Importance of Columbia-Snake River Navigation to U.S. Agriculture

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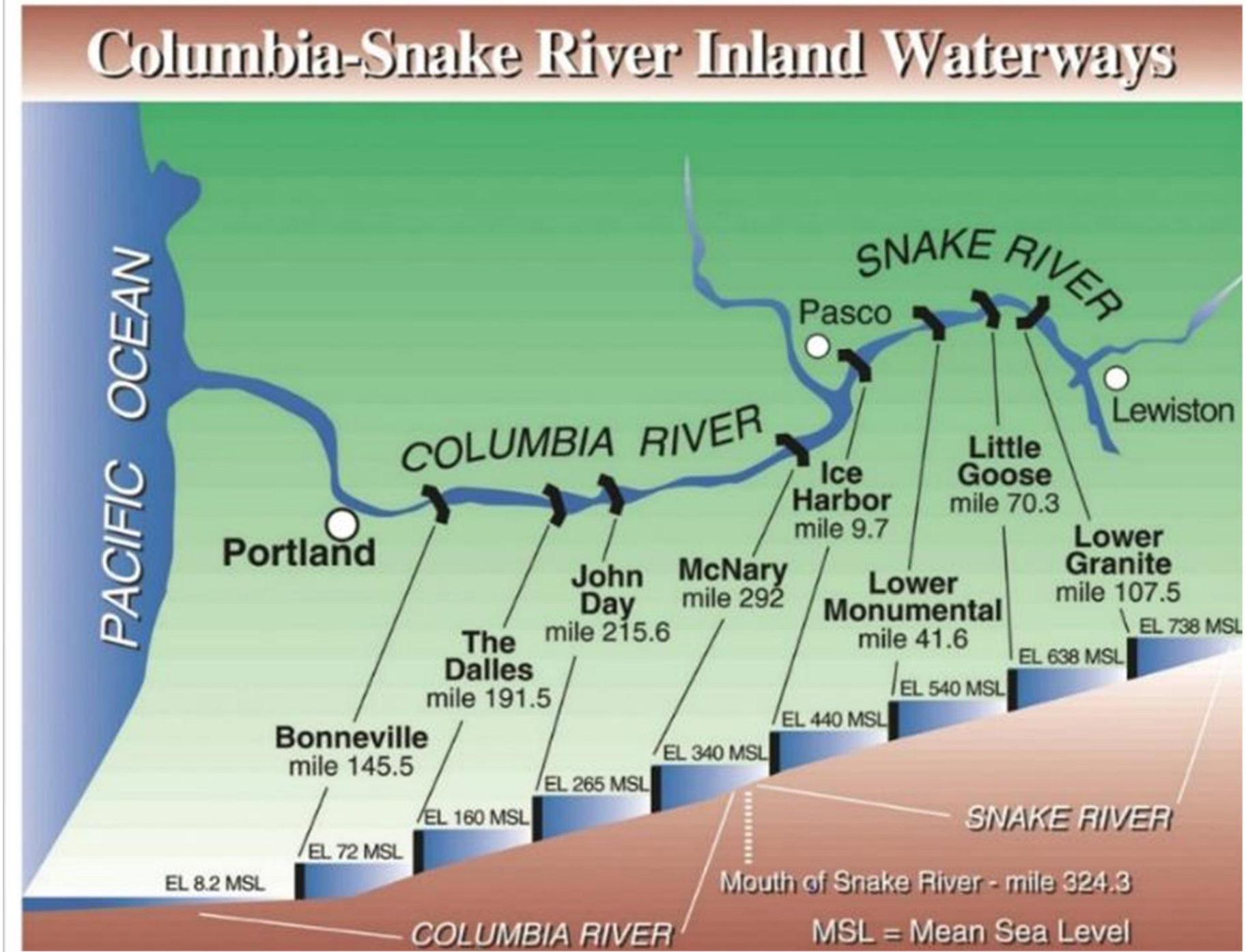
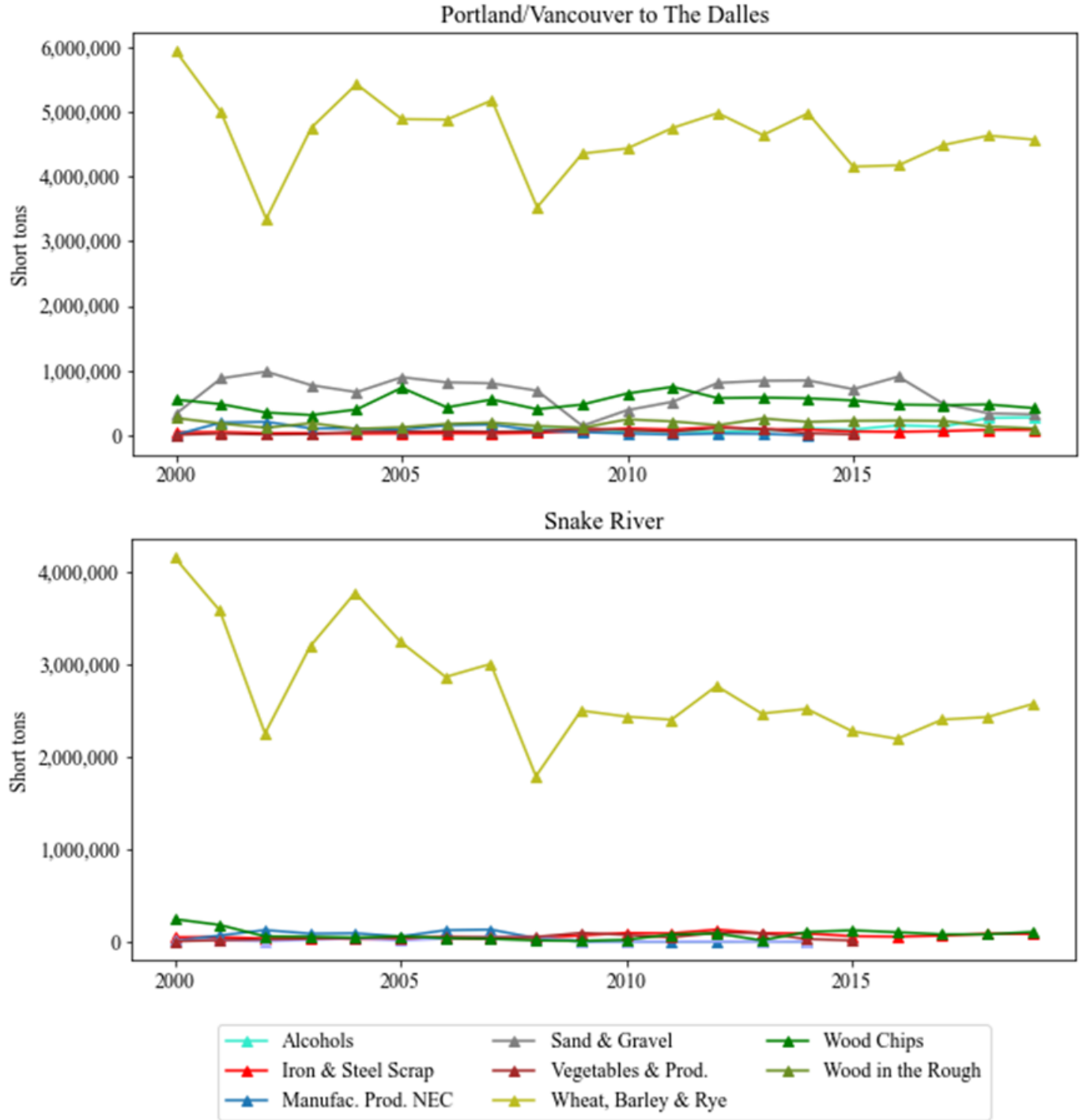
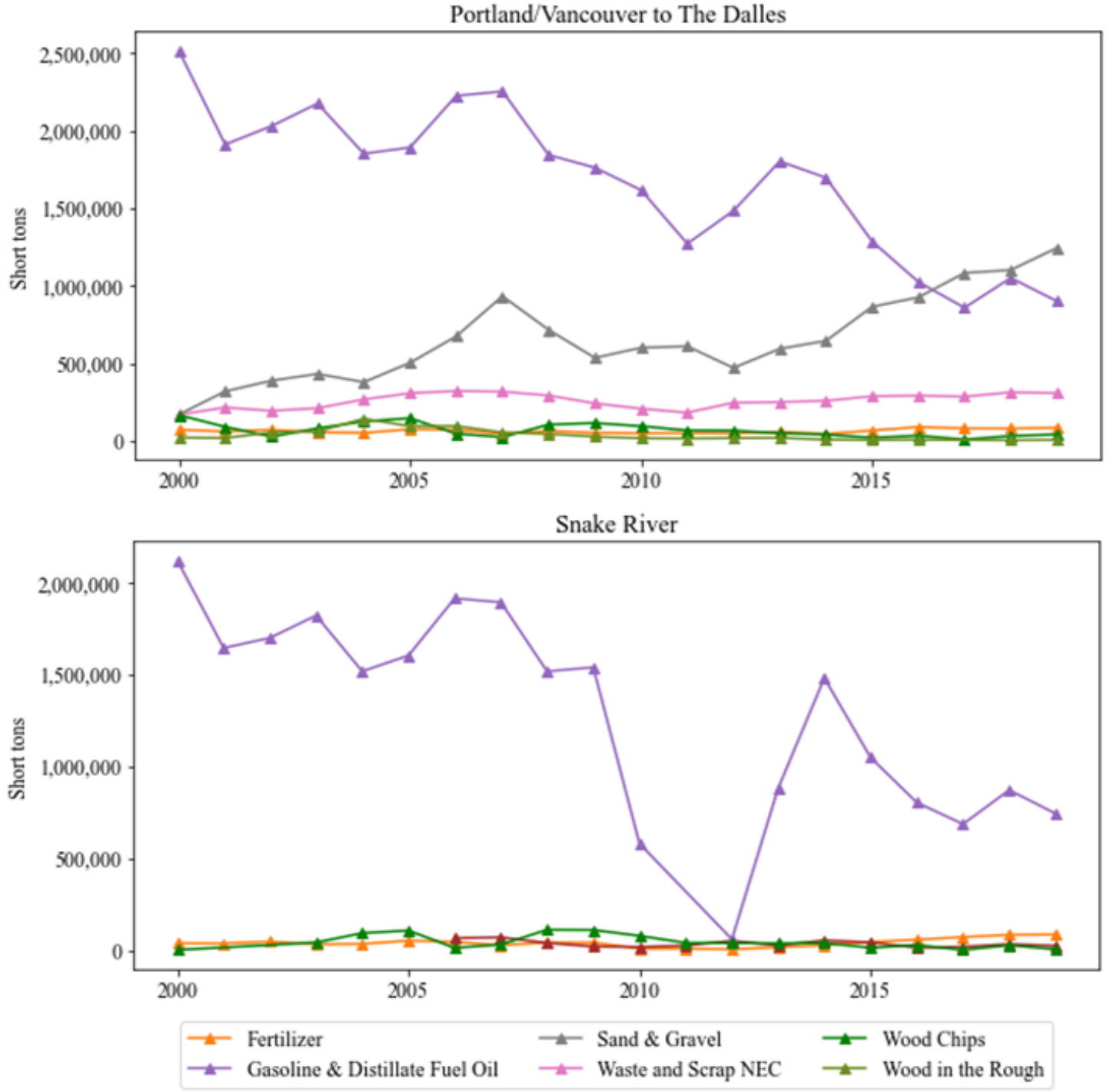
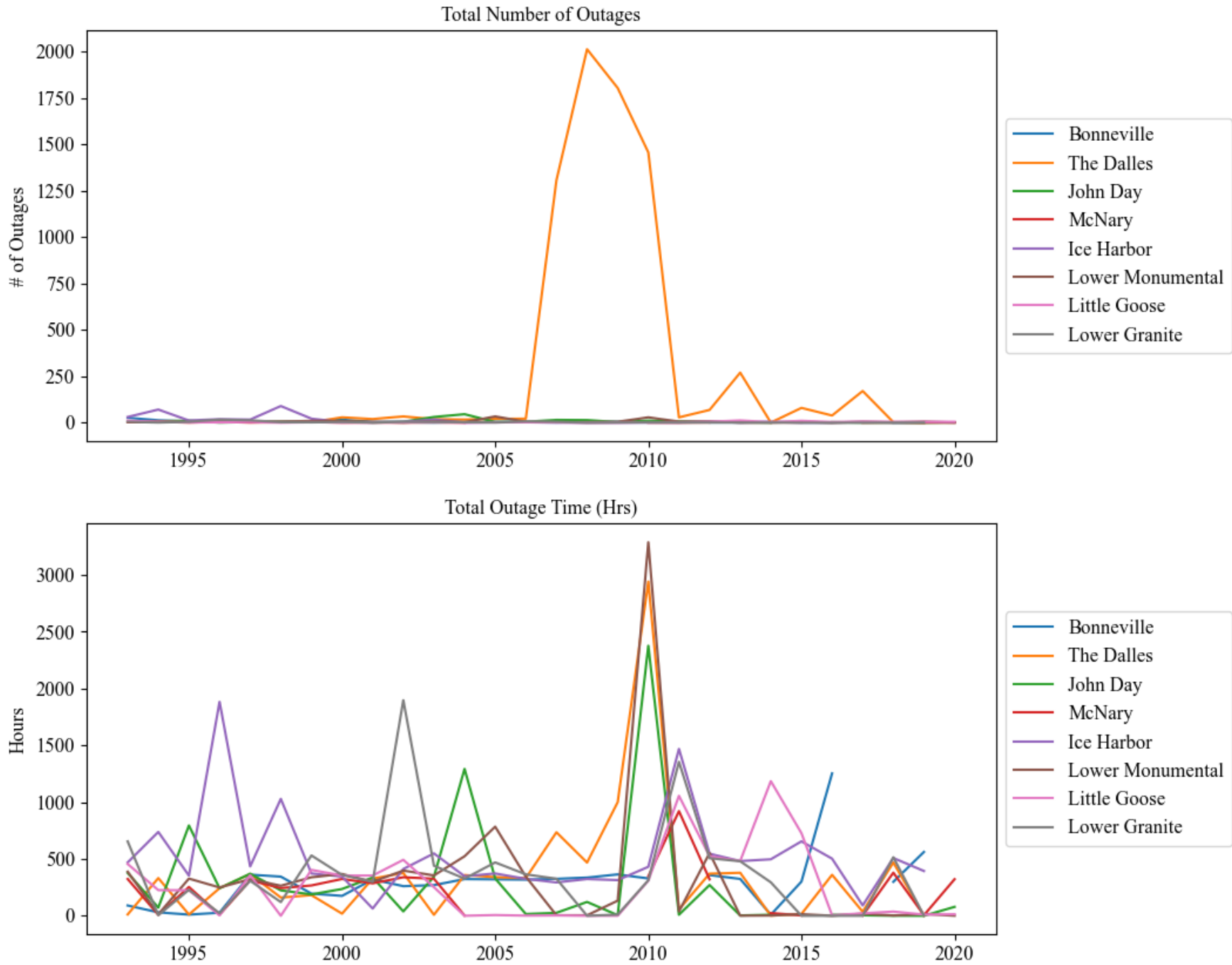

Columbia-Snake River Inland Waterways
PACIFIC OCEAN
COLUMBIA RIVER
SNAKE RIVER
Portland
Bonneville
mile 145.5
The Dalles
mile 191.5
John Day
mile 215.6
McNary
mile 292
Ice Harbor
mile 9.7
Pasco
Lower Monumental
mile 41.6
Little Goose
mile 70.3
Lower Granite
mile 107.5
Lewiston
EL 8.2 MSL
EL 72 MSL
EL 160 MSL
EL 265 MSL
EL 340 MSL
EL 440 MSL
EL 540 MSL
EL 638 MSL
EL 738 MSL
SNAKE RIVER
Mouth of Snake River - mile 324.3
COLUMBIA RIVER
MSL = Mean Sea Level


Portland/Vancouver to The Dalles
Short tons
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
2000
2005
2010
2015
Snake River
Short tons
4,000,000
3,000,000
2,000,000
1,000,000
0
2000
2005
2010
2015
Alcohols
Iron & Steel Scrap
Manufac. Prod. NEC
Sand & Gravel
Vegetables & Prod.
Wheat, Barley & Rye
Wood Chips
Wood in the Rough


Portland/Vancouver to The Dalles
Short tons
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2000
2005
2010
2015
Snake River
Short tons
2,000,000
1,500,000
1,000,000
500,000
0
2000
2005
2010
2015
Fertilizer
Gasoline & Distillate Fuel Oil
Sand & Gravel
Waste and Scrap NEC
Wood Chips
Wood in the Rough


Total Number of Outages
# of Outages
2000
1750
1500
1250
1000
750
500
250
0
1995
2000
2005
2010
2015
2020
Bonneville
The Dalles
John Day
McNary
Ice Harbor
Lower Monumental
Little Goose
Lower Granite
Total Outage Time (Hrs)
Hours
3000
2500
2000
1500
1000
500
0
1995
2000
2005
2010
2015
2020
Bonneville
The Dalles
John Day
McNary
Ice Harbor
Lower Monumental
Little Goose
Lower Granite

Objective: Evaluate the Importance of Columbia-Snake River Navigation to U.S. Agriculture

- Estimate the value added of Columbia-Snake River navigation
- Evaluate the impacts of value added under different levels of infrastructure investment

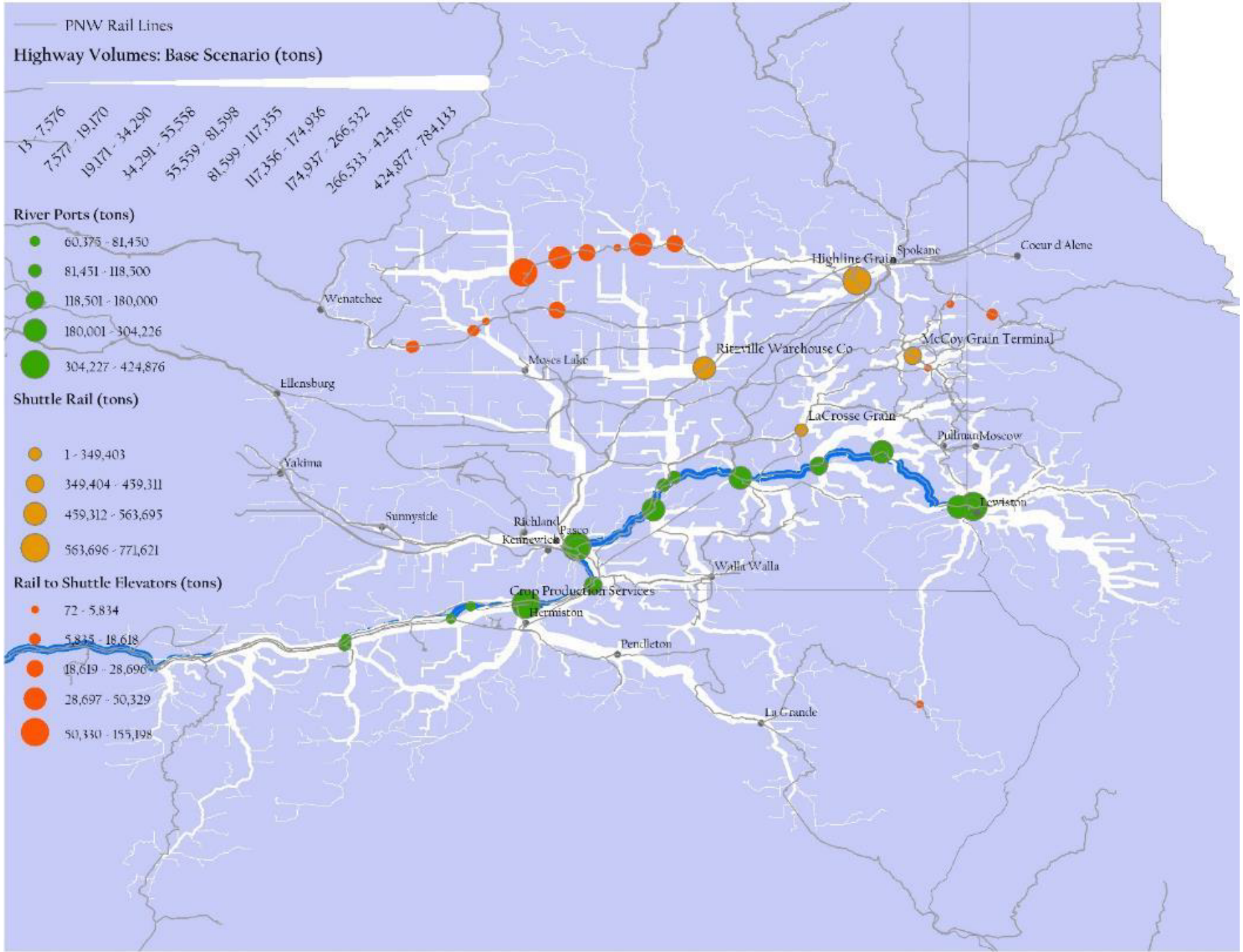
=> Model intermodal freight networks for commodities currently utilizing the river system

=> Shock the model to understand impacts under different levels of infrastructure investment

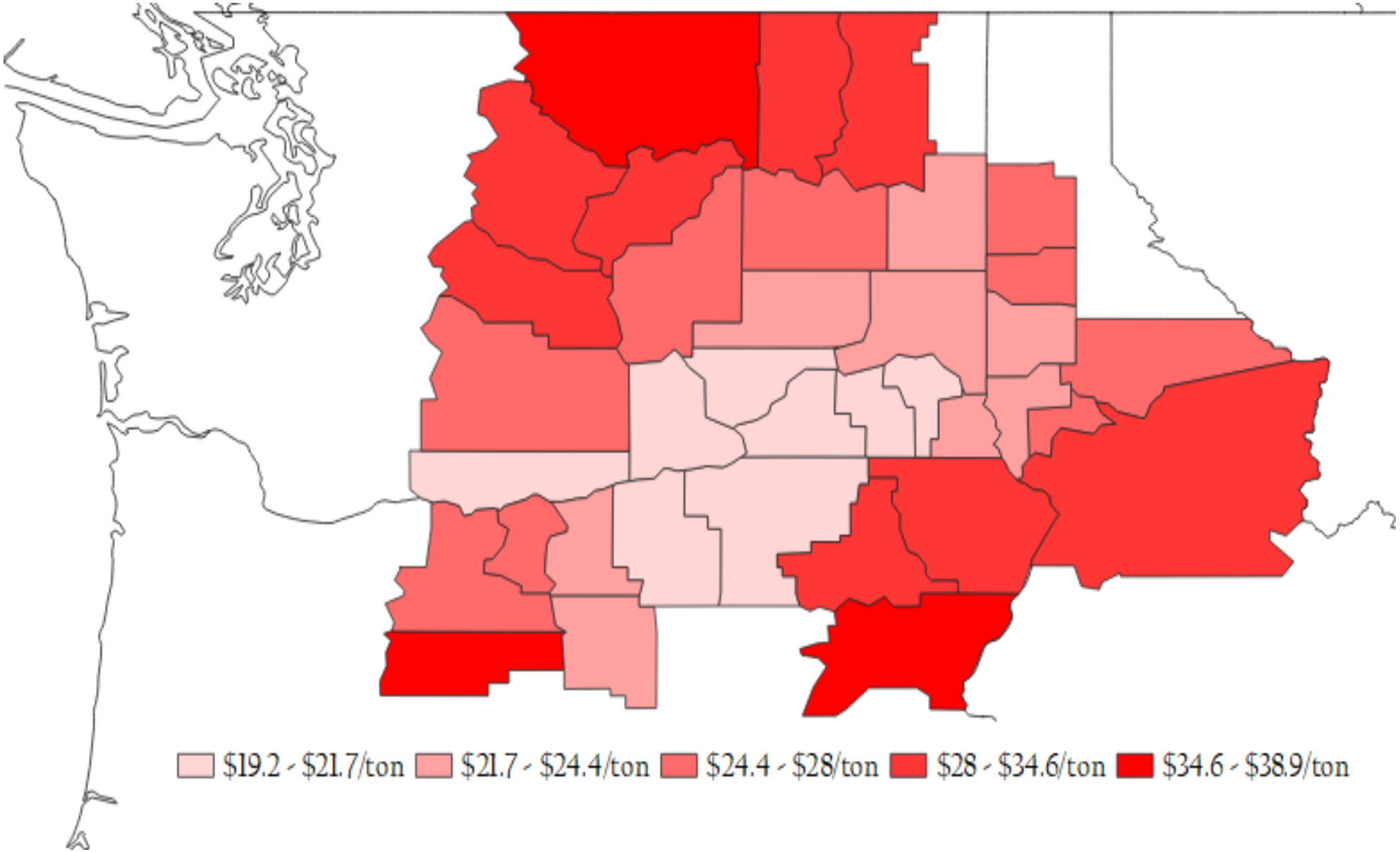
- AOS 1: an improved scenario in which all planned, outstanding, and proposed maintenance projects are completed improving river transportation efficiency and **reducing barge transportation costs by 6%.**

- AOS 2: an unimproved scenario in which planned maintenance projects are deferred resulting in reduced river transportation efficiency and **increasing barge transportation costs by 6%.**

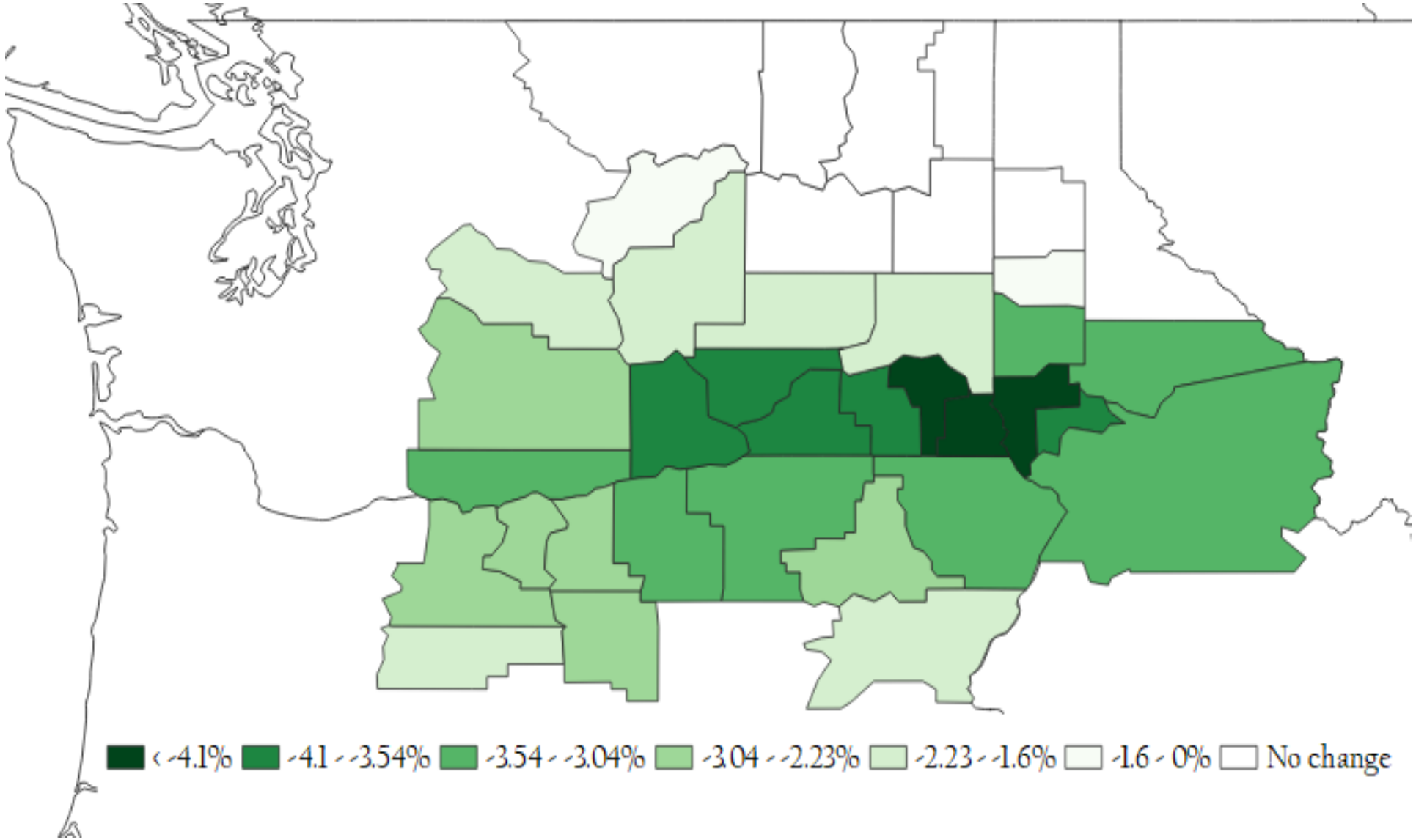
- AOS 3: a degraded scenario in which river maintenance is neglected resulting in a substantial decrease in river transportation efficiency and **increasing barge transportation costs by 12%.**


PNW Rail Lines
Highway Volumes: Base Scenario (tons)
13 - 7,576
7,577 - 19,170
19,171 - 34,290
34,291 - 55,558
55,559 - 81,598
81,599 - 117,355
117,356 - 174,936
174,937 - 266,532
266,533 - 424,876
424,877 - 784,133
River Ports (tons)
60,375 - 81,430
81,431 - 118,500
118,501 - 180,000
180,001 - 304,226
304,227 - 424,876
Shuttle Rail (tons)
1 - 349,403
349,404 - 459,311
459,312 - 563,695
563,696 - 771,621
Rail to Shuttle Elevators (tons)
72 - 5,834
5,835 - 18,618
18,619 - 28,696
28,697 - 50,329
50,330 - 155,198
Wenatchee
Moses Lake
Ellensburg
Yakima
Sunnyside
Richland
Pasco
Kennewick
Walla Walla
Crop Production Services
Hermiston
Pendleton
La Grande
Highline Grain
Spokane
Coeur d Alene
Ritzville Warehouse Co
McCoy Grain Terminal
LaCrosse Grain
Pullman
Moscow
Lewiston

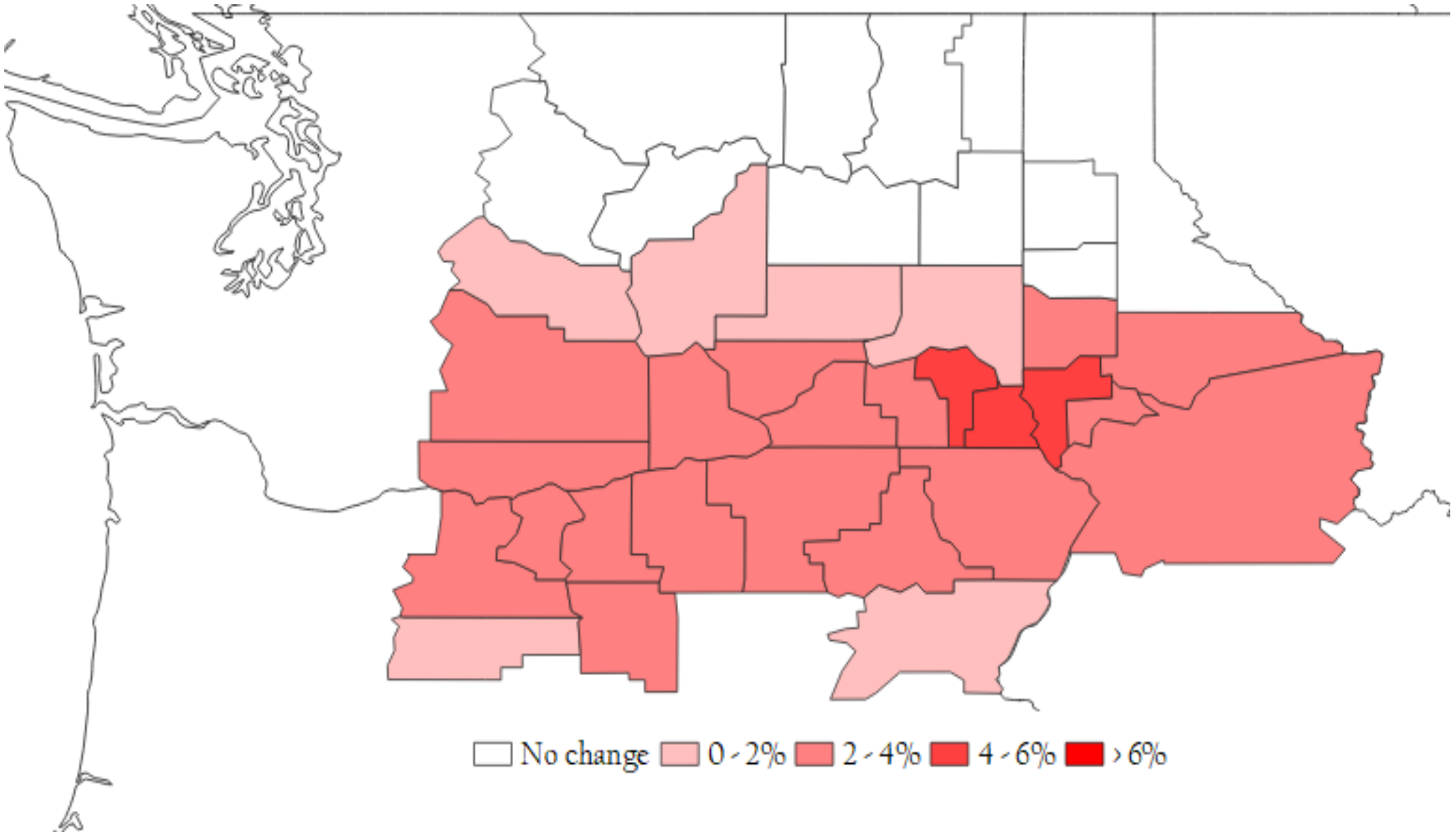
Grain - Baseline Unit Transportation Costs/Ton by County



Grain - Change in Unit Cost/Ton by County Under 6% Decrease in Barge Rates (AOS 1)



Grain - Change in Unit Cost/Ton by County Under 6% Increase in Barge Rates (AOS 2)



	Baseline	AOS 1 (-6%)	AOS 2 (+6%)	AOS 3 (+12%)
Volume (tons)				
Road	6,258,690	0.2%	-0.4%	-0.4%
Barge	3,933,470	2.0%	-2.5%	-7.8%
Rail	398,690	-0.9%	11.5%	24.6%
Shuttle Rail	2,144,030	-3.6%	4.6%	14.2%
Expenditures ($)				
Road	$53,327,600	0.3%	-1.2%	-2.4%
Barge	$52,126,800	-3.9%	3.3%	3.0%
Rail	$3,193,280	-0.8%	10.8%	22.1%
Shuttle Rail	$36,258,200	-3.5%	4.6%	14.0%
Total Expenditures	$144,905,880	-2.2%	2.1%	4.2%

	Baseline	AOS 1 (-6%)	AOS 2 (+6%)	AOS 3 (+12%)
Volume (tons)				
Road	22,966,290	0.1%	-0.1%	-0.1%
Barge	7,060,409	1.3%	-3.6%	-6.9%
Rail	1,462,900	-0.3%	13.4%	17.0%
Shuttle Rail	2,144,030	-3.6%	4.6%	14.2%
Tanker	1,744,710	0.0%	0.0%	0.0%
Pipeline	14,065,800	0.0%	4.2%	4.3%
Expenditures ($)				
Road	$181,556,720	-0.1%	-0.3%	-0.3%
Barge	$85,012,082	-4.5%	1.6%	2.9%
Rail	$15,550,880	-0.3%	13.4%	15.7%
Shuttle Rail	$36,258,200	-3.5%	4.6%	14.0%
Tanker	$21,601,900	0.0%	0.0%	0.0%
Pipeline	$96,929,800	0.1%	0.5%	0.2%
Total Expenditures	$436,909,582	-1.2%	1.1%	2.2%

	Jobs	Value Added
AOS 1	265	$56,466,223
AOS 2	-83	($21,106,961)
AOS 3	-143	($35,782,540)

	Grain	Petroleum	Fertilizer	Forest Products	Sand & Gravel
AOS 1	$10,853,289	$43,262,524	$49,208	$1,030,117	$1,271,085
AOS 2	($11,331,264)	($7,401,674)	($49,636)	($1,040,495)	($1,283,891)
AOS 3	($22,493,916)	($8,555,874)	($98,677)	($2,074,409)	($2,559,663)

- 6% reduction in barge transportation costs is estimated to contribute to an additional $56 million/year in value-added to the regional economy.
- 6% increase in barge transportation costs is estimated to result in a $21 million/year reduction in value added for the regional economy.
- 12% increase in barge transportation costs is estimated to result in a $36 million/year reduction to value-added for the regional economy.
- These economic impacts are heterogeneous across states and industries.

=> How do inland waterway investments impact navigation costs?

=> What is the demand curve for inland waterway freight?

Thanks!