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The Schnitzer Group

Dave Robertson
PG&E Gas Transmission

March 30, 2000

Department of the Army
Walla Walla District Corps of Engineers
Attention: Lower Snake River Study
201 North Third Avenue
Walla Walla, WA 99362-1876

This letter is being written in reference to the Draft Feasibility Report and Environmental Impact Statement for the Lower Snake River Juvenile Salmon Migration Feasibility Study. The following represents the comments of the Oregon Freight Advisory Committee, which is a group of people representing shippers, carriers, trade associations, port districts, and others interested in a balanced freight transportation system in Oregon.

The committee is concerned about transportation and related impacts that would occur with breaching of the four dams on the lower Snake River. Concerns are primarily about impacts in Oregon but more broadly about impacts on the Northwest transportation system, especially as system changes adversely affect Oregon's producers, shippers, and carriers.

To help address these concerns, the Committee encouraged the Oregon Department of Transportation (ODOT) and several other agencies to look more closely at impacts from dam breaching. ODOT and three other agencies--the Port of Portland, Oregon Department of Agriculture, and Oregon Economic and Community Development Department--subsequently jointly commissioned a study to assess the proposed dam breachings' transportation and related impacts in Oregon.

In February 2000, the agencies released a report titled "Breaching the Lower Snake River Dams: Transportation Impacts in Oregon." We believe the report helps to highlight a number of issues that are not adequately addressed in the Draft Feasibility Report and EIS, and encourage the Corps to examine adverse impacts of these issues more thoroughly.

1. Container shipping. About 9,000 full export containers now shipped via the lower Snake River through the Port of Portland annually could be diverted to other shipping points. This could result in two or more of the six ocean container services ending direct service to Portland, which in turn would mean the elimination of container service to and from South America, Europe, and Australia/New Zealand. We are concerned about the adverse impacts on Oregon producers and shippers that would result from elimination of this service, and encourage the Corps to address this more thoroughly.

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2. Rail capacity. We recognize the uncertainties associated with predicting the amount of Snake River traffic that might be diverted to rail. We nonetheless encourage the Corps to thoroughly examine capacity and other issues associated with possible increased rail traffic that might result from dam breaching. Of special interest are the adverse impacts that might occur in the Portland area due to concerns about capacity constraints there. Increases in rail traffic due to dam breaching could worsen the Portland area's existing and emerging capacity constraints.
- 3, 4
3. Infrastructure investments. Shifting of substantial quantities of Snake River barge traffic to ports on the Columbia River likely would mean additional investments in infrastructure would be needed at these ports. While we appreciate the Corps' analysis suggesting the private sector and government would work together to make these investments, we are concerned that this might not occur in the manner envisioned. Failure to make the needed investments in a timely manner could have substantial adverse impacts on the region's transportation system and economy. We are especially concerned about what these impacts might be on Oregon's transportation system and economy if the necessary investments in infrastructure are not made in Washington. Thus we encourage the Corps to more thoroughly address potential adverse impacts resulting from failure to make timely and necessary investments in infrastructure.
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4. Indirect and cumulative impacts. Some of the impacts discussed above would fall under the categories of indirect and cumulative impacts. National Environmental Policy Act and Council of Environmental Quality provisions require a thorough analysis of these impacts, especially those that are "caused by the action and are later in time or farther removed in distance" and which might occur incrementally "when added to other past, present, and reasonably foreseeable future actions." In the Northwest, this would include a variety of actions, which, in combination with Snake River dam breaching, could adversely affect Oregon's and the Northwest's transportation system and economy. Thus we encourage the Corps to thoroughly address potential indirect and cumulative transportation and related impacts in its analysis of Snake River dam breaching.

Thank you for the opportunity to comment on the Draft Feasibility Report and EIS. Please contact me at P.O. Box 220, Medford, Oregon 97501 or at mbsr@cdsnet.net if I can further explain the committee's concerns.

Sincerely,



Michael E. Burrill, Chair
Oregon Freight Advisory Committee

Breaching the Lower Snake River Dams: Transportation Impacts in Oregon

Summary Report

Prepared for:

Port of Portland
Oregon Department of Agriculture
Oregon Economic and Community Development
Department
Oregon Department of Transportation

Prepared by:

HDR Engineering, Inc.

in association with
Ogden Beeman & Assoc., Inc.
TW Environmental, Inc.

February 2000

Introduction

Purpose of this Study

Breaching the four federal dams on the lower Snake River is one of several options under consideration to improve fish habitat and migration return rates for threatened salmon runs. Breaching the dams would result in a host of economic benefits and costs ranging from projected increases in revenues from improved fishing to losses in hydropower production. This study was undertaken by the Port of Portland, Oregon Department of Agriculture, Oregon Economic and Community Development Department, and Oregon Department of Transportation to consider the possible economic and transportation impacts to Oregon and the region if the dams are breached.

The purpose of this study is to identify and quantify transportation impacts specific to the state of Oregon that could occur if four dams on the lower Snake River are breached.

Several previous studies have addressed the possible impacts of breaching the lower Snake River dams, including the U.S. Army Corps of Engineers' (Corps) *Lower Snake River Juvenile Salmon Migration Feasibility Study*, the Washington State Legislative Transportation Committee's *Lower Snake River Drawdown Study*, and others. However, none of these studies has focused on the specific impacts that breaching the dams may have on Oregon's ports and transportation system. This study provides that key element: a regional perspective focusing on the direct and indirect transportation and associated impacts that could occur in Oregon if the dams are breached.

Study Findings

Over the course of this study, analysts reviewed the possible effects of proposed dam breaching on several aspects of Oregon's transportation system and economy, including:

Among other impacts, breaching the dams will affect:

*Barge operations
Container movements to the Port of Portland
Shipping prices for grain and other commodities
Port, highway, and railroad systems*

- Barge operations on the lower Snake River and the Columbia River,
- Container shipments through the Port of Portland,
- Transportation alternatives and mode shifts,
- Infrastructure capacity at port facilities on the Columbia River and on railroads and highways in Oregon, and
- Crop production and selection.

The findings are summarized below.

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- The current practice of barging commodities on the Snake River would cease. While many goods would continue to be shipped on the Columbia River between the Tri-Cities and Portland,

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producers currently shipping via barge on the Snake River would be forced to either truck their freight to the Tri-Cities or find alternative means of shipping their goods to market altogether.

- The demand for barge service would be reduced as shippers move to alternative modes, including rail to export facilities, and long-haul trucks directly to export facilities. The reduced demand would result in a potential loss of income to the Columbia-Snake River barge industry of \$4 million to \$11 million per year.¹
- Impacts to the barge industry would likely result in rate changes for barge services with shipping costs for grain produced in northeast Oregon increasing by as much as \$0.13 a bushel.
- A loss of volume and changes in revenues and equipment utilization could limit the ability of barge operators to provide current levels of service on the remaining portion of the Columbia River. Changes could include less frequent calls, or changes in rates.²
- Up to 9,000 full export containers currently shipped through the Port of Portland each year could be diverted to the Puget Sound area or other end points such as the Gulf of Mexico and the East Coast.
- Up to four of the six ocean carrier services that currently serve the Port of Portland may choose to stop calling at Portland if containers could no longer be shipped on the Snake River. Two of these carrier services are considered "likely" to stop calling and two others are considered "vulnerable." This would result in a loss of service to South America and Europe and a reduction in service to the Pacific Rim.
- If fewer ocean carriers serve Portland, Willamette Valley shippers (and others who use the Port of Portland to ship export containers) may need to ship containers through Puget Sound area ports, with associated cost increases estimated at \$200 per container on average.

¹ Estimates of impacts to net revenues can vary widely depending on assumptions about the level of competition provided by truck and rail, and the level of fixed costs for each barge company. For this analysis, several scenarios were modeled, with the most likely scenario suggesting a \$5.7 million reduction in net revenue, a -27 percent to -58 percent change in profit.

² A \$0.13 per bushel increase was estimated for some producers in northeast Oregon currently shipping grain to market through Lewiston, Idaho. This analysis is documented in *Technical Memorandum No. 5. Potential Shifts in Crop Production and Selection*. A separate analysis suggested that the barge industry could either raise or lower its rates depending on the competitive strategies selected by each barge firm. Some scenarios considered for this study indicated that these changes could result in an increase of \$0.10 per bushel, or rate cuts of as much as 10 percent. This analysis is documented in *Technical Memorandum No. 4 Findings*.



- 9 • Ports in the Tri-Cities area and downriver toward the Ports of Umatilla and Morrow would experience substantial volume increases as grain and perhaps wood chips are trucked to these ports from areas currently served by Snake River barges.
- 9 • If the large volume of commodities currently moved by barge were shifted to truck and rail modes, either for hauling to barges in the Tri-Cities area or for transport to another endpoint for export, the existing transportation system infrastructure and current rail service levels may not be able to accommodate demand.
- 10 • Export grain elevators on the lower Columbia River may not have adequate capacity to accommodate increased truck and rail traffic. Specifically of concern is whether freight facilities are adequately equipped to transfer commodities from truck and rail rather than barge.
- 11 • Oregon ports of Morrow and Umatilla could experience a “cascade effect” of increased traffic and volume from producers who choose to truck grain farther downriver to avoid congested facilities at the Tri Cities area.
- 12 • Agricultural land with yields of less than 45 bushels per acre may be at risk of being taken out of production due to the lowered rate of return that would result from higher transportation costs. Low yield dryland wheat farm acreage in Wallowa County, Oregon, and Lincoln and Adams Counties in Washington are at greatest risk for being removed from production.
- 13, 14 • Increased transportation costs could reduce the value of some farmland in eastern Oregon and eastern Washington by an estimated \$88 per acre. This would have ripple effects on the local economies of these areas.
- 15 • There appears to be little potential for other dryland crops (specifically oilseed crops such as canola) to replace dryland wheat.

16 These findings highlight the impacts to segments of Oregon’s economy and transportation system. This information is intended to provide a regional perspective for federal actions on the Columbia-Snake River System.³ The analysis the U.S. Army Corps of Engineers conducted did not take these regional impacts into account.

17 The findings and the methodology and assumptions that support them are discussed in detail in this report. The findings, methods, data, and assumptions are documented in greater detail in a series of

³ The Columbia-Snake River System refers to the navigable, dam-controlled portions of the Columbia and Snake rivers, from Lewiston, Idaho to the Pacific Ocean.

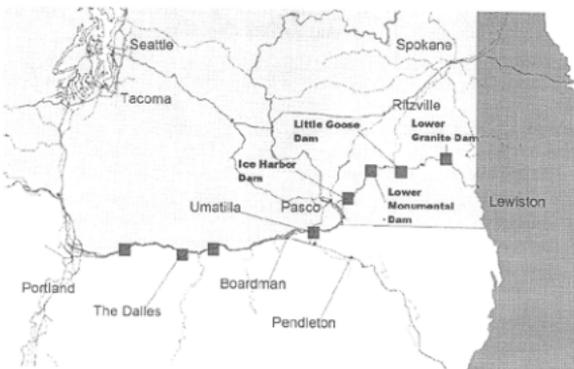
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technical memoranda also prepared for this analysis. These memoranda are:

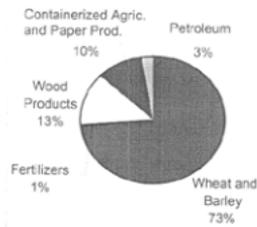
- Technical Memorandum No. 1 - Data Sources,
- Technical Memorandum No. 2 - Study Assumptions,
- Technical Memorandum No. 3 - Technical Methodology and Comments from Peer Review Panel,
- Technical Memorandum No. 4 - Findings,
- Technical Memorandum No. 5 - Potential Shifts in Crop Production and Selection, and
- Technical Memorandum No. 6 - Transportation System and Facility Cost Impacts.

History of Navigation on the Snake River

The Columbia-Snake River System is a critical component of the Pacific Northwest regional economy. Currently, wheat and barley make up approximately 75 percent of nearly 4 million tons of commodities shipped each year through the navigation lock at Ice Harbor Dam, the last dam on the lower Snake River before it joins the Columbia River. Most of these commodities are exported out of the Port of Portland and other lower Columbia River ports forming the nation's number one wheat export gateway, and the world's second largest system for grain exports.



Each year, 4 million tons of commodities are shipped past Ice Harbor Dam on the Snake River, many traveling from the port at Lewiston, Idaho to export facilities at Portland, Vancouver, Longview, Kalama, and other lower Columbia River ports.



Grain, primarily wheat and barley, makes up about 73 percent of the volume of goods shipped on the lower Snake River. Paper products and peas and lentils, all of which are shipped in containers, make up only 10 percent of the volume, but their comparatively high values make them an important part of the Columbia-Snake River System traffic.

Based on studies that began in the early 1930s, Congress approved the Lower Snake River Dam project in 1945. Construction of the Lower Granite Dam began in 1956. By 1975, four dams had been built on the Snake River between Lewiston, Idaho and the Tri-Cities area in eastern Washington. From east to west these dams are Lower Granite Dam, Little Goose Dam, Lower Monumental Dam, and Ice Harbor Dam.

Construction of these dams created a series of slackwater reservoirs on the last 140 miles of the Snake River upstream of its confluence with the Columbia River. As a result, waters were calm enough and deep enough to allow a commercial barge system designed to enhance the economies of eastern Washington and western Idaho. The barge industry provides low-cost transport for commodities, primarily grain and paper products, to be shipped downstream to export ports.

Federal Actions Affecting the Lower Snake River

In 1992, the Snake River sockeye salmon was listed as endangered under the Endangered Species Act. Subsequently, Salmon River (a Snake River tributary) spring/summer and fall chinook salmon have been listed as threatened.⁴

The National Marine Fisheries Service and the U.S. Army Corps of Engineers are currently considering all “reasonable and prudent” actions to increase the chance of survival for threatened and endangered species. The Corps is involved because it constructed and operates the four dams on the lower Snake River.

In December 1999, the Corps released a draft environmental impact statement (DEIS) to evaluate alternatives that may increase the survival rate of juvenile salmon past the four dams on the lower Snake River. This study focuses on one of those alternatives – breaching the four dams on the lower Snake River. Breaching the dams would reduce the level of the reservoirs by approximately 100 feet. Barge traffic would be unable to navigate the Snake River beyond its mouth near the Tri-Cities.

Findings

Introduction

Under the Corps’ proposed dam breaching scenario, commercial barge navigation on the lower Snake River would cease. Producers would be forced to find alternative shipping routes, modes, and destinations for their goods, which could affect downstream export facilities, including the Port of Portland.

Barges are currently the least expensive form of transportation for most commodities shipped to Portland from many points in Idaho, eastern Washington, and eastern Oregon. Moreover, shipment by barge is supported by an efficient network of handling facilities and systems at lower Columbia River ports. Although commercial navigation could continue to function on the Columbia River under a dam breaching scenario, many shippers would be forced to either truck goods longer distances to Columbia River barge ports in eastern Washington and Oregon or ship them via railroad or longer-haul trucks directly to Portland, Puget Sound, or other ports for export.

Breaching the dams would end commercial barge navigation on the lower Snake River.

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⁴ The designation for the Snake River sockeye salmon has been reduced to threatened.

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Even small changes in volume shifted from barge to truck and rail could lead to economic distress for the barge industry.

Changes in transportation modes and costs could impact Oregon and the Port of Portland, affecting the level of barge service, commodity volumes, the number of competing ocean carriers offering direct container service at the Port of Portland, and Oregon's transportation infrastructure. Specifically, a loss of volume and changes in revenue and equipment utilization could limit the ability of barge operators to provide service on the remaining Columbia River portion of the inland waterway. In addition, changes in rates and shipping modes could alter ocean carriers' interest in serving the Port of Portland. If a large percentage of the goods moved by barge were transferred to trucks and railroads, up-river port facilities and the highway and rail systems that feed them may not have adequate facilities to accommodate increased traffic. Lastly, if it becomes too costly to transport goods, some producers may decide to stop farming marginal lands, affecting the region's wheat industry, and further reducing volumes at the Port.

Overview of Study Methodology and Assumptions

The methodology for this study consisted of:

- Reviewing existing information as it applies to conditions in Oregon,
- Interviewing producers and transportation providers to supplement the literature review,
- Developing study assumptions where empirical data were not available, and
- Modeling several scenarios to forecast the impacts of variables that could be affected by dam breaching.

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Although using assumptions as a substitute when empirical data are not available is common practice, it is essential to the credibility of this study that all assumptions are logical and supportable. This was accomplished through:

- Comparison with publicly available information regarding representative shippers, transportation providers, and ports,
- Comparison with results of other relevant studies,
- Interviews with ocean carriers, shippers, port district representatives and others, and
- Review by a technical study team and a three-member expert peer review panel.

A summary of the methodology and assumptions are provided later in this report.

Organization of the Findings

The effects in Oregon of breaching the lower Snake River dams are provided for the following areas of study:

- Barge and Towboat Industry,
- Container Industry,
- Transportation System and Producers, and
- Crop Selection and Production.

The findings are discussed in greater depth below.

Effects on Barge and Towboat Industry

Barges currently provide the least expensive shipping mode for most commodities shipped to Portland from origins in western Idaho, eastern Washington, and eastern Oregon. Grain makes up the largest volume of commodities shipped on barges, representing about 75 percent of the total Snake River traffic.

The analysis of impacts to the barge industry considered two possible outcomes of breaching the dams:

1. Rail providers would compete aggressively for market share. Under this scenario, it is assumed that investors, possibly rail companies or grain companies, would expand capacity at existing or new inland grain elevators and rail lines to allow efficient transfer to and from rail. This scenario was further broken down to examine two different degrees of rail investment.⁵
2. Rail competition would be constrained by existing elevator capacities favoring shifts towards a truck to barge combination through the Tri-Cities area grain elevators.

Under the first scenario, rail could provide a relatively attractive alternative to the truck-barge mode, capturing 10 percent to 32 percent of the current barge volume. With a shift in grain to other modes, the barge industry would face lowered profits and under-utilization of tugs and barges. Even with limited competition from rail providers, as modeled under the second scenario, barge operators could lose 3 percent of their current volumes, and face decreases in net revenue and utilization.

Focus on Barge Capacity:

A barge can transport three loads of grain between Lewiston and Portland in a month, or four loads between Pasco and Portland. If the dams are breached, barges could make more trips, effectively increasing the delivery capacity of the existing fleet. Even with little or no reduction in volume of barge shipments, this would lead to under-utilization of equipment – a threat to barge operators' profitability.

⁵ Assumptions regarding the level of competition provided by rail significantly affect the degree to which the barge industry is negatively impacted under a drawdown. Two rail scenarios were modeled, one with unlimited throughput capacity at all existing elevators (32 percent reduction in barged volumes), a second with capacity improvements at only two, strategically located elevators (10 percent reduction in barged volumes). The second of these scenarios is considered more likely.

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Regardless of the assumptions related to the level of competition provided by rail, under-utilization of equipment and loss of volume could impact the barge companies' profitability and lead to changes in the level of service provided to shippers (e.g., the number of barges in operation and frequency of calls). The number of barge service providers may also be reduced.

Depending on the rail scenario chosen and general assumptions related to barge company profits and fixed costs, the barge industry as a whole may experience a loss in net revenue of between \$4 million and \$11 million per year. Uncertainties regarding levels of fixed costs make it difficult to gauge the degree of impact that this might have on profits; however, under a scenario in which 10 percent of volume currently transported by barge is diverted to rail (and a conservative estimate for fixed costs is used), the drop from current profit levels may be close to 30 percent.

22

The barge industry on the Columbia-Snake River system operates under relatively high fixed costs due to the high cost of equipment; particularly barges and tugs. Barge vessels are specifically designed for the Columbia-Snake River system and are more expensive than barges used on other comparable river systems in the United States.⁶

If the dams are breached, barge companies could experience under-utilization of their fleets. Because these barges have been designed specifically for this river system, they cannot operate on other river systems, and therefore would not have any reasonable resale value beyond being sold for scrap metal and parts. The high cost of new equipment and the inability to profitably sell under-utilized barges will make it difficult for the industry to respond to increases or decreases in demand; an important consideration when examining the changes to the transportation system that could result from breaching the dams.

Competition for market share after dam breaching could lead to consolidation within the barge industry, currently comprising four firms, reducing the amount of choice for purchasers of barge services.

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There are currently four barge companies on the Columbia-Snake River System. Given the likely excess supply of grain barges resulting from dam breaching, there may be aggressive price competition among these firms to capture as much market share as possible in order to use their otherwise idle barges. Under these competitive market conditions, it may be difficult for the smaller operators to capture a market share from the dominant operator because they lack the capacity to handle seasonal increases in demand. In addition, any rate reduction by the dominant operator to increase market share could have a dramatic impact on the smaller operators, including

⁶ A grain barge on the Mississippi River system can be purchased for around \$200,000- \$300,000, while a Columbia-Snake River grain barge can cost upwards of \$2 million.

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Table 1
Summary of Barge Industry

Impacts				
Commodity	Reduction in volume	Reduction in industry's revenue	Reduction in industry's cost	Reduction in industry's net revenues
Grain *	568,000 tons	\$7,876,000	\$2,148,000	\$5,728,000
Containers **	18,000 containers	\$2,520,000	\$2,043,000	\$477,000
Woodchips, minimum impact	0 tons	\$2,500,000	\$200,000	\$2,300,000
Woodchips, maximum impact	500,000 tons	\$6,250,000	\$810,000	\$5,440,000

*Based on a 10 percent reduction in barged volumes as a result of rail competition. The results of two other scenarios with estimated volume reductions of 3 percent and 32 percent are included in Technical Memorandum No. 4 - Findings.

** Includes 9,000 full containers and 9,000 back-haul empty containers

forcing them out of business. It should be noted, however, that purchasers of barge services have some incentive to support the three smaller barge companies to maintain competition within the industry, and to guard against disruptions in service.

The impacts described above refer specifically to the movement of bulk grain. Table 1 captures the lost revenue resulting from changes in the shipment of grain and other commodities.

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Table 2
Lewiston Containers Shipped by Barge (1998)

Commodity	TEU's*
Paper	11,949
Pulses	3,071
Grain	609
Bentonite	406
Other	26
Total	16,061

*Twenty-foot equivalent units. Most of the containers shipped out of Lewiston are 40 feet long. One 40 foot container is equivalent to two TEU's.

Effects on Container Industry

In the fiscal year ending July 1999, the Port of Portland's Terminal-6 handled roughly 90,000 containers for export.⁷ Of this total, approximately 21,000 traveled by barge down the Columbia and Snake Rivers to the Port of Portland's facilities, including an estimated 9,000 full containers originating at the Port of Lewiston on the Snake River.

The analysis of container movements focused on two possible effects of breaching the dams on the lower Snake River: (1) the risk that the Port of Portland may lose the container traffic originating in Lewiston, and (2) the impacts of a change in container volumes on the level of service provided to the Port by ocean carriers. These effects are discussed below.

Loss of Lewiston Container Traffic

Two commodities make up the majority of the Snake River containers: (1) paper products, primarily food grade cartons manufactured by Potlatch, and (2) peas and lentils (pulses). Table 2 is a summary of commodities shipped by container.

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⁷ From barge, rail, and gate data for fiscal year 1998-1999 provided by the Port of Portland.

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Loss of low-cost barging may encourage producers to ship to other export gateways, including Puget Sound, East Coast, or Gulf of Mexico ports.

Paper products are manufactured at the Potlatch paper mill in Lewiston and exported to countries on the Pacific Rim, particularly Japan. Because Potlatch supplies a large number of containers, it has a strong bargaining position with the ocean carriers, who generally pay inland shipping costs.⁸

Peas and lentils (pulses) are grown and processed extensively in the Palouse region of eastern Washington and western Idaho. These pulses are then shipped either in containers or break-bulk, primarily by barge to Portland, but also via truck and rail to Puget Sound, East Coast, and Gulf of Mexico ports. In contrast to Potlatch's paper products, which make up the bulk of the Lewiston container traffic, pulses are shipped by a number of different firms. Since each firm controls fewer containers, ocean carriers are less likely to include inland transportation costs in negotiated rates. Consequently, because producers pay the inland rate themselves, they are likely to use the least-cost transportation mode to ship these containers to export ports. This is different from ocean carriers, that must weigh inland costs against a variety of other costs in deciding on the export port.

If barge transportation were eliminated as a result of dam breaching, shippers in Lewiston would need to find alternative means for getting their products to market. This could range from moving product by truck or rail to barge facilities in the Tri-Cities to using completely different modes altogether. The analysis of container shipping rates conducted for this study indicated that if the dams were breached, rail would be the most likely mode choice for much of the container traffic shipped from Lewiston. Although it is far more costly than direct barging, rail would be the next lowest cost transportation mode for most shippers.

⁸ Inland shipping costs refer to all costs between the point of production and the export port. Paying inland shipping costs is one way in which ocean carriers compete for loaded cargo for the east to west trans-Pacific trip.

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The analysis also found that rail rates are currently the same for containers originating in Lewiston that are shipped to the Ports of Seattle, Tacoma, or Portland. Once on a rail car, the containers could go to any of these ports for the same charge. Because Seattle and Tacoma combined have a larger selection of transpacific services, it is expected that most, if not all, of the Lewiston cargo would be diverted there. Elimination of low-cost barge service may also lead to the selection of a different export port located along the East Coast or the Gulf of Mexico.

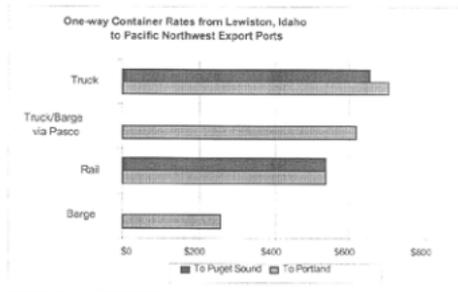
Changes in Ocean Carrier Service

Container shipments make up approximately seven percent of the volume of commodities shipped on the lower Snake River. This traffic contributes toward Portland's viability as a worldwide port of call in the movement of containers. Without the current volume of container traffic out of Lewiston, it is probable that there would no longer be an economic incentive for certain ocean carriers to make a direct call in Portland.

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As many as four of the six container services that currently call Portland could choose to end direct service to Portland.

This conclusion is based on a review of some of the costs for ocean carriers calling at Portland directly rather than serving Portland indirectly from the Puget Sound. An analysis of costs showed that, without the Lewiston containers, two of the six services⁹ currently calling Portland would almost certainly alter their routing patterns away from Portland. These carriers currently provide the only service from Portland to South America and Europe. Two other carrier services, providing service to the Pacific Rim, were considered "vulnerable."¹⁰



⁹ A service is a regularly scheduled ship call at the Port. Each service can represent multiple ocean carriers.

¹⁰ Refer to *Technical Memorandum No. 4 - Findings* for more information regarding the details of this analysis

Reduced ocean carrier service at the Port of Portland likely would mean more producers in Oregon would ship through Puget Sound ports, increasing shipping and handling charges by \$200 per container on average. This increase would affect most of the containers carrying goods produced in the Willamette Valley, not just those displaced from barges on the lower Snake River.

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Focus on Oregon Producers:

Some wheat producers in northeast Oregon (accounting for one percent of Oregon's wheat crop) ship wheat by barge from Lewiston. These producers could see an increase in shipping costs of \$0.13 per bushel as a result of having to truck their goods to a downriver port such as Umatilla or to other locations.

Should Portland lose three or four of its direct container services following Snake River dam breaching, all Oregon container shippers, not just those using the barge system, would likely be faced with higher transportation costs. The loss of direct service capacity would force much of Oregon's container cargo to be shipped via Puget Sound or more distant ports. The additional transportation cost to move this cargo between Portland and the Puget Sound is estimated at approximately \$200 per container, on average. Today, as a result of the strong presence of competitive direct service to Portland, container carriers that call in the Puget Sound but not at Portland currently absorb, or "equalize," the overland rates to the Puget Sound from Portland. With reduced direct-call competition for the Portland traffic, many carriers would likely end this practice. The cost of shipping cargo directly from Portland could also increase relative to other West Coast ports because of reduced rate competition among the remaining Portland carriers.

It should be emphasized that the level of the analysis used to estimate carrier behavior could only determine that two services would likely change routing patterns, and that two additional services would be vulnerable to changing patterns. If three or four of the six existing services continue to call Portland, then it is possible that equalization of rates between the Puget Sound and Portland would continue. However, the consequences of the loss of three or more of the container services are far-reaching enough that this potential impact deserves serious consideration.

Effects on Transportation System and Producers

Breaching the dams would likely increase transportation costs for a small number of northeast Oregon producers who currently ship their products on barge via the lower Snake River. These producers would need to use an alternative mode of transportation for shipping products for export. More importantly, rate increases or decreases for barge traffic could affect a much larger number of Oregon producers and industries. As discussed previously, barge industry profits would be reduced due to lower volumes and shorter hauls after a dam breaching. In order to reduce the impacts of a drawdown, barge operators might choose to adjust the rates they charge for shipping goods on the river.

The analysis of volumes of grain shipped at different prices indicated two possible strategies for the barge industry: (1) maximize industry-wide profits through a small increase in rates, or (2) attempt to

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increase individual firm market share through lowered prices. Pricing strategies could also change over time as barge operators adjust to changes in competition and demand.¹¹

Rate increases or decreases designed to reduce the impact to barge operators would affect producers using barge services along the entire length of the Columbia-Snake River system, not just those who previously used lower Snake River ports. This could affect a large portion of Oregon's wheat crop, as well as other Oregon commodities shipped in containers (e.g., hay cubes and french fries).

Loss of navigation on the Snake River is likely to divert significant volumes of cargo onto highways and possibly to rail, requiring improvements and alterations to the region's infrastructure. For this study, three scenarios were considered with varying levels of competition from truck and rail modes.¹²

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Three dam breaching scenarios were considered for this analysis resulting in different levels of wheat being barged on the river. These scenarios and the estimated shifts in grain transportation by barge are:

Maximum Rail Investment	-32%
Limited Rail Infrastructure	-10%
Current Elevator Capacity	-3%

With no improvements to the existing rail infrastructure, the analysis suggests that approximately 3 percent of the grain currently shipped by barge would be diverted to rail. Under a "Maximum Rail Investment" scenario, where capacity improvements were assumed at all of the existing rail elevators in the study area, as much as 32 percent of the current barged grain volume could be transferred to rail.

A third scenario, recommended by the Peer Review Panel as the most probable scenario under consideration, assumed investment in two strategically located elevators to allow additional rail capacity. This scenario would result in a shift of approximately 10 percent of the current barged grain traffic onto rail. For all three breaching scenarios, the use of trucks to ship grain directly to export elevators remained a largely unused alternative, as it continued to be more expensive than shipment by barge for most users.

While shifts between modes will occur, the predominant pattern for shipment of grain and other bulk commodities will continue to be the truck-barge mode; under dam breaching the transfer from truck to barge would move west to the Columbia River ports. Rather than trucking grain to elevators along the lower Snake River, producers in eastern Washington and western Idaho would need to truck goods over longer distances to grain elevators in the Tri-Cities area or

¹¹ Estimates of barge industry pricing strategies are necessarily speculative. Refer to the analysis of barge industry profits included in *Technical Memorandum No. 4 - Findings* for more information regarding the assumptions used to arrive at these conclusions.

¹² *Technical Memorandum No. 4 - Findings* provides further details regarding the estimated mode split under the three drawdown scenarios modeled for this study.

34, 35
cont.

elsewhere along the Columbia River. The increased distance of these truck hauls would primarily impact roads in Washington State. A small increase in truck traffic could occur on Interstate 84 and other connecting roads in Oregon.

36, 37

The increased truck activity would be concentrated at a relatively small number of facilities on the Columbia River and would likely result in traffic congestion in those areas, particularly during peak harvest periods. Grain could also be diverted onto rail lines, contributing to possible future insufficient rail capacity in the Portland metropolitan area. The volume of grain shipped by rail is estimated to increase by 151,000 tons without any investment in rail facilities to as much as 1,778,000 tons assuming capacity investments across the region's rail system. Investments at two strategic sites would result in an estimated increase of approximately 548,000 tons. This investment would result in approximately 5,480 additional rail carloads of grain, which would be concentrated in the harvest months and would increase the number of trains per day.

Increases in rail traffic are estimated at about 10,000 cars per year.

Much of the container traffic currently shipped by barge would likely divert to rail as well, contributing 4,500 – 9,000 additional rail cars.¹³ Total rail car increases from grain and containers are expected to be approximately 10,000 – 14,000 rail cars, with some scenarios suggesting as many as 26,000 cars in a year.¹⁴

The increase in rail traffic resulting from breaching the lower Snake River dams is generally not expected to result in the need for additional mainline track capacity. However, a recent study for the Southwest Washington Regional Transportation Council estimated that without any expansion of track capacity on the Burlington Northern and Santa Fe Railway in the Portland area, growth in train demand to serve the Port of Portland could be limited by as early as 2003.¹⁵ With capacity constraints already a major concern in the Columbia Gorge and across the Burlington Northern Railway's (BNSF's) Columbia River bridge, additional traffic resulting from the loss of barging if the dams are breached could lead to delays or shifts

¹³ Containers are expected to be shipped on double-stack cars with two containers per car. The analysis completed for this study suggests that all of the full export containers would travel to export facilities on rail after dam breaching, leading to approximately 4,500 rail cars. No analysis was completed as to how those containers would be positioned in Lewiston. Positioning of empties could lead to as many as 4,500 additional rail cars attributable to the shipment of containers.

¹⁴ Grain and container trains are typically made up of between 50 and 104 cars. Uncertainties regarding the seasonality of grain shipments, and actual train lengths prevented the study team from more precisely estimating the number of trains per day that could be generated as a result of dam breaching.

¹⁵ *Commuter Rail Feasibility Study*, by HDR Engineering, Inc. for the Southwest Washington Regional Transportation Council, May 1999, p.2.

36, 37 cont.

Focus on Woodchips:

Changes in the shipment of woodchips are an unknown factor in estimating impacts to Oregon's highways. Paper mills in Longview, Camas, and Vancouver will continue to require woodchips. These could either be trucked to Boardman from Lewiston and shipped by barge, supplied out of Boardman, or supplied from another source either in Washington or Oregon. Impacts are not likely to be severe in Oregon; however, limited sections of road in Oregon could see increases of as much as 500,000 tons each year.

A \$0.13 per bushel increase in transportation costs is equivalent to a drop in production of two to three bushels per acre.

38, 39, 40

away from rail to truck or truck/barge. This congestion could also affect producers' decisions to ship through the Port of Portland, and could further complicate producers' decisions related to mode choice for shipment of commodities.

Shifts in volume from Snake River elevators to downstream facilities could cause delays at ports as elevator operators adjust to higher volumes and, in some cases, changed modes. While it is assumed that capacity would be increased at grain elevators located in Kennewick, Pasco, Burbank, Wallula, and Port Kelly, farmers could also choose to drive farther rather than wait at congested facilities.¹⁶ This would increase vehicle miles traveled and impacts to downstream ports.

Effects on Crop Selection and Production

A breaching of the Snake River dams could also affect farmers' decisions about what crops to grow, and how many acres to plant. This analysis sought to identify the potential for farmers to shift production away from wheat and also looked at the effect that increased transportation costs could have on a farmer's decisions to plant marginal lands.

Previous studies examining the effects of dam breaching on crop production in Washington State and a limited analysis completed for this study suggest that transportation costs could increase by as much as \$0.23 a bushel in parts of Washington State¹⁷ and by \$0.13 a bushel for some producers in northeastern Oregon. Overall, the costs of production for wheat were estimated at approximately \$2.43 per bushel for northeastern Oregon. While significant over the long run, increases of \$0.13 or even \$0.23 are within the year-to-year swings in price for grain and are not expected to dramatically reduce grain production. However, if crop prices remain low, the increased transportation costs could affect farmers' decisions as to how many acres to plant.

¹⁶ The assumption that adequate capacity could be provided at grain facilities in the Tri-Cities area is based on an analysis of capacity needs and constraints completed for this study by Ogden Beeman and Associates. It should be noted, however, that if additional dam breaching further down the Columbia-Snake River system is viewed as possible, investors may be less willing to fund infrastructure improvements in the Tri-Cities area. This could cause additional traffic to shift to Oregon ports and onto highways and local roads, markedly increasing the transportation impacts to Oregon. Refer to *Technical Memorandum No. 2 - Study Assumptions* for more information regarding this assumption.

¹⁷ *Lower Snake River Drawdown Study*, by HDR Engineering, Inc. for the Washington State Legislative Transportation Committee, January 1999.

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cont.

A little more than one percent of Oregon's wheat production would be directly affected by the loss of barge navigation on the lower Snake River. These producers, located primarily in Wallowa County, currently truck their wheat to Lewiston for barging to Portland. The \$0.13 per bushel increase predicted for these growers is financially equivalent to a drop in production of two to three bushels per acre. Some of the land in Wallowa County is estimated to produce yields that are marginal in terms of their profitability. The increase in transportation costs could shift some of these acres out of production. Because the valuation of rural land is based on its level of productivity, an increase in transportation costs would also lower land values. According to analyses completed by the study team, increased transportation costs would reduce the value of farmland by an estimated \$88 per acre.¹⁸

41, 42, 43

Although a dam breaching would directly affect the transportation costs for a small percentage of Oregon farmers, the more widespread impacts to Washington farmers could result in a much larger amount of land being removed from farming in the region. This could adversely affect barge operators on the Columbia River and lower Columbia River port facilities already concerned about the impacts of lower grain volumes.

This analysis also considered the possibility of replacing wheat with other dryland crops that could be more profitable (specifically, oilseed crops such as canola). However, discussions with producers and other parties indicated that demand for these crops is already being met by producers in the region, and they do not represent a viable alternative to wheat and barley.

44, 45, 46

Finally, the study team looked at the possible "trickle-down" effects of lost production on rural communities. Production losses could result in additional income losses in these communities from the reduced need for farm inputs, equipment, labor, and other production variables. In addition, decreased land values could reduce tax revenues to local governments, and have a far-reaching impact if those governments were to raise taxes to recoup some of the lost revenue. In Oregon, Wallowa County would be most affected by breaching of the Snake River dams. The Oregon Economic and Community Development Department recently ranked Wallowa County fourth statewide on its list of sixteen economically distressed

¹⁸ Refer to *Technical Memorandum No. 5 – Crop Selection and Production* for further information regarding the assumptions and methodology used to estimate these impacts.

Data and assumptions were refined and verified through interviews with producers, transportation providers, and staff of various area ports.

counties.¹⁹ Further reductions in land values could be expected to exacerbate this problem.

Study Approach and Methodology

The approach used for this study is summarized in the following steps.

1. Review Existing Information and Reports

A vast amount of technical data are available for the lower Snake River, including information about its history, navigation procedures, commodity movements, fishery information, and other economic characteristics. This study included review of the technical analyses developed to support the U.S Army Corps of Engineers' *Lower Snake River Juvenile Salmon Migration Feasibility Study*; the *Eastern Washington Intermodal Transportation Study (EWITS)* prepared by researchers at Washington State University; and other databases prepared by the Corps, National Waterborne Commerce Data Center, U.S. Department of Agriculture, Farm Service Agency, Oregon Department of Transportation, and Washington State Department of Transportation.

To supplement this information and to ensure that it reflects "real world" conditions, the study team interviewed over two dozen commodity producers, transportation providers, and staff from several ports within the Columbia-Snake River system. The study team also collected proprietary information from the Corps, Port of Portland, and barge and railroad operators, which has been incorporated into the analysis.

The information included:

- Types and volumes of commodities shipped by barge on the lower Snake River,
- Types and volumes of commodities shipped using other transportation methods in eastern Washington, Idaho, and Oregon,
- Agricultural production and cost data for Washington and Oregon,
- Origins and destinations for key commodities,
- Rates charged for barge, rail, and truck shipping,

¹⁹ Oregon Economic and Community Development Department Distressed Counties list, 1998. <http://www.econ.state.or.us/da0798i.htm>

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- Fixed and variable cost information for the barge industry,
- Barge equipment utilization rates,
- Barge operator cash flow needs, and
- Ocean-carrier ports of call, destinations, and inland carrier alliances.

2. Develop Study Assumptions

Where empirical data were not available to support the study, the study team developed assumptions to substitute for missing information. While this is common practice, it is essential that all assumptions are logical and supportable. The following techniques were used to support the assumptions used in this study:

- Supplementation and corroboration of publicly available information with representative shippers, transportation providers and ports,
- Comparison of results with other relevant studies, and
- Review of inputs and methodologies used in the analysis by a technical study team and a three-member peer review panel.

General Assumptions

The general assumptions used in the study analysis were as follows.

- Breaching the dams, defined as a permanent removal of the earthen portions of the Ice Harbor, Little Goose, Lower Granite, and Lower Monumental dams on the lower Snake River, will end commercial navigation on the lower Snake River.
- Barges will continue to operate on the Columbia-Snake River System from the Tri-Cities downriver.
- Crop production levels and demand for all commodities shipped on the lower Snake River are assumed to remain constant. Grain shipments were analyzed using 1996 production data; container traffic levels are based on fiscal year 1998-1999 data. All impacts were assessed based on these quantities, and the rates currently charged for shipping them.²⁰

Specific data assumptions were also needed to analyze different aspects of the study, and are listed below.

²⁰ A wide range of rates were considered for the demand analysis performed to estimate impacts to the barge industry, but the base case for analysis was grounded in current rates, not on projected rates for a future year.

47 cont.

Assumptions Regarding the Effect of Dam Breaching on Barge Industry Volume and Profitability

For purposes of this study, the following assumptions were made regarding barge industry volume and productivity.

- Shippers will seek the lowest cost transportation mode and most direct route.
- Barge operators have some control over the price they charge for services.
- The barge industry is characterized by high equipment costs resulting in high fixed costs.
- Near-term fixed costs could not be significantly lowered after the dams are breached due to the limited ability to sell off barges.

Assumptions Regarding the Effect of Dam Breaching on Container Shipments through the Lower Columbia River

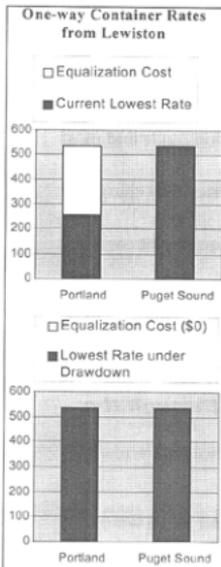
For purposes of the study, the following assumptions were made regarding container shipments.

- Rates for shipping containers by truck, rail, and barge would remain constant after the dam breaching.
- Rate calculations for one-way shipment of 40 foot containers were used to estimate probable modes and destination ports. It is assumed that the findings based on these rates can be applied to shipments of other types of containers.
- Port fees, which may vary between ports and under individual contracts within the same port, would not influence a shipper's rate-based choice of export port.
- Ocean carrier market shares remain constant.

Assumptions Regarding the Effect of Dam Breaching on the Transportation System and Shipping Alternatives

For purposes of the study, the following assumptions were made regarding the transportation system and shipping alternatives.

- For the purposes of the transportation infrastructure analysis, production levels for Oregon grain remain constant at 1996 levels, a high yield year.
- Capacity improvements are feasible at shallow draft Columbia River ports and would allow them to handle increased grain



As shown in the chart above, at present it would cost a shipper almost \$300 more to transport a container from Lewiston to the Puget Sound than it would to transport it to Portland. If the dams are breached, the cost would be equal for both locations.

47 cont.

shipments and associated truck traffic transporting grain to the Tri-Cities. In addition, either public or private investment is available to fund these capacity improvements and concerns over breaching of dams on Columbia River would not prevent adequate investment in this capacity.

- Barge capacity and service levels would be adequate to meet the increased demand.
- Assumptions which were used to generate the mode shift calculations for the estimate of impacts to the barge industry (such as level of competition from rail) were also used in this analysis.

Assumptions Regarding the Effect of Dam Breaching on Crop Production and Selection

For purposes of the study, the following assumptions were made regarding crop production and selection.

- The cost of producing a bushel of dryland (non-irrigated) wheat is \$146 per acre, or about \$2.43 per bushel.
- Crop prices were assumed to remain constant at 1999 rates (crop prices are currently at historically low levels).

3. Develop Study Methodology

The study methodology included several analytical efforts to identify impacts that may occur if the dams on the lower Snake River are breached. These included:

- A cost-revenue analysis of the barge industry,
- A truck and rail rate analysis,
- An analysis of ocean carriers' response to dam breaching, and
- An analysis of fixed and variable costs associated with wheat production in Oregon and Washington.

Several cost-revenue analysis methodologies were considered for estimating the impact of breaching the dams on the barge industry. The data and assumptions described above were used as inputs to a linear programming model. The model is based on commodity flow rates occurring under optimal conditions in which transportation and handling costs are minimized.

Barge industry conditions before the proposed dam breaching, including volumes of goods shipped by barge, were modeled to establish baseline conditions and to allow a consistent basis for comparison. The methodology also allowed a "sensitivity analysis" to identify the effects of differing rate and capacity conditions for rail

47 cont.

Focus on Equalization: At present, Puget Sound ocean carriers provide financial incentives to Portland-tributary shippers to remain competitive with direct-calling Portland carriers. These incentives are generally equal to the difference in inland transportation cost to Portland versus the Puget Sound. The provision of these financial incentives is known in the industry as "equalization."

Avoiding these equalization costs is the primary motivation for ocean carriers to offer direct Portland service. If barge transport from Lewiston ceased, the equalization cost would drop to zero as the inland rates to Portland and the Puget Sound would become equal. Ocean carriers would then no longer have a motivation to call Portland to capture Lewiston cargo.

and trucks. Review of the baseline conditions and input from the peer review panel indicated that only an analysis of utilization and demand response²¹ adequately captured the extent to which fixed costs and capacity affect the barge companies' bottom lines. While this methodology required a variety of assumptions, outlined in the previous section, it appeared to be an effective method for estimating likely impacts to the barge industry.

Analysis of the effects breaching the dams would have on conditions that affect ocean carriers and those carriers' responses to those conditions also required consideration of a complex set of variables. One of the study team's primary concerns was that without the low-cost inland shipping alternative that barges provide, there might be little economic incentive for ocean carriers to call directly at Portland or to equalize overall shipping costs for Portland and Puget Sound ports. This analysis compared the costs of calling on Portland directly (added time at sea, pilotage fees, etc.) with inland costs between ports (e.g., Portland and the Puget Sound), and evaluated the cost-effectiveness for ocean carriers of continuing to call in Portland versus continuing to equalize costs between Puget Sound ports and Portland.

The methodology considered several variables:

- Vessel operating costs (fuel, labor, travel time, loading, and unloading time),
- Portland port costs (pilotage, moorage, and line fees),
- Equalization cost per container box, and
- Average number of container boxes per vessel call.

A step in the analysis reviewed impacts to infrastructure that could occur with dam breaching. The methodology was designed to identify likely short-term and long-term transportation alternatives for Pacific Northwest shippers and producers. The analysis used the linear programming model described above to consider the impacts on highways, rail lines, and port facilities of diverting commodities to rail and truck transport. The analysis also estimated the extent to which improvements would be required at downstream ports in Oregon to handle the increased volume. This analysis focused primarily on grain because it represents the bulk of goods currently shipped on the lower Snake River, but transport options for containers and woodchips were also considered.

²¹ The analysis of barge utilization seeks to estimate the ability of barge operators to meet fixed cost obligations given reduced utilization of equipment after dam breaching. The estimate of demand looks at the effect various pricing strategies by barge operators would have on the quantity of grain that would travel by barge. When used in combination, these methods appear to be the best way of gauging impacts to the barge industry.

Lastly, the study team reviewed current crop enterprise budgets and fixed and variable costs for crop production to identify any impacts that dam breaching would have on crop production and selection. This analysis resulted in an estimated “break-even” yield-per-acre for land being used for wheat production. Using a Geographic Information System (GIS) to compare estimated transportation cost increases with projected yields, the study team was able to identify “marginal” lands at risk for being taken out of production after dam breaching. Additionally, the study team used estimates for increased transportation costs to identify long-term impacts to agricultural land values in parts of Oregon affected by a drawdown.

47 cont.

4. Technical and Expert Review

Technical staff consisting of representatives of all of the study partners (the Port of Portland, Oregon Department of Agriculture, Oregon Economic and Community Development Department, and Oregon Department of Transportation) met bi-weekly. The methodology and assumptions were carefully reviewed and modified regularly to ensure that they reflected “real-world” conditions and were logical and supportable.

In addition, the methodology and assumptions were reviewed by a three-member panel of nationally recognized experts in the fields of agricultural and transportation economics:

- Dr. Phil Baumel, Distinguished Professor in Agriculture, Iowa State University,
- Dr. John Martin, President, Martin & Associates, Inc., and
- Bob Meadows, Vice President and Principal Economist, CH2M Hill.

This panel met twice to review the study assumptions and methodology. Their comments were used to refine both the assumptions and the methodology prior to the final analysis and modeling.

Technical memoranda were prepared throughout the study to document the study approach and findings.

- Technical Memorandum No. 1 – Data Sources,
- Technical Memorandum No. 2 – Study Assumptions,
- Technical Memorandum No. 3 – Technical Methodology and Comments from Peer Review Panel,
- Technical Memorandum No. 4 – Findings,

The methods, assumptions and findings of this study were reviewed and supported by a three-member panel of nationally recognized experts.

Technical memoranda prepared to support this study are available for review from Aaron Ellis at the Port of Portland at 503-944-7054 or ellis@portptld.com

48

- Technical Memorandum No. 5 – Potential Shifts in Crop Production and Selection, and
- Technical Memorandum No. 6 – Transportation System and Facility Cost Impacts.

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and
Oregon Department of Transportation.

This study uses methodology, assumptions, and modeling similar to those used in the *Lower Snake River Drawdown Study*.²² The authors are grateful to the Washington State Legislative Transportation Committee for generously sharing the Eastern Washington Intermodal Transportation Study (EWIIS) Commodity Flow Model, that was used to identify the impacts of changes in transportation routes and rates on commodity transportation.

Other individuals and organizations generously provided information that was invaluable in making sure the findings in this study are based on “real world” conditions. These include: representatives of the barge, rail, and trucking industries, grain elevator operators, staff at both upstream and export ports, ocean carriers, and many others.

²² *Lower Snake River Drawdown Study*, prepared by HDR Engineering for the Washington State Legislative Transportation Committee, January 1999.