	0	3,450	1,232	2,576	824	3,350	0	3,410	17,792
Sand, Gravel, Stone, and Crushed Rock	5,660	0	4	0	0	1,351	9,248	8,982	0	2,825	7,560	2,623	38,253
Iron Ore; Iron Steel Waste and Scrap	0	0	1,000	900	900	1,800	230	0	0	960	1,000	1,900	8,690
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	900	0	0	0	0	0	0	0	900
Sulfur (Liquid and Dry); Clay; Salt	23	91	0	76	74	0	101	68	0	258	0	25	716
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	21	21
Paper and Allied Products	6,138	135	6,605	1,800	2,000	2,612	5,692	6,927	9,642	6,071	3,145	3,225	53,992
Building Cement and Concrete; Lime; Glass	0	0	127	0	0	0	0	0	0	0	0	0	127
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	1,000	0	0	0	1,000
Primary Non-Ferrous Metal Products	1,712	4,480	2,232	2,262	5,022	8,050	4,533	5,650	3,107	2,852	2,032	2,228	44,160
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	4,575	0	0	1,501	1,833	296	0	0	0	3,748	16,326	3,893	32,172
Fresh Fish and Other Marine Products	0	0	0	500	0	0	0	0	0	0	0	0	500
Wheat	627,291	287,330	340,834	355,222	307,686	210,434	294,740	934,730	660,560	469,944	606,201	460,653	5,555,625
Corn	6,107	20	0	62	19	78	72	0	0	4,812	5,684	94	16,948
Rye, Barley, Rice, Sorghum, Oats	10,361	4,621	13,562	3,864	13,827	11,950	4,494	35,600	34,262	4,750	20,482	8,800	166,573
Oilseeds (Soybean, Flaxseed, and Others)	0	0	858	0	0	0	0	5,108	3,041	0	0	0	9,007
Vegetable Products	7,618	2,380	8,146	6,133	13,976	9,084	7,298	10,418	6,750	11,839	11,300	11,399	106,341
Animal Feed, Grain Mill Products, Flour	11,006	6,765	7,620	9,296	5,819	4,891	4,737	7,350	12,309	14,302	7,875	9,354	101,324
Other Agricultural Products, Including Food	3,531	282	4,530	3,457	5,022	4,814	1,896	3,936	1,665	2,451	6,129	7,203	44,916
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	3,750	1,850	3,300	513	630	1,600	1,862	962	117	1,520	0	659	16,763
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	775	581	895	1,227	674	290	342	419	38	1,370	0	0	6,611
Total	751,516	338,358	497,499	488,138	466,862	373,779	455,837	1,133,601	834,231	637,521	780,903	566,642	7,324,887

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

Table A.13 Up Bound Movements Through Bonneville, 1997													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	2,500	0	0	0	6,770	0	0	0	0	6,000	0	15,270
Petroleum Products (General)	4,206	0	0	0	0	2,904	0	2,933	0	0	0	5,271	15,314
Crude Petroleum	0	0	0	0	0	0	0	0	1,182	0	0	0	1,182
Gasoline, Jet Fuel, and Kerosene	89,036	92,442	36,201	88,321	72,274	107,320	72,795	115,926	114,042	105,980	99,781	60,373	1,054,491
Distillate, Residual and Other Fuel Oils	44,713	40,912	51,478	76,813	94,128	68,418	86,090	71,677	94,954	80,387	70,371	90,532	870,473
Petroleum Pitches, Asphalt, and Naptha	5,905	7,671	0	5,890	7,143	6,256	0	3,088	6,216	2,849	0	0	45,018
Chemicals and Related Products (General)	0	0	0	4,150	0	0	0	0	1,800	0	0	0	5,950
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	14,600	9,400	4,400	5,421	17,680	11,450	15,917	11,400	10,794	7,200	4,800	113,062
Organic Industrial Chemicals	1,800	1,750	1,800	850	2,000	6,100	0	3,550	1,800	1,800	3,400	1,800	26,650
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	0	2,510	0	54	0	0	243	0	54	162	54	0	3,077
Pulp and Waste Products	8,800	3,206	1,960	9,064	5,878	4,696	0	0	0	0	6,400	7,133	47,137
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	1,678	1,678
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	52	62	0	0	114
Building Cement and Concrete; Lime; Glass	0	0	0	200	0	0	0	0	0	0	0	0	200
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	6,901	8,497	4,335	4,466	3,724	3,556	5,125	5,423	5,245	7,789	5,325	5,354	65,740
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	1,906	0	0	0	0	0	0	0	0	1,906
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	3,200	7,325	1,320	421	500	500	300	1,320	6,645	8,415	575	3,465	33,986
Waste Material (Garbage, Landfill, Sewage)	7,761	10,474	4,594	7,514	9,822	11,256	19,060	18,455	20,897	18,043	12,974	8,674	149,524
Commodity Unknown	6,838	1,960	1,960	1,960	1,960	2,800	0	1,568	0	150	0	1,425	20,621
Total	179,160	193,847	113,048	206,009	202,850	238,256	195,063	239,857	264,287	236,431	212,080	190,505	2,471,393

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

Table A.14 Down Bound Movements Through Bonneville, 1997													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	2,984	0	0	0	0	0	386	0	0	0	3,370
Distillate, Residual and Other Fuel Oils	0	0	2,204	0	0	0	0	0	0	0	0	0	2,204
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	1,404	0	0	0	0	0	0	0	0	1,404
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	3,496	725	4,233	9,506	3,459	8,108	4,824	400	5,000	0	878	40,629
Organic Industrial Chemicals	0	0	0	0	289	69	91	5	151	0	0	0	605
Crude Materials and Inedibles, Except Fuels	0	0	0	23	0	0	0	0	0	0	0	0	23
Forest Products (Lumber, Logs, Woodchips)	97,128	96,738	66,000	114,480	110,566	94,570	102,031	99,866	90,691	130,212	142,078	126,110	1,270,470
Pulp and Waste Products	5,200	2,500	0	3,300	2,122	2,200	2,100	0	3,248	1,550	0	0	22,220
Sand, Gravel, Stone, and Crushed Rock	3,700	6,800	50	3,350	10,242	14,400	9,976	24,089	15,104	20,020	47,013	14,425	169,169
Iron Ore; Iron Steel Waste and Scrap	0	1,100	930	2,400	1,400	3,100	2,420	900	1,800	0	3,200	1,600	18,850
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	1,400	0	1,200	0	0	0	2,500	0	0	5,100
Sulfur (Liquid and Dry); Clay; Salt	276	0	0	0	0	182	0	0	306	68	98	205	1,135
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	11,757	9,303	5,043	9,154	5,751	8,170	6,660	4,987	2,536	9,588	13,357	15,313	101,619
Building Cement and Concrete; Lime; Glass	0	0	0	0	361	0	0	0	0	0	0	0	361
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	2,204	2,834	962	3,710	2,168	4,642	2,878	3,880	2,817	3,298	1,995	2,916	34,304
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	9,943	13,699	7,203	1,246	3,471	2,948	5,606	9,369	6,475	9,621	7,296	4,136	81,013
Fresh Fish and Other Marine Products	0	0	0	5	21	6	0	0	0	0	0	0	32
Wheat	484,839	531,902	444,274	365,303	322,226	287,684	399,819	734,254	482,693	383,700	543,973	571,427	5,552,094
Corn	93	44	0	0	7,219	20	59	36	37	79	8,953	34	16,574
Rye, Barley, Rice, Sorghum, Oats	22,231	9,971	2,520	0	0	12,785	6,508	34,667	48,374	62,215	34,454	4,800	238,525
Oilseeds (Soybean, Flaxseed, and Others)	0	0	45	943	0	140	371	0	2,200	3,405	0	5,408	12,512
Vegetable Products	10,079	12,772	846	15,827	11,362	7,558	9,787	6,615	14,092	16,123	15,756	11,023	131,840
Animal Feed, Grain Mill Products, Flour	18,342	6,327	4,188	6,191	3,531	3,117	4,047	2,721	4,209	8,877	10,338	2,853	74,741
Other Agricultural Products, Including Food	11,724	7,124	4,105	4,912	2,528	4,506	891	2,575	3,345	4,408	3,725	7,755	57,598
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	200	5,114	4,354	835	381	100	2,005	1,400	252	0	4,913	1,530	21,084
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	1,000	2,500	0	0	0	3,500
Commodity Unknown	605	774	0	0	24	702	731	495	1,295	0	608	50	5,284
Total	678,321	710,498	546,433	538,716	493,168	451,558	564,088	931,683	682,911	660,664	837,757	770,463	7,866,260

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

Table A.15 Up Bound Movements Through Bonneville, 1998													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	6,900	0	0	0	0	0	0	0	6,900
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	2,238	0	0	5,916	0	2,961	0	11,115
Gasoline, Jet Fuel, and Kerosene	76,449	75,070	43,645	70,600	122,219	107,692	130,407	123,384	138,427	131,467	87,486	74,495	1,181,341
Distillate, Residual and Other Fuel Oils	47,824	69,893	65,282	62,910	72,044	74,517	50,277	87,665	78,500	84,999	72,728	53,715	820,354
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	14,878	2,217	0	0	0	0	0	17,095
Chemicals and Related Products (General)	1,800	0	1,750	0	0	1,600	0	0	0	0	0	0	5,150
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	1,000	5,350	1,700	13,109	17,128	8,200	1,873	2,007	4,400	2,000	0	56,767
Organic Industrial Chemicals	1,750	1,750	0	0	3,300	0	0	7,150	1,700	3,500	1,800	3,700	24,650
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	0	0	0	0	0	180	0	162	81	108	0	54	585
Pulp and Waste Products	1,482	0	0	1,400	0	0	2,418	0	1,090	1,368	1,064	0	8,822
Sand, Gravel, Stone, and Crushed Rock	2,500	0	0	0	0	0	0	0	0	0	0	0	2,500
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	20	0	0	0	0	0	0	20
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	144	0	0	0	0	0	0	1,750	0	0	0	1,894
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	200	0	0	0	0	0	0	0	0	0	0	0	200
Primary Non-Ferrous Metal Products	6,564	6,482	6,251	5,451	5,715	3,855	5,895	6,178	6,180	12,782	7,255	4,822	77,430
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	6,491	0	0	0	0	80	0	6,571
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	2,540	2,153	2,120	625	140	0	3	2,025	1,400	3,829	0	700	15,535
Waste Material (Garbage, Landfill, Sewage)	12,807	16,008	10,985	16,304	13,919	17,955	14,182	18,799	18,186	13,932	14,090	17,187	184,354
Commodity Unknown	0	0	1,511	0	1,600	0	0	0	25	0	0	0	3,136
Total	153,916	172,500	136,894	158,990	238,946	246,554	213,599	247,236	255,262	256,385	189,464	154,673	2,424,419

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

Table A.16 Down Bound Movements Through Bonneville, 1998													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	7,000	0	0	0	0	0	0	0	0	3,550	0	10,550
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	0	0	0	0	0	0	0	0	0	0	0
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	3,200	0	0	0	3,200
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	9,532	425	4,500	6,500	4,490	6,116	6,600	6,700	0	0	3,900	0	48,763
Organic Industrial Chemicals	0	0	0	0	0	0	0	0	0	75	0	66	141
Crude Materials and Inedibles, Except Fuels	101	0	0	0	0	0	0	0	0	0	0	0	101
Forest Products (Lumber, Logs, Woodchips)	110,778	105,900	83,252	106,097	96,062	94,950	96,742	111,790	87,628	88,127	87,824	65,773	1,134,923
Pulp and Waste Products	0	0	0	24	1,320	1,840	1,891	0	0	0	0	0	5,075
Sand, Gravel, Stone, and Crushed Rock	6,633	28,809	17,439	29,493	23,585	36,218	25,737	18,967	17,037	28,530	34,455	44,347	311,250
Iron Ore; Iron Steel Waste and Scrap	0	1,200	1,200	3,200	1,168	0	3,220	1,400	3,600	1,600	1,200	1,150	18,938
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	1,200	0	1,800	0	0	0	0	0	0	0	3,000
Sulfur (Liquid and Dry); Clay; Salt	0	70	68	503	420	27	0	0	68	0	0	0	1,156
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	14,888	24,788	8,921	13,298	24,420	16,498	17,048	19,305	18,204	11,753	13,602	18,701	201,426
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	216	0	0	0	0	0	0	0	0	216
Primary Non-Ferrous Metal Products	4,845	4,111	1,714	2,715	2,607	2,634	3,857	2,430	2,290	2,764	4,175	1,946	36,088
Primary Wood Products; Veneer; Plywood	0	1,150	0	0	0	0	0	0	0	0	0	0	1,150
Food and Farm Products (General)	2,752	4,455	4,622	1,770	3,157	2,178	3,589	2,878	3,627	6,237	678	88	36,031
Fresh Fish and Other Marine Products	0	0	0	525	0	7	11	0	0	0	0	0	543
Wheat	525,432	324,396	242,561	350,875	331,212	260,827	502,023	793,370	424,957	859,703	841,703	560,260	6,017,319
Corn	61	3,171	2,500	340	121	0	0	0	0	42	3,022	4,260	13,517
Rye, Barley, Rice, Sorghum, Oats	69	16,349	2,400	505	6,200	13,406	15,322	55,505	45,771	6,754	9,362	14,981	186,624
Oilseeds (Soybean, Flaxseed, and Others)	0	0	278	0	23	0	0	1,382	2,400	0	0	2,840	6,923
Vegetable Products	17,774	16,553	5,573	6,462	5,992	11,460	9,869	7,801	12,837	13,297	14,324	7,915	129,857
Animal Feed, Grain Mill Products, Flour	2,741	14,886	4,489	9,568	3,445	3,460	4,432	6,359	6,814	15,959	20,655	17,949	110,757
Other Agricultural Products, Including Food	8,604	2,662	766	6,123	1,915	5,958	8,799	7,494	11,869	4,248	2,015	9,602	70,055
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	2,600	156	9,875	1,390	470	0	10	0	100	20	0	4,628	19,249
Waste Material (Garbage, Landfill, Sewage)	0	0	50	0	0	0	0	0	0	28	0	0	78
Commodity Unknown	211	543	68	186	246	0	0	0	0	1,434	239	0	2,927
Total	707,021	556,624	391,476	539,790	508,653	455,579	699,150	1,035,381	640,402	1,040,571	1,040,704	754,506	8,369,857

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

Table A.17 Up Bound Movements Through Bonneville, 1999													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	6,110	0	0	0	0	0	10,381	0	0	0	16,491
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	2,966	0	2,966
Gasoline, Jet Fuel, and Kerosene	75,508	94,633	72,831	108,801	120,455	86,403	137,163	136,263	117,635	127,115	87,771	71,049	1,235,627
Distillate, Residual and Other Fuel Oils	63,781	44,694	48,742	83,665	82,158	63,054	72,852	80,239	93,636	69,603	72,958	73,697	849,079
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	1,600	0	0	1,400	0	0	0	2,900	5,900
Fertilizer (Nitrogenous, Potassic, Phosphoric)	5,000	2,400	2,000	1,400	2,200	8,498	3,000	0	2,500	4,842	3,300	3,026	38,166
Organic Industrial Chemicals	1,800	3,600	1,600	1,800	1,650	1,500	0	1,750	1,400	1,800	2,600	0	19,500
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	283	0	0	135	54	162	0	340	0	400	81	808	2,263
Pulp and Waste Products	0	0	0	0	0	0	1,500	0	0	0	0	1,710	3,210
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	2,560	0	2,560
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	690	0	0	0	0	0	0	0	690
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	50	0	0	0	0	0	0	0	0	0	0	50
Primary Non-Ferrous Metal Products	7,265	4,502	4,876	4,314	4,622	4,174	5,174	5,531	6,615	9,000	7,708	8,531	72,312
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	146	0	0	0	0	0	0	0	146
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	7,700	0	0	3,000	0	0	0	0	0	8,925	0	19,625
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	3,300	0	3,300
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	21	0	0	0	0	0	0	0	21
Animal Feed, Grain Mill Products, Flour	0	0	0	0	450	0	0	0	0	0	0	0	450
Other Agricultural Products, Including Food	0	0	0	0	606	0	0	0	0	0	0	0	606
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	370	102	1,293	1,326	0	0	0	3,525	1,090	5,051	58	650	13,465
Waste Material (Garbage, Landfill, Sewage)	19,046	14,967	14,687	16,083	18,560	18,509	21,616	15,182	19,406	17,375	16,808	13,475	205,714
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	173,053	172,648	152,139	217,524	236,212	182,300	241,305	244,230	252,663	235,186	209,035	175,846	2,492,141

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

Table A.18 Down Bound Movements Through Bonneville, 1999													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	0	0	0	0	0	0	3,110	6,244	0	0	9,354
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	3,600	3,600
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	1,950	4,250	4,500	11,918	3,500	5,900	3,500	4,559	953	12,598	890	0	54,518
Organic Industrial Chemicals	0	0	0	5,524	76	68	0	0	0	0	235	0	5,903
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	22	0	0	1,200	140	1,362
Forest Products (Lumber, Logs, Woodchips)	79,514	91,075	84,022	84,759	84,572	97,946	97,825	106,207	88,907	94,398	82,907	91,908	1,084,040
Pulp and Waste Products	2,674	0	0	1,675	4,950	0	0	0	1,300	0	0	1,500	12,099
Sand, Gravel, Stone, and Crushed Rock	41,253	37,536	8,000	57,336	57,132	56,064	30,187	27,307	15,239	20,282	11,935	11,773	374,044
Iron Ore; Iron Steel Waste and Scrap	1,260	3,600	2,000	3,400	3,600	0	2,900	3,750	2,900	2,900	3,000	3,600	32,910
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	3,800	0	0	3,800	0	0	0	0	0	0	0	7,600
Sulfur (Liquid and Dry); Clay; Salt	1,311	0	68	186	268	389	283	89	25	112	112	503	3,346
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	15,821	14,844	12,176	14,063	12,294	14,590	11,071	21,957	17,870	17,240	12,645	18,755	183,326
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	400	0	0	0	0	0	0	0	2,000	0	0	2,400
Primary Non-Ferrous Metal Products	4,093	4,541	1,826	2,279	3,006	2,237	6,802	6,486	2,318	3,495	2,449	3,108	42,640
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	555	971	289	2,054	1,630	2,871	668	73	2,053	2,398	746	14,308
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	1,693	1,693
Wheat	470,682	476,403	390,074	332,103	334,123	294,548	255,023	400,227	285,855	747,808	392,391	319,196	4,698,433
Corn	4,118	169	27	364	106	652	83	272	0	194	517	2,253	8,755
Rye, Barley, Rice, Sorghum, Oats	15,593	4,210	16,788	9,000	12,834	13,378	0	32,450	39,426	18,530	13,858	11,808	187,875
Oilseeds (Soybean, Flaxseed, and Others)	163	0	0	0	3,046	370	89	1,312	2,626	374	495	0	8,475
Vegetable Products	15,417	13,511	9,478	9,873	7,762	11,749	10,466	6,146	11,672	15,294	16,333	17,021	144,722
Animal Feed, Grain Mill Products, Flour	11,903	14,870	9,472	11,856	9,200	15,173	9,406	16,557	13,828	19,045	21,961	21,025	174,296
Other Agricultural Products, Including Food	8,341	12,803	10,094	9,801	5,715	7,559	8,252	4,044	13,376	9,472	6,720	10,084	106,261
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	0	770	1,057	0	15	140	0	750	0	212	429	1,406	4,779
Waste Material (Garbage, Landfill, Sewage)	0	0	1,054	0	0	0	0	0	0	0	0	0	1,054
Commodity Unknown	1,199	1,110	2,250	22	110	2,640	1,000	0	916	2,569	349	595	12,760
Total	675,292	684,447	553,857	554,448	548,163	525,033	439,758	632,803	500,394	974,820	570,824	520,714	7,180,553

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

Table A.19 Up Bound Movements Through Bonneville, 2000													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	1,477	0	0	0	0	0	0	0	0	0	0	0	1,477
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	78,630	60,111	63,356	88,865	80,450	106,441	124,288	116,382	113,406	109,851	79,486	72,605	1,093,871
Distillate, Residual and Other Fuel Oils	39,836	49,837	46,324	94,177	88,718	51,216	78,933	67,642	85,435	95,782	76,574	62,767	837,241
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	2,000	0	0	2,400	0	0	5,686	0	0	1,800	1,500	1,800	15,186
Fertilizer (Nitrogenous, Potassic, Phosphoric)	3,016	4,500	0	12,817	7,700	5,077	6,120	2,807	5,776	8,800	7,419	0	64,032
Organic Industrial Chemicals	1,300	1,800	2,950	1,800	1,800	3,320	1,400	3,600	1,700	0	1,800	0	21,470
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	681	0	0	304	81	999	0	108	189	0	549	0	2,911
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	3,674	0	0	1,229	0	0	0	0	0	4,903
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	125	140	0	0	0	0	0	0	0	0	50	315
Primary Non-Ferrous Metal Products	9,764	8,333	4,304	7,804	8,187	6,798	8,417	10,181	8,151	9,065	8,506	8,523	98,033
Primary Wood Products; Veneer; Plywood	0	0	338	0	0	1,000	0	0	0	0	0	0	1,338
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	6	0	0	0	0	0	0	6
Wheat	3,450	0	0	0	10,300	0	0	0	0	0	0	0	13,750
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	1,063	0	0	0	0	0	0	0	0	0	1,063
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	3,315	1,275	3,007	2,188	0	0	700	1,150	1,050	3,942	499	1,000	18,126
Waste Material (Garbage, Landfill, Sewage)	18,030	14,456	13,740	21,571	20,654	21,855	21,129	23,316	20,091	23,430	20,166	18,197	236,635
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	161,499	140,437	135,222	235,600	217,890	196,712	247,902	225,186	235,798	252,670	196,499	164,942	2,410,357

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

Table A.20 Down Bound Movements Through Bonneville, 2000													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	2,745	0	0	0	0	0	0	5,877	0	0	0	0	8,622
Distillate, Residual and Other Fuel Oils	2,925	0	0	0	0	0	0	0	3,000	0	0	0	5,925
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	3,500	8,298	10,750	15,033	13,453	1,985	880	5,507	0	5,508	950	0	65,864
Organic Industrial Chemicals	50	0	0	0	0	0	0	0	0	0	14	0	64
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	89,785	107,816	77,974	84,181	93,524	87,047	67,272	104,604	73,796	77,596	83,398	75,506	1,022,499
Pulp and Waste Products	3,586	0	0	0	0	2,906	0	0	1,408	1,600	0	1,830	11,330
Sand, Gravel, Stone, and Crushed Rock	324	21,464	26,758	33,278	32,145	41,326	35,884	61,229	30,731	60,960	29,251	17,700	391,050
Iron Ore; Iron Steel Waste and Scrap	3,200	1,200	3,600	6,650	3,250	2,000	15,500	3,900	3,049	1,500	7,000	6,300	57,149
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	1,700	1,600	0	0	1,500	2,000	1,500	1,300	0	0	0	9,600
Sulfur (Liquid and Dry); Clay; Salt	24	1,337	0	274	68	480	22	300	550	25	51	0	3,131
Primary Manufactured Goods	0	300	0	0	0	0	0	0	0	0	0	0	300
Paper and Allied Products	23,719	9,280	19,916	20,539	9,828	16,926	18,172	15,867	15,090	19,731	9,758	9,379	188,205
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	2,724	2,084	1,411	3,731	3,904	3,451	6,826	4,654	2,842	6,634	3,449	4,350	46,060
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	3,000	0	0	0	3,000
Food and Farm Products (General)	2,318	269	1,200	6,890	1,366	1,692	7,145	9,682	1,333	6,460	14,345	9,855	62,555
Fresh Fish and Other Marine Products	0	2,500	0	57	201	7	0	0	0	0	0	0	2,765
Wheat	443,529	334,429	262,431	344,720	540,299	411,956	357,577	588,496	499,601	666,241	588,254	664,961	5,702,494
Corn	100	96	107	241	212	293	352	0	97	0	99	44	1,641
Rye, Barley, Rice, Sorghum, Oats	24,410	8,250	5,135	3,871	5,190	10,983	5,925	33,120	31,725	19,525	19,043	10,994	178,171
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	1,845	2,333	129	0	0	0	400	4,707
Vegetable Products	19,623	9,413	11,678	12,621	6,884	15,257	7,378	15,904	20,892	18,688	18,914	11,612	168,864
Animal Feed, Grain Mill Products, Flour	16,178	21,912	14,805	13,165	21,179	25,634	9,845	9,994	15,525	20,474	21,343	19,198	209,252
Other Agricultural Products, Including Food	9,434	5,169	9,810	5,571	9,738	7,409	6,425	3,450	3,005	1,990	2,281	6,044	70,326
Barged Fish	0	0	0	0	232	49	85	8	0	0	0	0	374
All Manufactured Equipment and Machinery	782	275	2,047	1,059	0	0	0	550	427	226	580	900	6,846
Waste Material (Garbage, Landfill, Sewage)	0	0	0	38	23	0	0	0	0	0	0	0	61
Commodity Unknown	0	0	0	115	135	0	0	0	0	0	0	0	250
Total	648,956	535,792	449,222	552,034	741,631	632,746	543,621	864,771	707,371	907,158	798,730	839,073	8,221,105

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

Table A.21 Up Bound Movements Through Bonneville, 2001													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	713	0	0	0	713
Gasoline, Jet Fuel, and Kerosene	71,088	109,438	79,814	92,170	121,022	162,058	106,918	99,156	128,225	126,768	46,963	62,219	1,205,839
Distillate, Residual and Other Fuel Oils	54,061	55,374	38,642	85,417	85,187	68,796	81,454	66,399	79,885	95,220	90,431	78,305	879,171
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	1,800	1,800	0	0	0	0	0	0	2,700	0	0	0	6,300
Fertilizer (Nitrogenous, Potassic, Phosphoric)	7,200	16,300	10,970	35,430	28,265	27,146	21,386	14,398	10,320	4,400	0	2,626	178,441
Organic Industrial Chemicals	0	1,600	1,600	1,800	0	0	0	0	0	0	0	0	5,000
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	1,600	1,600
Forest Products (Lumber, Logs, Woodchips)	365	0	0	0	0	108	0	0	145	0	0	0	618
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	6,250	6,250
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	76	0	0	0	76
Primary Manufactured Goods	216	125	0	18	78	0	0	0	0	0	0	0	437
Paper and Allied Products	0	0	0	332	0	0	0	0	1,713	0	0	0	2,045
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	8,192	8,647	6,419	6,340	9,810	6,214	6,955	7,403	7,536	8,184	7,165	6,323	89,188
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	224	0	4	0	0	0	0	0	0	228
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	6,600	0	0	0	6,600
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	594	0	0	0	594
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	911	0	0	0	911
Other Agricultural Products, Including Food	0	0	500	0	0	0	0	0	0	0	0	0	500
Barged Fish	0	0	0	0	0	4	0	0	0	0	0	0	4
All Manufactured Equipment and Machinery	340	2,150	3,017	4,341	100	1,000	75	160	2,054	5,727	1,345	0	20,309
Waste Material (Garbage, Landfill, Sewage)	19,963	18,348	11,716	20,292	21,451	20,530	22,322	22,556	22,063	21,412	21,373	29,763	251,789
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	163,225	213,782	152,678	246,364	265,913	285,860	239,110	210,072	263,535	261,711	167,277	187,086	2,656,613

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

Table A.22 Down Bound Movements Through Bonneville, 2001													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	0	0	0	0	0	0	0	0	0	3,879	3,879
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	3,200	0	0	3,200
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	7,819	1,500	3,400	945	0	0	0	0	0	1,515	1,804	16,983
Organic Industrial Chemicals	68	310	0	0	4,500	88	29	26	0	125	26	0	5,172
Crude Materials and Inedibles, Except Fuels	154	0	316	0	0	0	0	0	49	0	0	0	519
Forest Products (Lumber, Logs, Woodchips)	88,276	71,440	60,729	77,238	52,475	71,701	60,313	66,016	65,962	47,875	46,658	38,290	746,973
Pulp and Waste Products	0	2,000	0	1,050	1,800	0	1,500	0	0	0	1,020	1,900	9,270
Sand, Gravel, Stone, and Crushed Rock	9,400	9,500	21,900	53,118	91,453	92,689	112,472	125,207	104,269	119,802	100,771	76,124	916,705
Iron Ore; Iron Steel Waste and Scrap	4,100	3,000	1,500	2,900	2,900	4,300	2,500	4,600	3,000	5,500	2,900	6,400	43,600
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	1,200	48	0	0	1,700	1,500	0	0	1,500	0	5,948
Sulfur (Liquid and Dry); Clay; Salt	399	506	0	353	304	129	0	361	676	615	901	73	4,317
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	33	0	33
Paper and Allied Products	7,119	8,395	10,247	11,994	10,719	13,230	15,730	14,940	10,106	12,078	10,117	12,477	137,152
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	110	0	110
Primary Non-Ferrous Metal Products	2,626	2,281	4,158	8,835	5,008	3,244	2,784	2,422	2,724	2,966	2,480	3,164	42,692
Primary Wood Products; Veneer; Plywood	0	0	0	2,500	0	0	0	0	0	0	0	0	2,500
Food and Farm Products (General)	3,490	13,778	8,081	7,599	5,813	5,977	9,535	3,606	5,710	8,938	7,736	7,273	87,536
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	414,594	640,510	449,549	399,921	458,444	345,818	286,911	499,744	414,253	561,710	469,336	371,807	5,312,597
Corn	0	557	91	85	70	20	135	135	22	46	25	0	1,186
Rye, Barley, Rice, Sorghum, Oats	21,971	5,700	5,058	10,940	8,125	13,350	6,936	28,677	6,858	27,007	5,600	18,691	158,913
Oilseeds (Soybean, Flaxseed, and Others)	0	0	626	32	728	2,554	663	0	762	1,102	178	85	6,730
Vegetable Products	19,262	13,216	7,389	12,430	13,654	11,669	11,276	16,280	8,441	10,700	25,717	17,467	167,501
Animal Feed, Grain Mill Products, Flour	24,391	17,174	17,232	23,418	20,059	12,836	7,242	20,315	17,617	18,831	20,520	20,210	219,845
Other Agricultural Products, Including Food	1,882	4,376	886	1,341	2,244	1,061	745	3,052	998	5,980	664	2,270	25,499
Barged Fish	0	0	0	94	570	118	147	9	0	0	0	0	938
All Manufactured Equipment and Machinery	120	800	420	505	866	272	385	22	152	350	170	100	4,162
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	27	0	27
Commodity Unknown	0	0	850	159	0	0	0	196	0	28	288	0	1,521
Total	597,852	801,362	591,732	617,960	680,677	579,056	521,003	787,108	641,599	826,853	698,292	582,014	7,925,508

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

Table A.23 Up Bound Movements Through Bonneville, 2002													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	81,329	70,764	78,010	75,130	92,639	85,816	114,057	136,749	100,175	97,939	102,897	60,490	1,095,995
Distillate, Residual and Other Fuel Oils	63,364	77,352	43,953	75,602	89,351	72,215	70,766	78,939	87,307	96,267	82,459	68,997	906,572
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	3,100	2,862	5,897	8,872	15,020	6,674	4,229	5,197	13,518	2,998	6,051	0	74,418
Organic Industrial Chemicals	0	0	0	0	0	2,999	0	0	0	0	0	0	2,999
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	1,800	0	0	0	0	1,500	0	1,880	162	516	0	0	5,858
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	4,300	0	0	0	0	0	0	0	0	0	0	200	4,500
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	724	0	0	0	0	0	0	0	0	0	0	0	724
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	10	30	40
Primary Non-Ferrous Metal Products	6,847	7,077	4,155	8,020	8,802	7,650	5,944	6,095	6,850	4,691	8,913	4,292	79,336
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	2	0	0	0	0	0	2
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	3,000	0	0	0	0	0	0	3,000
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	3,000	0	0	0	0	0	0	3,000
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	1,076	0	0	0	0	0	0	1,076
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	2	0	0	0	0	0	2
All Manufactured Equipment and Machinery	997	255	1,789	1,713	1,885	3,491	3,170	837	2,876	4,641	260	1,010	22,924
Waste Material (Garbage, Landfill, Sewage)	24,483	19,485	12,240	22,420	25,923	22,560	27,719	29,184	23,688	23,061	20,509	20,246	271,518
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	186,944	177,795	146,044	191,757	233,620	209,981	225,889	258,881	234,576	230,113	221,099	155,265	2,471,964

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

Table A.24 Down Bound Movements Through Bonneville, 2002													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	0	6,229	0	0	0	0	0	0	0	0	6,229
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	2,955	5,110	9,903	953	1,000	0	0	0	3,100	789	23,810
Organic Industrial Chemicals	0	0	0	0	0	0	60	28	28	0	23	0	139
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	42,160	37,650	31,250	51,245	58,791	42,200	52,500	36,900	51,100	46,620	45,090	34,560	530,066
Pulp and Waste Products	0	0	0	0	0	300	1,500	1,800	0	2,400	0	0	6,000
Sand, Gravel, Stone, and Crushed Rock	107,963	22,556	13,700	23,705	88,534	115,498	135,436	100,759	109,038	130,059	76,321	60,701	984,270
Iron Ore; Iron Steel Waste and Scrap	2,925	2,329	3,000	6,200	3,500	3,500	4,650	3,550	4,700	4,500	6,600	3,025	48,479
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	77	0	0	0	0	77
Non-Ferrous Metallic Ores, Including Alumina	1,500	0	1,800	0	3,026	1,800	0	1,400	0	1,600	0	0	11,126
Sulfur (Liquid and Dry); Clay; Salt	450	0	0	76	414	261	280	284	236	78	1,185	158	3,422
Primary Manufactured Goods	0	0	0	0	0	24	0	34	0	0	0	0	58
Paper and Allied Products	14,865	5,867	4,881	11,013	6,535	16,095	10,551	13,238	14,469	10,539	15,541	15,030	138,624
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	1,100	1,100
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	2,000	2,000
Primary Non-Ferrous Metal Products	2,960	2,314	1,616	4,726	3,010	2,568	3,032	2,831	3,208	3,088	2,856	2,216	34,425
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	12,370	3,914	4,461	7,323	4,411	1,261	5,738	968	1,738	1,885	4,833	1,610	50,512
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	339,000	358,978	227,508	291,973	297,785	325,558	332,835	436,824	301,542	363,367	331,661	316,922	3,923,953
Corn	44	23	43	23	0	0	21	0	0	1,504	0	0	1,658
Rye, Barley, Rice, Sorghum, Oats	28,705	2,500	11,700	13,681	2,600	17,400	7,385	13,851	11,900	5,875	15,400	5,800	136,797
Oilseeds (Soybean, Flaxseed, and Others)	82	0	1,821	179	22	0	0	27	464	2,068	209	26	4,898
Vegetable Products	7,939	8,821	9,112	3,911	9,499	20,019	10,466	14,564	15,893	14,457	18,460	12,934	146,075
Animal Feed, Grain Mill Products, Flour	18,360	20,107	15,909	24,632	29,166	20,417	8,884	12,737	14,520	13,484	14,739	15,360	208,315
Other Agricultural Products, Including Food	1,596	1,828	1,976	516	2,674	1,741	667	779	3,203	354	2,241	735	18,310
Barged Fish	0	0	0	107	468	131	34	15	0	0	0	0	755
All Manufactured Equipment and Machinery	350	315	572	150	40	310	160	913	235	270	687	2,445	6,447
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	50	0	0	0	0	50
Commodity Unknown	51	205	570	95	0	0	76	90	0	0	127	105	1,319
Total	581,320	467,407	332,874	450,894	520,378	570,036	575,275	641,719	532,274	602,148	539,073	475,516	6,288,914

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

Table A.25 Up Bound Movements Through Bonneville, 2003													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	77,486	96,834	57,089	102,262	109,971	133,782	143,253	163,429	113,179	87,546	78,851	53,959	1,217,641
Distillate, Residual and Other Fuel Oils	54,268	63,510	53,763	75,278	74,704	73,018	91,172	77,423	102,319	102,340	86,435	67,779	922,009
Petroleum Pitches, Asphalt, and Naptha	0	0	3,157	0	0	0	0	0	0	0	0	0	3,157
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	2,994	0	2,992	9,551	9,452	8,155	3,010	3,500	3,037	0	6,018	3,006	51,715
Organic Industrial Chemicals	0	0	0	0	0	0	0	3,012	0	0	0	0	3,012
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	12,000	0	0	12,000
Forest Products (Lumber, Logs, Woodchips)	3,117	5,500	2,362	5,035	2,900	5,200	6,026	5,662	2,389	5,000	5,471	5,200	53,862
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	7,100	6,225	8,200	0	0	0	0	21,525
Iron Ore; Iron Steel Waste and Scrap	400	0	0	0	0	0	0	0	0	0	0	0	400
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	1	0	0	0	0	0	0	0	0	0	0	1
Primary Non-Ferrous Metal Products	4,670	6,619	4,158	6,933	5,637	6,663	5,448	6,313	6,882	12,177	7,852	5,703	79,055
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	1,050	4,167	300	0	0	0	100	105	1,100	1,370	4,576	100	12,868
Waste Material (Garbage, Landfill, Sewage)	24,618	19,769	12,579	23,664	24,647	24,754	28,051	24,606	25,404	22,786	21,650	24,282	276,810
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	168,603	196,400	136,400	222,723	227,311	258,672	283,285	292,250	254,310	243,219	210,853	160,029	2,654,055

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

Table A.26 Down Bound Movements Through Bonneville, 2003													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	2,949	0	0	1,555	0	0	0	0	0	0	0	4,504
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	3,270	0	3,270
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	1,466	1,522	556	2,870	0	0	0	905	0	1,206	8,525
Organic Industrial Chemicals	0	0	0	0	0	0	0	0	266	0	0	0	266
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	25	0	0	25
Forest Products (Lumber, Logs, Woodchips)	41,050	46,200	35,750	48,213	39,050	36,575	47,980	47,850	39,210	50,386	50,770	50,600	533,634
Pulp and Waste Products	4,300	3,700	0	0	2,121	2,000	1,800	60	1,800	0	0	0	15,781
Sand, Gravel, Stone, and Crushed Rock	79,694	8,476	41,699	78,425	87,054	80,407	0	42,696	84,191	98,796	73,610	70,900	745,948
Iron Ore; Iron Steel Waste and Scrap	6,915	6,299	4,050	9,650	7,750	4,500	3,300	4,100	4,328	5,107	4,690	3,200	63,889
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	134	1,500	2,400	0	2,500	2,500	1,500	0	0	0	0	10,534
Sulfur (Liquid and Dry); Clay; Salt	76	134	448	77	153	0	65	158	181	201	207	102	1,802
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	30	30
Paper and Allied Products	8,280	5,223	4,087	5,002	2,662	3,329	4,398	4,186	5,224	10,383	7,316	10,228	70,318
Building Cement and Concrete; Lime; Glass	2,660	1,300	0	0	0	0	0	0	0	0	0	0	3,960
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	28	0	28
Primary Non-Ferrous Metal Products	3,226	2,438	1,356	2,914	3,564	3,140	3,656	3,025	5,408	3,231	3,144	2,686	37,788
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	1,008	56	1,064
Food and Farm Products (General)	650	4,815	7,596	5,008	4,101	6,320	10,312	2,090	6,021	3,567	12,107	7,643	70,230
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	224,580	299,016	331,063	354,000	342,032	314,462	341,585	437,425	389,506	551,123	431,076	462,367	4,478,235
Corn	21	236	83	388	425	44	0	0	0	0	124	0	1,321
Rye, Barley, Rice, Sorghum, Oats	12,607	10,281	8,950	21,725	11,301	0	1,350	24,850	10,820	5,977	17,367	8,160	133,388
Oilseeds (Soybean, Flaxseed, and Others)	0	208	0	2,926	737	0	0	55	203	1,587	134	0	5,850
Vegetable Products	12,311	9,607	10,016	16,363	11,424	11,496	6,497	14,782	14,706	16,519	19,466	9,244	152,431
Animal Feed, Grain Mill Products, Flour	10,593	16,814	11,500	12,924	20,206	17,826	13,020	16,873	14,751	18,486	18,280	15,106	186,379
Other Agricultural Products, Including Food	529	1,723	2,928	1,143	1,917	1,974	1,242	1,036	744	3,582	573	255	17,646
Barged Fish	0	0	0	128	476	77	55	15	0	0	0	0	751
All Manufactured Equipment and Machinery	100	2,994	2,120	150	26	75	870	578	0	270	0	22	7,205
Waste Material (Garbage, Landfill, Sewage)	0	0	73	0	0	0	0	0	119	120	0	0	312
Commodity Unknown	0	0	133	5	0	816	0	0	0	0	0	0	954
Total	407,592	422,547	464,818	562,963	537,110	488,411	438,630	601,279	577,478	770,265	643,170	641,805	6,556,068

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

Table A.27 Up Bound Movements Through Bonneville, 2004													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	64,495	70,777	19,384	98,305	106,679	83,586	69,863	96,014	93,620	73,271	67,660	28,706	872,360
Distillate, Residual and Other Fuel Oils	71,011	96,954	18,226	90,729	71,202	90,804	67,932	118,305	87,583	103,347	88,703	78,322	983,118
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	3,030	5,533	0	6,325	5,299	12,026	5,148	3,518	0	6,552	3,003	7,021	57,455
Organic Industrial Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	5,250	12,000	0	11,600	11,800	12,400	7,800	7,100	6,500	10,933	10,292	11,000	106,675
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	2,000	4,800	0	0	6,800
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	75	0	75
Primary Non-Ferrous Metal Products	6,957	7,950	848	4,810	6,061	5,172	4,399	4,881	5,290	5,021	5,073	2,715	59,177
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	1	0	0	0	0	0	1
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	1	0	0	0	0	0	1
All Manufactured Equipment and Machinery	625	1,044	2,530	644	292	1,650	1,100	100	1,100	3,195	290	0	12,570
Waste Material (Garbage, Landfill, Sewage)	22,213	21,747	4,165	24,084	24,027	24,810	27,082	26,867	27,439	37,962	23,575	28,065	292,036
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	173,581	216,005	45,153	236,497	225,360	230,448	183,326	256,785	223,532	245,081	198,671	155,829	2,390,268

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

Table A.28 Down Bound Movements Through Bonneville, 2004													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	6,300	0	0	0	0	0	0	0	0	0	0	0	6,300
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	896	0	1,003	0	1,204	0	1,212	0	900	1,208	1,510	7,933
Organic Industrial Chemicals	0	0	21	0	0	0	111	26	27	30	0	0	215
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	36,900	47,350	24,700	52,125	58,650	46,850	46,408	44,700	43,283	39,983	47,967	50,621	539,537
Pulp and Waste Products	0	1,077	0	0	32	0	0	25	0	0	60	0	1,194
Sand, Gravel, Stone, and Crushed Rock	0	1,200	0	88,880	81,735	91,931	61,532	89,553	82,354	84,262	67,905	0	649,352
Iron Ore; Iron Steel Waste and Scrap	2,200	2,857	1,605	5,224	3,500	5,100	2,530	6,123	5,100	4,167	4,886	4,455	47,747
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	1,800	24	0	0	1,500	2,000	2,500	0	0	3,400	0	0	11,224
Sulfur (Liquid and Dry); Clay; Salt	618	76	79	0	0	76	0	33	0	0	132	53	1,067
Primary Manufactured Goods	0	50	0	0	0	0	0	0	0	0	137	0	187
Paper and Allied Products	9,186	9,724	2,000	8,815	7,442	7,008	7,119	11,282	7,066	6,990	8,509	2,056	87,197
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	24	0	74	73	0	365	0	0	0	115	58	709
Primary Non-Ferrous Metal Products	2,761	2,719	537	4,035	3,244	3,031	5,734	3,608	3,839	3,269	3,345	3,204	39,326
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	194	0	194
Food and Farm Products (General)	1,824	8,789	51	1,457	9,437	4,035	5,851	8,287	2,463	10,140	5,245	2,618	60,197
Fresh Fish and Other Marine Products	0	0	0	30	0	0	0	0	0	0	0	0	30
Wheat	609,184	567,221	163,873	395,455	280,606	306,081	314,122	498,428	531,945	703,788	524,092	465,193	5,359,988
Corn	0	512	230	0	0	0	20	0	0	0	0	0	762
Rye, Barley, Rice, Sorghum, Oats	6,617	2,617	160	2,612	324	9,374	0	3,054	9,958	16,902	12,223	224	64,065
Oilseeds (Soybean, Flaxseed, and Others)	113	409	0	0	27	0	0	76	0	0	0	0	625
Vegetable Products	14,251	12,804	7,431	10,508	7,869	8,950	8,903	13,010	9,343	15,454	13,940	10,756	133,219
Animal Feed, Grain Mill Products, Flour	16,569	25,264	6,536	21,285	15,301	14,313	7,712	10,762	12,842	6,745	9,994	4,533	151,856
Other Agricultural Products, Including Food	411	2,267	0	2,295	865	448	507	582	1,598	1,019	561	518	11,071
Barged Fish	0	0	0	163	773	96	41	9	0	0	0	0	1,082
All Manufactured Equipment and Machinery	2,407	6,045	750	550	548	1,500	28	860	0	331	1,850	144	15,013
Waste Material (Garbage, Landfill, Sewage)	0	162	0	0	96	0	51	0	0	0	0	0	309
Commodity Unknown	0	79	0	0	0	429	280	0	0	0	0	0	788
Total	711,141	692,166	207,973	594,511	472,022	502,426	463,814	691,630	709,818	897,380	702,363	545,943	7,191,187

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

Table A.29 Up Bound Movements Through Bonneville, 2005													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	5,902	0	5,902
Gasoline, Jet Fuel, and Kerosene	38,622	53,278	37,972	116,642	111,940	71,822	90,624	148,536	132,478	66,227	55,871	47,475	971,487
Distillate, Residual and Other Fuel Oils	52,002	91,493	75,851	78,923	72,279	60,082	81,341	83,256	99,333	92,489	79,869	67,716	934,634
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	7,626	3,514	3,037	19,527	12,830	12,281	2,527	3,498	3,515	3,005	3,005	74,365
Organic Industrial Chemicals	0	0	0	0	0	0	0	2,099	0	0	670	800	3,569
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	700	1,200	1,900
Forest Products (Lumber, Logs, Woodchips)	17,200	5,000	2,900	7,900	8,700	3,000	4,500	7,300	10,253	10,016	10,100	7,700	94,569
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	3,513	1,000	0	0	4,513
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	1,000	0	0	0	0	1,000
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	2,099	2,997	1,542	2,793	2,359	1,496	1,639	2,087	2,401	3,125	2,085	3,154	27,777
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	9,200	9,200
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	300	3,150	62	0	92	0	751	0	1,525	0	70	1,200	7,150
Waste Material (Garbage, Landfill, Sewage)	26,571	33,293	13,353	23,733	26,129	28,045	32,603	29,009	36,284	43,157	21,709	25,812	339,698
Commodity Unknown	0	0	0	0	0	0	1,000	0	0	0	0	0	1,000
Total	136,794	196,837	135,194	233,028	241,026	177,275	224,739	275,814	289,285	219,529	179,981	167,262	2,476,764

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

Table A.30 Down Bound Movements Through Bonneville, 2005													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	0	0	0	0	0	0	0	3,917	0	0	3,917
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	2,000	1,500	1,534	0	0	1,196	1,170	0	0	0	0	7,400
Organic Industrial Chemicals	0	0	0	0	0	0	0	0	0	0	0	65	65
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	46,180	43,350	47,000	54,100	56,194	59,700	55,735	80,741	75,950	53,950	55,150	67,750	695,800
Pulp and Waste Products	0	0	31	0	0	0	2,500	337	1,501	1,172	518	25	6,084
Sand, Gravel, Stone, and Crushed Rock	0	0	8,404	80,813	86,457	96,617	134,479	150,121	80,581	89,272	80,442	75,018	882,204
Iron Ore; Iron Steel Waste and Scrap	52	5,637	2,500	6,300	7,328	6,100	4,585	3,000	3,550	5,300	6,000	3,800	54,152
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	4,200	30	1,200	0	1,532	0	1,200	2,450	0	0	0	1,200	11,812
Sulfur (Liquid and Dry); Clay; Salt	78	345	52	0	0	2,299	0	0	247	342	91	354	3,808
Primary Manufactured Goods	33	0	0	0	0	0	0	0	0	0	0	0	33
Paper and Allied Products	2,517	2,812	31	2,760	710	221	521	3,513	3,342	3,495	3,678	2,320	25,920
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	3,491	0	0	0	0	0	0	0	0	0	0	0	3,491
Primary Non-Ferrous Metal Products	4,156	3,564	2,708	3,233	3,414	3,774	3,802	4,634	4,083	3,725	4,073	3,524	44,690
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	1,130	3,276	0	882	4,107	85	624	1,825	797	0	184	2,560	15,470
Fresh Fish and Other Marine Products	1,345	0	0	0	0	0	5,600	0	0	0	0	0	6,945
Wheat	497,663	483,110	317,761	364,832	354,124	182,950	374,879	360,117	382,562	649,749	430,909	485,795	4,884,451
Corn	0	0	0	0	0	0	0	2,300	0	0	0	0	2,300
Rye, Barley, Rice, Sorghum, Oats	20,672	0	0	24,454	0	13,174	5,825	14,939	22,348	3,156	559	0	105,127
Oilseeds (Soybean, Flaxseed, and Others)	96	58	0	0	2,167	850	0	0	0	44	0	388	3,603
Vegetable Products	6,127	7,099	6,334	7,941	6,001	10,522	7,602	3,859	9,833	15,546	9,877	14,674	105,415
Animal Feed, Grain Mill Products, Flour	3,321	3,254	4,940	4,817	3,272	2,693	670	2,069	3,530	2,185	2,695	2,712	36,158
Other Agricultural Products, Including Food	392	0	129	1,348	158	973	664	190	1,812	837	957	386	7,846
Barged Fish	0	0	0	175	765	85	24	1	0	0	0	0	1,050
All Manufactured Equipment and Machinery	52	1,000	224	0	7	0	800	0	0	10	0	0	2,093
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	0	0
Commodity Unknown	0	0	0	0	0	223	0	0	0	0	0	0	223
Total	591,505	555,535	392,814	553,189	526,236	380,266	600,706	631,266	590,136	832,700	595,133	660,571	6,910,057

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

Table A.31 Up Bound Movements Through Bonneville, 2006													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	3,587	0	0	0	0	3,587
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	62,469	68,608	56,362	68,957	114,808	127,479	111,964	134,567	110,847	124,485	87,711	53,127	1,121,384
Distillate, Residual and Other Fuel Oils	74,685	79,228	80,103	80,468	83,618	73,914	87,723	114,076	104,344	104,923	93,752	106,134	1,082,968
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	3,123	13,646	3,020	6,730	14,938	6,538	2,907	3,291	5,398	5,752	3,510	3,035	71,888
Organic Industrial Chemicals	120	0	0	0	0	0	1,755	0	0	0	0	0	1,875
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	12,100	11,500	5,370	16,500	12,070	7,241	8,962	7,000	5,300	4,650	4,500	3,000	98,193
Pulp and Waste Products	0	0	0	0	0	0	0	0	1,900	0	0	1,950	3,850
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	20	0	0	0	0	0	0	0	0	0	0	20
Primary Non-Ferrous Metal Products	2,478	2,974	1,529	2,262	1,951	2,536	2,777	2,944	5,592	2,438	3,141	5,162	35,784
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	811	1,385	235	40	0	0	230	1,750	150	0	0	570	5,171
Waste Material (Garbage, Landfill, Sewage)	30,874	26,469	17,891	29,661	28,964	27,649	27,308	31,059	27,286	26,207	26,780	21,056	321,204
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	294	0	294
Total	186,660	203,830	164,510	204,618	256,349	245,357	243,626	298,274	260,817	268,455	219,688	194,034	2,746,218

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

Table A.32 Down Bound Movements Through Bonneville, 2006													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	0	0	0	0	0	0	0	0	0	0	0
Distillate, Residual and Other Fuel Oils	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	15	1,516	0	0	0	0	0	0	0	1,516	3,047
Organic Industrial Chemicals	304	0	0	0	0	40	0	0	162	0	0	0	506
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	47,910	48,650	32,100	31,000	44,600	60,450	49,500	66,471	66,059	60,600	76,850	70,982	655,172
Pulp and Waste Products	577	229	0	0	0	0	352	28	2,000	0	0	461	3,647
Sand, Gravel, Stone, and Crushed Rock	13,722	200	42,638	79,302	85,276	98,483	73,669	78,124	77,590	83,550	72,466	86,350	791,370
Iron Ore; Iron Steel Waste and Scrap	3,923	6,000	5,400	5,772	4,800	6,972	5,550	5,300	4,500	4,150	2,209	6,519	61,095
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	1,200	2,200	0	0	1,600	0	0	0	0	0	0	0	5,000
Sulfur (Liquid and Dry); Clay; Salt	0	414	384	181	162	102	524	652	152	0	75	0	2,646
Primary Manufactured Goods	0	0	0	0	0	78	0	0	0	0	0	0	78
Paper and Allied Products	4,028	9,242	3,661	1,861	2,349	5,688	7,157	9,559	4,689	785	7,249	11,180	67,448
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	3,600	0	3,600
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	3,630	2,897	2,388	3,660	3,420	3,427	3,843	9,753	3,940	4,884	4,930	3,802	50,574
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	38	0	38
Food and Farm Products (General)	1,082	643	1,112	8,113	986	693	939	1,082	803	3,916	2,917	125	22,411
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	1,515	0	1,515
Wheat	412,843	404,360	281,533	348,517	339,939	324,590	386,876	481,062	451,822	452,576	370,661	457,372	4,712,151
Corn	0	0	0	0	0	0	0	0	0	31	130	106	267
Rye, Barley, Rice, Sorghum, Oats	386	0	5,587	25,325	8,880	0	2,000	3,418	12,152	34,799	17,200	5,674	115,421
Oilseeds (Soybean, Flaxseed, and Others)	67	0	0	0	0	185	0	2,050	0	2,381	0	2,115	6,798
Vegetable Products	11,121	2,401	9,092	11,342	7,192	10,825	8,798	6,498	9,053	13,609	9,128	7,488	106,547
Animal Feed, Grain Mill Products, Flour	3,041	4,073	1,718	2,790	4,669	3,881	2,704	3,292	3,396	5,584	5,425	4,249	44,822
Other Agricultural Products, Including Food	226	1,450	874	1,591	666	912	29	1,833	20	0	732	0	8,333
Barged Fish	0	0	0	4,608	595	31	19	8	0	0	0	0	5,261
All Manufactured Equipment and Machinery	0	120	1,186	0	240	95	7	345	2,600	2,338	0	0	6,931
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	0	0	0	0	0	261	261
Commodity Unknown	870	0	0	0	0	195	0	0	0	0	335	0	1,400
Total	504,930	482,879	387,688	525,578	505,374	516,647	541,967	669,475	638,938	669,203	575,460	658,200	6,676,339

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

Table A.33 Up Bound Movements Through Bonneville, 2007													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	62,769	55,628	70,079	104,506	135,921	107,866	102,916	107,869	96,179	72,150	82,857	52,429	1,051,169
Distillate, Residual and Other Fuel Oils	90,232	87,925	77,660	112,892	89,663	91,852	98,995	120,748	89,891	132,624	110,757	85,497	1,188,736
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	7,064	3,522	2,164	1,524	3,125	6,950	2,916	6,036	3,495	2,922	5,358	2,952	48,028
Organic Industrial Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	2,467	12,973	5,800	10,700	7,908	4,862	0	14,550	5,400	2,500	2,000	2,800	71,960
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	120	0	0	0	0	0	0	0	0	120
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	100	0	0	100
Primary Non-Ferrous Metal Products	5,188	3,535	2,684	3,066	2,084	5,248	2,424	4,168	4,072	3,515	4,172	4,291	44,447
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	2,957	0	0	0	0	0	0	0	0	0	0	0	2,957
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	1,000	900	1,086	0	240	0	1,100	150	4,854	1,320	300	133	11,083
Waste Material (Garbage, Landfill, Sewage)	29,140	20,735	19,530	25,805	31,139	27,869	27,836	28,568	29,826	25,751	23,436	25,472	315,107
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	200,817	185,218	179,003	258,613	270,080	244,647	236,187	282,089	233,717	240,882	228,880	173,574	2,733,707

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

Table A.33 Down Bound Movements Through Bonneville, 2007													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	5,625	13,348	0	0	0	0	0	0	0	1,942	2,870	6,956	30,741
Distillate, Residual and Other Fuel Oils	64,855	1,509	0	0	0	0	0	0	4,702	5,501	692	2,844	80,103
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	0	0	0	0	1,516	0	0	800	0	3,100	5,416
Organic Industrial Chemicals	0	0	0	0	0	0	0	0	0	2,643	3,378	2,200	8,221
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	800	0	800
Forest Products (Lumber, Logs, Woodchips)	0	73,200	59,172	55,475	68,254	52,150	69,959	50,340	34,488	41,000	33,050	56,500	593,588
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	59	255	0	92,473	93,314	84,714	84,805	102,496	76,615	103,271	61,352	85,870	785,224
Iron Ore; Iron Steel Waste and Scrap	1,200	5,025	3,900	2,655	2,400	5,000	6,291	9,117	10,160	13,600	2,500	5,932	67,780
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	2,863	0	2,000	0	20	0	0	0	0	0	1,800	0	6,683
Sulfur (Liquid and Dry); Clay; Salt	0	51	0	0	148	108	390	75	127	869	321	1,227	3,316
Primary Manufactured Goods	0	0	0	0	32	0	0	32	0	0	0	0	64
Paper and Allied Products	3,636	8,744	4,375	5,935	7,681	12,046	4,639	3,971	9,429	7,149	10,788	16,890	95,283
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	120	0	115	0	0	235
Primary Non-Ferrous Metal Products	3,208	3,598	1,570	3,733	3,572	5,278	4,020	3,297	3,512	3,680	3,088	3,274	41,830
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	0	0	1,280	167	1,164	1,278	2,159	1,064	0	0	579	0	7,691
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	544,323	525,602	324,078	385,897	430,524	263,465	363,431	621,444	345,612	620,680	400,136	411,053	5,236,245
Corn	0	3,650	0	0	0	0	0	0	0	0	2,500	0	6,150
Rye, Barley, Rice, Sorghum, Oats	14,319	9,900	8,400	2,500	0	5,720	0	6,900	13,903	30,410	26,575	3,600	122,227
Oilseeds (Soybean, Flaxseed, and Others)	0	1,257	0	3	120	578	0	299	579	1,221	80	1,009	5,146
Vegetable Products	13,157	13,245	1,382	11,396	8,240	6,897	12,545	10,147	8,632	10,043	12,162	5,737	113,583
Animal Feed, Grain Mill Products, Flour	5,655	6,227	5,232	6,909	5,152	3,058	4,531	6,631	1,317	3,094	5,210	4,474	57,490
Other Agricultural Products, Including Food	0	134	0	0	253	25	0	812	867	3,249	1,464	447	7,251
Barged Fish	0	0	0	6	293	29	15	9	0	0	0	0	352
All Manufactured Equipment and Machinery	0	0	1,933	75	0	0	1,346	2,372	1,375	0	1,003	40	8,144
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	370	0	0	144	0	0		0	514
Commodity Unknown	0	0	0	1,256	0	0	0	26	0	130	0	0	1,412
Total	658,900	665,745	413,322	568,480	621,537	440,346	555,647	819,296	511,318	849,397	570,348	611,153	7,285,489

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

Table A.35 Up Bound Movements Through Bonneville, 2008													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	0	0	3,557	3,557
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	40,764	63,616	37,126	57,564	89,345	81,579	85,522	95,093	97,643	62,416	50,571	55,536	816,775
Distillate, Residual and Other Fuel Oils	74,692	95,302	84,287	82,150	75,688	82,258	87,146	87,088	84,991	113,202	81,212	56,035	1,004,051
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	5,511	14,944	2,950	6,498	9,662	6,437	5,984	0	9,086	0	5,496	66,568
Organic Industrial Chemicals	0	0	0	0	160	0	6,258	60	0	0	0	0	6,478
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	2,500	3,400	5,000	7,500	2,500	3,400	15,950	10,750	9,675	11,937	9,580	5,100	87,292
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	13,400	8,100	0	0	5,700	27,200
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	1,500	100	0	0	0	0	0	0	0	0	1,600
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	50	0	0	0	0	50
Primary Iron and Steel Products	125	0	0	0	0	0	0	0	0	0	0	0	125
Primary Non-Ferrous Metal Products	5,728	3,266	3,952	2,402	4,589	1,977	2,759	3,339	3,810	1,465	2,420	3,479	39,186
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	295	0	0	0	0	0	0	0	600	0	0	0	895
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	3,400	0	0	0	0	0	0	0	0	0	0	3,400
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	36	800	1,500	300	350	60	464	1,000	1,400	2,108	869	0	8,887
Waste Material (Garbage, Landfill, Sewage)	26,137	23,386	16,536	25,088	25,718	27,036	26,928	29,065	37,234	29,591	25,017	20,691	312,427
Commodity Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	150,277	198,681	164,845	178,054	204,848	205,972	231,464	245,829	243,453	229,805	169,669	155,594	2,378,491

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

Table A.36 Down Bound Movements Through Bonneville, 2008													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	2,559	0	6,495	2,732	0	0	0	1,886	0	0	13,672
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	2,592	5,550	0	4,795	0	7,381	3,927	2,259	2,156	1,761	4,600	4,449	39,470
Distillate, Residual and Other Fuel Oils	0	1,269	5,021	2,064	5,323	0	1,515	5,635	2,066	6,663	0	3,781	33,337
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	0	1,416	0	0	1,215	0	0	0	0	492	0	3,123
Organic Industrial Chemicals	4,378	31	0	2,268	107	0	2,399	0	3,589	0	3,903	0	16,675
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	139	0	0	0	0	0	0	139
Forest Products (Lumber, Logs, Woodchips)	49,980	43,000	32,100	30,820	43,912	45,901	36,200	36,200	21,800	35,800	33,500	30,900	440,113
Pulp and Waste Products	0	0	0	0	187	159	63	111	26	0	0	0	546
Sand, Gravel, Stone, and Crushed Rock	621	7,274	22,714	93,079	87,171	1,000,655	88,632	92,909	93,045	102,062	0	0	1,588,162
Iron Ore; Iron Steel Waste and Scrap	7,458	2,129	3,500	6,380	6,386	7,981	6,300	5,800	5,680	9,700	2,400	7,800	71,514
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	1,600	0	1,550	65	1,500	0	0	0	0	0	4,715
Sulfur (Liquid and Dry); Clay; Salt	737	160	530	0	550	398	0	0	0	76	0	127	2,578
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	4,346	5,377	3,381	3,226	2,863	3,115	4,237	6,698	3,830	5,811	5,808	2,765	51,457
Building Cement and Concrete; Lime; Glass	0	129	0	0	0	0	0	0	0	0	0	0	129
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	4,203	2,675	2,364	3,640	4,162	3,219	3,213	3,309	2,742	3,047	2,901	2,648	38,123
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	1	0	0	0	0	1
Food and Farm Products (General)	1,399	0	0	459	1,583	919	1,802	6,852	2,496	1,771	1,507	2,616	21,404
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	473,178	314,477	257,914	334,597	238,705	122,982	229,385	465,732	242,657	202,378	315,365	256,156	3,453,526
Corn	0	0	0	0	0	0	0	2,650	0	3,000	5,150	0	10,800
Rye, Barley, Rice, Sorghum, Oats	0	8,700	11,345	25,153	15,047	0	197	3,650	19,040	0	14,683	3,100	100,915
Oilseeds (Soybean, Flaxseed, and Others)	258	143	1,827	201	930	0	0	823	0	0	73	0	4,255
Vegetable Products	12,967	14,013	2,259	11,673	9,340	7,811	6,122	6,731	2,206	5,205	4,448	2,860	85,635
Animal Feed, Grain Mill Products, Flour	5,285	4,849	2,596	6,343	3,677	3,832	3,734	5,860	7,493	4,071	2,514	3,401	53,655
Other Agricultural Products, Including Food	1,287	0	1,004	3,437	529	2,133	2,483	0	1,082	0	0	385	12,340
Barged Fish	0	0	0	9	507	62	19	10	0	0	0	0	607
All Manufactured Equipment and Machinery	2,369	1,200	1,350	1,075	445	0	0	0	300	300	0	300	7,339
Waste Material (Garbage, Landfill, Sewage)	0	0	0	156	0	0	0	70	0	0	0	0	226
Commodity Unknown	0	0	0	0	288	0	0	55	0	0	0	0	343
Total	571,058	410,976	353,480	529,375	429,757	1,210,699	391,728	645,355	410,208	383,531	397,344	321,288	6,054,799

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

Table A.37 Up Bound Movements Through Bonneville, 2009													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	0	0	0	0	0	3,257	0	0	3,257
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	65,886	62,474	46,961	66,072	92,493	95,194	88,614	84,400	81,684	65,029	51,799	50,982	851,588
Distillate, Residual and Other Fuel Oils	78,148	79,107	53,551	77,798	64,941	85,194	89,500	89,976	69,761	62,611	85,155	73,688	909,430
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fertilizer (Nitrogenous, Potassic, Phosphoric)	3,513	3,018	3,000	3,471	6,976	6,386	5,538	2,505	3,450	4,118	3,482	3,525	48,982
Organic Industrial Chemicals	0	3,515	0	0	0	0	0	0	0	0	0	0	3,515
Crude Materials and Inedibles, Except Fuels	0	0	0	2,000	0	0	0	0	0	0	0	0	2,000
Forest Products (Lumber, Logs, Woodchips)	16,800	13,600	1,800	9,670	10,100	9,800	6,900	1,800	3,200	4,600	7,300	1,600	87,170
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Sand, Gravel, Stone, and Crushed Rock	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron Ore; Iron Steel Waste and Scrap	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Non-Ferrous Metal Products	3,734	1,762	824	1,875	1,417	3,252	1,907	1,687	1,713	3,839	2,237	1,849	26,096
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	0	0	0	0	0	0	0
Food and Farm Products (General)	1,612	0	0	0	0	0	12	138	0	0	0	40	1,802
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	0	0	0	0	0	0	0	0
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetable Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agricultural Products, Including Food	0	0	0	0	0	0	0	0	0	0	0	0	0
Barged Fish	0	0	0	0	0	0	0	0	0	0	0	0	0
All Manufactured Equipment and Machinery	0	350	0	150	0	0	215	1,150	0	1,953	0	0	3,818
Waste Material (Garbage, Landfill, Sewage)	23,434	22,060	14,817	20,760	23,414	24,183	23,559	23,941	22,612	13,692	17,633	19,269	249,374
Commodity Unknown	0	0	0	0	0	0	0	100	0	0	0	0	100
Total	193,127	185,886	120,953	181,796	199,341	224,009	216,245	205,697	182,420	159,099	167,606	150,953	2,187,132

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

Table A.38 Down Bound Movements Through Bonneville, 2009													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	0	0	0	0	0	0	0
Coal, Lignite, and Coke	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Products (General)	0	0	0	0	1,290	0	0	0	0	0	0	4,892	6,182
Crude Petroleum	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline, Jet Fuel, and Kerosene	0	0	2,821	1,325	1,292	0	2,942	1,839	3,853	4,807	13,742	0	32,621
Distillate, Residual and Other Fuel Oils	3,620	8,391	4,716	3,257	1,290	1,411	3,197	795	3,154	0	0	0	29,831
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals and Related Products (General)	0	0	0	0	0	2,450	0	0	0	0	0	0	2,450
Fertilizer (Nitrogenous, Potassic, Phosphoric)	0	2,308	0	1,780	0	0	0	0	0	0	0	0	4,088
Organic Industrial Chemicals	2,863	3,769	30	1,938	0	4,553	2,578	2,480	0	0	0	4,993	23,204
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Products (Lumber, Logs, Woodchips)	26,105	42,700	24,400	19,200	22,100	25,471	31,950	48,360	54,800	67,700	44,965	35,700	443,451
Pulp and Waste Products	0	0	0	0	0	0	0	0	0	0	0	102	102
Sand, Gravel, Stone, and Crushed Rock	26	0	0	0	0	0	8,100	8,170	0	26,415	65,967	37,533	146,211
Iron Ore; Iron Steel Waste and Scrap	0	4,321	410	8,100	7,400	8,440	9,865	8,600	6,000	7,700	6,700	6,700	74,236
Marine Shells (Unmanufactured)	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Ferrous Metallic Ores, Including Alumina	2,500	0	0	0	0	0	0	0	0	0	1,800	3,700	8,000
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	49	0	0	0	0	0	0	49
Primary Manufactured Goods	0	0	0	0	0	0	0	0	0	0	0	0	0
Paper and Allied Products	857	853	215	2,140	455	480	890	249	0	224	842	829	8,034
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Iron and Steel Products	0	0	0	0	0	0	0	10	0	0	0	0	10
Primary Non-Ferrous Metal Products	3,540	2,805	1,753	2,743	2,674	4,681	5,514	2,702	2,985	1,800	2,036	2,256	35,489
Primary Wood Products; Veneer; Plywood	0	20	0	0	0	0	0	0	0	0	0	0	20
Food and Farm Products (General)	4,030	3,048	2,312	2,790	3,070	1,293	3,402	3,428	5,002	4,796	5,602	3,009	41,782
Fresh Fish and Other Marine Products	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheat	317,529	370,303	283,614	323,004	409,593	392,445	284,741	387,531	317,717	383,753	445,125	337,846	4,253,201
Corn	0	0	0	230	0	0	0	0	0	0	0	3,600	3,830
Rye, Barley, Rice, Sorghum, Oats	6,500	0	0	0	0	3,600	0	2,000	0	0	5,100	5,800	23,000
Oilseeds (Soybean, Flaxseed, and Others)	0	0	0	0	0	0	0	0	0	0	1,442	0	1,442
Vegetable Products	5,543	4,292	3,306	10,376	7,962	5,298	3,842	6,633	10,055	7,597	8,456	10,964	84,324
Animal Feed, Grain Mill Products, Flour	4,783	6,488	3,939	3,186	905	1,875	2,094	1,269	2,404	3,871	4,122	4,213	39,149
Other Agricultural Products, Including Food	0	0	0	458	0	0	254	0	0	0	0	0	712
Barged Fish	0	0	0	7	395	80	32	170	0	0	0	0	684
All Manufactured Equipment and Machinery	0	200	3,700	3,664	0	0	6,290	405	500	0	1,200	870	16,829
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	411	0	0	0	0	0	0	411
Commodity Unknown	0	0	0	0	0	329	1,000	0	0	0	0	0	1,329
Total	377,896	449,498	331,216	384,198	458,426	452,866	366,691	474,641	406,470	508,663	607,099	463,007	5,280,671

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

Table A.39 Up Bound Movements Through Bonneville, 2010													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	0	0	0	*	*	*	*	*	*	0
Gasoline, Jet Fuel, and Kerosene	45,210	65,719	37,687	85,907	99,444	66,521	*	*	*	*	*	*	400,488
Distillate, Residual and Other Fuel Oils	63,434	62,371	60,528	87,253	89,296	65,629	*	*	*	*	*	*	428,511
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)	7,000	3,563	1,500	2,991	7,061	3,520	*	*	*	*	*	*	25,635
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)	3,400	3,400	0	0	1,800	3,500	*	*	*	*	*	*	12,100
Pulp and Waste Products	0	0	0	0	0	0	*	*	*	*	*	*	0
Sand, Gravel, Stone, and Crushed Rock	0	3,000	0	0	0	0	*	*	*	*	*	*	3,000
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, Including Alumina	0	0	0	0	0	0	*	*	*	*	*	*	0
Sulfur (Liquid and Dry); Clay; 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 and Concrete; Lime; 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	2,033	1,676	650	2,306	1,150	1,348	*	*	*	*	*	*	9,163
Primary Wood Products; Veneer; Plywood	0	0	0	0	0	0	*	*	*	*	*	*	0
Food and Farm Products (General)	160	0	0	0	0	0	*	*	*	*	*	*	160
Fresh Fish and Other Marine Products	0	0	0	0	0	0	*	*	*	*	*	*	0
Wheat	0	0	0	0	0	0	*	*	*	*	*	*	0
Corn	0	0	0	0	0	0	*	*	*	*	*	*	0
Rye, Barley, Rice, Sorghum, 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, 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	340	10	1,650	0	726	0	*	*	*	*	*	*	2,726
Waste Material (Garbage, Landfill, Sewage)	22,395	19,204	15,323	21,296	22,721	23,011	*	*	*	*	*	*	123,950
Commodity Unknown	0	0	0	1,774	0	0	*	*	*	*	*	*	1,774
Total	143,972	158,943	117,338	201,527	222,198	163,529	0	0	0	0	0	0	1,007,507

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

* Indicates No Information

Table A.40 Down Bound Movements Through Bonneville, 2010													
Commodity by Ton	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Empty	0	0	0	0	0	0	*	*	*	*	*	*	0
Coal, Lignite, and Coke	0	0	0	0	0	0	*	*	*	*	*	*	0
Petroleum Products (General)	0	1,177	0	0	0	0	*	*	*	*	*	*	1,177
Crude Petroleum	0	0	0	0	0	0	*	*	*	*	*	*	0
Gasoline, Jet Fuel, and Kerosene	4,745	2,262	0	1,470	4,519	4,141	*	*	*	*	*	*	17,137
Distillate, Residual and Other Fuel Oils	1,889	0	3,141	5,979	1,630	1,323	*	*	*	*	*	*	13,962
Petroleum Pitches, Asphalt, and Naptha	0	0	0	0	240	0	*	*	*	*	*	*	240
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	0	0	0	0	0	*	*	*	*	*	*	0
Crude Materials and Inedibles, Except Fuels	0	0	0	0	0	0	*	*	*	*	*	*	0
Forest Products (Lumber, Logs, Woodchips)	46,550	69,060	50,699	75,184	49,975	75,347	*	*	*	*	*	*	366,815
Pulp and Waste Products	0	0	0	0	2,700	0	*	*	*	*	*	*	2,700
Sand, Gravel, Stone, and Crushed Rock	0	8,000	38,315	68,604	28,427	81,978	*	*	*	*	*	*	225,324
Iron Ore; Iron Steel Waste and Scrap	8,000	8,100	4,300	8,543	16,100	12,850	*	*	*	*	*	*	57,893
Marine Shells (Unmanufactured)	0	0	0	0	0	0	*	*	*	*	*	*	0
Non-Ferrous Metallic Ores, Including Alumina	0	0	2,800	4,000	9,600	0	*	*	*	*	*	*	16,400
Sulfur (Liquid and Dry); Clay; Salt	0	0	0	0	0	0	*	*	*	*	*	*	0
Primary Manufactured Goods	0	0	0	0	0	0	*	*	*	*	*	*	0
Paper and Allied Products	445	800	50	345	409	1,615	*	*	*	*	*	*	3,664
Building Cement and Concrete; Lime; Glass	0	0	0	0	0	0	*	*	*	*	*	*	0
Primary Iron and Steel Products	0	0	300	0	0	0	*	*	*	*	*	*	300
Primary Non-Ferrous Metal Products	2,731	3,752	1,948	2,540	2,830	2,550	*	*	*	*	*	*	16,351
Primary Wood Products; Veneer; Plywood	0	5,000	25	0	0	0	*	*	*	*	*	*	5,025
Food and Farm Products (General)	3,197	885	348	1,565	0	834	*	*	*	*	*	*	6,829
Fresh Fish and Other Marine Products	0	0	0	0	0	0	*	*	*	*	*	*	0
Wheat	329,634	524,689	220,500	367,100	338,308	341,900	*	*	*	*	*	*	2,122,131
Corn	0	0	0	0	0	0	*	*	*	*	*	*	0
Rye, Barley, Rice, Sorghum, Oats	0	0	0	0	0	240	*	*	*	*	*	*	240
Oilseeds (Soybean, Flaxseed, and Others)	0	3,234	0	0	0	0	*	*	*	*	*	*	3,234
Vegetable Products	5,523	7,531	6,850	7,298	5,282	2,287	*	*	*	*	*	*	34,771
Animal Feed, Grain Mill Products, Flour	4,497	1,978	1,240	2,761	1,023	2,124	*	*	*	*	*	*	13,623
Other Agricultural Products, Including Food	98	2,320	0	0	0	0	*	*	*	*	*	*	2,418
Barged Fish	0	0	0	42	257	66	*	*	*	*	*	*	365
All Manufactured Equipment and Machinery	0	500	2,250	0	0	0	*	*	*	*	*	*	2,750
Waste Material (Garbage, Landfill, Sewage)	0	0	0	0	0	0	*	*	*	*	*	*	0
Commodity Unknown	0	0	700	0	100	0	*	*	*	*	*	*	800
Total	407,309	639,288	333,466	545,431	461,400	527,255	0	0	0	0	0	0	2,914,149

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

* Indicates No Information