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REPORT SUMMARY

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The Importance of Columbia-Snake River Navigation to U.S. Agriculture (Summary)

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This is a summary of "The Importance of Columbia-Snake River Navigation to U.S. Agriculture" by Eric Jessup, Jake Wagner, Riley Higby, Alan Barrett, Libby Ogard, Kevin Morris, and Timur Dincer.[1] This research and analysis received funding from USDA's Agricultural Marketing Service (AMS) through cooperative agreement number 20-TMTSD-WA-0014. The opinions and conclusions are the authors' and do not necessarily reflect USDA or AMS. The full paper is available at: https://wpcdn.web.wsu.edu/cahnrs/uploads/sites/5/The-Importance-of-Columbia-Snake-River-Navigation-to-U.S.-Agriculture.pdf.

WHAT IS THE ISSUE?

The Columbia-Snake River System (CSRS) provides an efficient and sustainable way to move agricultural products and other commodities from Idaho, Washington, and Oregon to global markets. Understanding the CSRS's importance in agricultural trade is crucial for shipping, planning, and investment decisions. Such intelligent management of the CSRS is vital to preserving its function as a resilient, competitive transportation network and sustaining local economies that depend on it.

Currently in fairly good operating condition, the CSRS has fewer unplanned outages and long lockage delays than occur in the Mississippi River System. Each year, at the beginning of March, the CSRS closes for 3 weeks to perform needed maintenance on the locks and dams. Although the outages disrupt the navigation system, the fact that they are planned and routine allows shippers to be well prepared. Nevertheless, barge transportation costs can affect the regional "value added" metric—similar to gross domestic product (GDP), but for the regional level.

This research assesses how changes in operating efficiency resulting from various levels of investment in CSRS infrastructure affect the Pacific Northwest's shipping costs and regional economy. This research complements previous research, "The Importance of Inland Waterways to U.S. Agriculture," which focused exclusively on the Mississippi River System (MRS).[2]

[1] Jessup is a research professor at Washington State University. Wanger is an assistant research professor at Washington State University. Higby is the director of revenue for Higby Barrett, LLC. Barrett is the director of research and consulting at Higby Barrett, LLC. Ogard is the president of Prime Focus, LLC. Morris and Dincer are research assistants at Washington State University.

[2] https://www.ams.usda.gov/services/transportation-analysis/inland-waterways-report

HOW WAS THE STUDY CONDUCTED?

The authors specifically looked at five commodity supply chains—grain, fertilizer, petroleum products, forest products, and sand and gravel products—which make up 83 percent of the cargo on the Columbia River and 88 percent of the cargo on the Snake River. Baseline production and river shipment volumes are based on model year 2019 and assume the river's operating condition remains constant (i.e., neither worsens nor improves). For the study's five examined commodities, the authors empirically assess the total transportation costs and economic impacts of three scenarios:

The **improved scenario** assumes barge transportation costs decrease 6 percent (from 2019's baseline costs) because all planned, outstanding, and proposed maintenance projects are completed.

The **unimproved scenario** assumes barge transportation costs increase 6 percent (from 2019's baseline costs) because all planned and proposed maintenance projects are deferred.

The **degraded scenario** assumes barge transportation costs increase 12 percent (from 2019's baseline costs) because of neglected maintenance to existing infrastructure.

Transportation costs rise or fall as a result of the river system's operating efficiencies. When barge rates rise because of diminishing operating efficiencies, a shipper may transition from barge shipping to another mode, to minimize their transportation costs.

The authors use a two-stage approach to estimate the economic impacts of the CSRS under each scenario:

1. Shippers' transportation decisions and costs are evaluated using a transportation optimization model to estimate shipping costs for the five commodities using monthly tonnage lock reports for 2020 and 2021 and annual tonnage reports for 2000-2019;

2. Economic impacts of the changes in shipping costs are estimated for each State and commodity using a regional economic input-output model.

Finally, the authors evaluate three different types of contributions to the regional economy: direct impacts (economic activity that occurs directly within the barge industry); indirect impacts (economic activity needed to support the barge industry); and induced impacts (the economic activity from the spending on labor income and profits from the barge industry). Total economic impacts are the summation of the direct, indirect, and induced impacts.

WHAT DID THE STUDY FIND?

The researchers found changes in transportation costs under each scenario were not uniformly distributed across the study region. For example, shippers who relied more on barge shipping would typically receive greater benefits from the improved scenario (because of the river system's increased efficiencies) than shippers who relied less on barge shipping or had easy access to alternative modes.

The following sections break down other aspects of the researchers' findings:

Effects of Investment on "Value Added" to Regional Economy

For the 2019 baseline, the CSRS was estimated to contribute $346 million per year to the regional economy.

The **improved scenario** would add $56 million to the CSRS's value per year (from the baseline level) to the Pacific Northwest economy and add 265 jobs to the region. Oregon would gain the most (311 jobs); Idaho would add 10 jobs; and Washington would lose 55 jobs. The petroleum industry would gain 77 percent of the jobs, and the grain industry would gain 19 percent.

The **unimproved scenario** would reduce, by $21 million per year, the CSRS's value (from the baseline level) to the Pacific Northwest economy. All three States would lose jobs (83 total), and Washington would lose the most (57). Among regional industries, grain industry would lose the most jobs (44).

The **degraded scenario** would reduce, by $36 million per year, the CSRS's value (from the baseline level) to the Pacific Northwest economy. All three states would lose jobs (143 total), and Washington would lose the most (85). Again, among regional industries, the grain industry would lose the most jobs (90).

Effects of Investment on Grain Volumes Shipped (by Barge and Rail)

For the 2019 baseline, approximately 65 percent of the region's grain production (wheat, barley, and rye)—the highest volume commodity moving along the CSRS—was moved via barge to export ports.

The **improved scenario** would result in a 2.0-percent increase in barged grain volumes shipped; a 3.9 percent decrease in barge expenditures; a 3.2-percent decrease in grain volumes shipped by rail, a 3.3-percent decrease in rail expenditures; and a 2.2-percent decrease in total expenditures.

The **unimproved scenario** would result in a 2.5-percent decrease in barged grain volumes shipped; a 3.3-percent increase in barge expenditures; a 5.7-percent increase in grain volumes shipped by rail, a 5.1-percent increase in rail expenditures, and a 2.1 percent increase in total expenditures.

The **degraded scenario** would result in a 7.8-percent decrease in barged grain volumes shipped; a 3.0-percent increase in barge expenditures, a 15.9-percent increase in grain volumes shipped by rail; a 14.6-percent increase in rail expenditures; and a 4.2-percent increase in total expenditures.

Effects of Investment on Barge Volumes Shipped (by Commodity)

Petroleum. The researchers found the improved scenario would raise the volume of barged petroleum 2 percent; decrease barge expenditures 4.3 percent; and decrease total expenditures by 0.2 percent. The unimproved scenario would result in a 20.2-percent decrease in barged volumes; 17.7-percent decrease in barge expenditures; and a 0.2-percent increase in total expenditures. The dramatic decrease in volumes is likely due to the ready availability of alternative shipping modes, primarily pipeline.

Fertilizer. Because of production capacity constraints, the improved scenario would result in no change to barged volumes. However, the unimproved scenario would result in 0.2-percent decrease in barge volumes shipped; a 5.8-percent increase in barge expenditures; and a 6.0-percent increase in total expenditures.

Sand, Gravel, and Forest Products. Because of insufficient information, transportation models for sand and gravel and forest products were not developed. The researchers assumed any change in barge transportation costs in these industries would be passed on directly, resulting in an equivalent increase or decrease in total transportation costs.

PREFERRED CITATION

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