

Jennifer Lenhardt

23 November 2005

HC 441: Columbia River Ecology  
Clark Honors College  
University of Oregon

### **Perpetuating Detrimental Practices: Dredging and Barge Traffic on the Columbia River**

Just as the dams in the Columbia River Basin are sometimes considered “natural” objects warranting different evaluation in discussion of environmental concerns, the barge traffic they accommodate is discussed as an integral and inextricable part of goods transportation in the Columbia River Basin. Statistics regarding barge traffic through Terminal 6 (Port of Portland) indicate that 22 percent of export commodities out of the Port of Portland travel on fully loaded barges carrying goods such as hay (32 percent), frozen potatoes (16 percent), paper (12 percent), wheat (5 percent), as well as various other goods (*Container Barging* 1). In 2000, approximately 38 million metric tons of cargo was carried into Portland down the river system by barge (*Managing the Columbia River* 155).<sup>1</sup>

Considering the economic significance of barge traffic on this port alone it is clear why this particular mode of transportation is heavily protected for moving goods the 465 miles up-river as Lewiston, Idaho. The alleged additional costs of rail traffic or truck traffic inhibit the abolition of barge traffic on the river and lend weight to arguments for deep-channel dredging to accommodate for the ocean’s largest container barges. Barge traffic, and the continuous dredging to allow for it, perpetually damage the ecology of the river and repeatedly threaten the ability of the river to correct for human intervention.

---

<sup>1</sup> This represents roughly 5 percent “of the Portland metro tonnage from all sources of transportation” (*Managing the Columbia River* 159).

In a study of the issues surrounding dredging coastal ports, the National Academy Press notes that “the most powerful pressure for developing the capacity to handle large ships is the claim that such ships offer lower-cost transportation. Advocates of additional port dredging contend that without the capacity to handle large, economically efficient ships, commerce into and out of the United States must either use smaller, higher-cost ships or larger ships must enter and leave the nation’s ports less than fully loaded” (*Dredging Coastal Ports* 13). This idea persists in discussion of dredging the Columbia River three feet deeper than normal to accommodate deep-draft container ships and increase the amount of cargo that can be transported on the river at one time. Interestingly, the number of containers brought in by barge has decreased anywhere from 28 percent to the Port of Lewiston to 55 percent to the Port of Pasco over the years from 1998 – 2004 (*Container Barging* 1). The overall barge traffic from Terminal 6 has decreased 40 percent in these years (*Container Barging* 1).

Two primary barge shipping companies dominate the industry through the Port of Portland, Tidewater Barge Lines and Foss Maritime. An important consideration in evaluating the cost effectiveness of barge transportation is the cost to truck the goods once the barge arrives at a port. Additionally, the cost of the water lost through the locks each time a barge passes through (rather than running through the turbines) is not currently calculated as an expense of barge traffic. Ken Casavant charted the comparison between truck-barge and bulk rail transportation of wheat in Eastern Washington in 1995. He found that for every county that used bulk rail, its shipment costs were lower than the barge-truck option (Casavant 1).<sup>2</sup> He also notes that since the completion of the dams on the Snake and Columbia rivers in 1975, the decreased cost of barge transportation has put a downward pressure on the railways to offer competitive alternatives to barge traffic (Casavant 1). The deregulation of the railways in 1980 also enhances

---

<sup>2</sup> For the complete chart, see Appendix A.

the ability of the railways to compete in the market for transportation opportunities (Casavant 1). Casavant's argument seems to contradict the argument that barge-truck transportation is less expensive than bulk rail transportation for grain from eastern Washington.

Upon further examination, it is clear that fluctuations in economic conditions alter the choice of producers to ship by truck-barge or bulk rail. An article published in 1997 in the *Portland Business Journal* indicated a sharp increase in the number of containers expected to travel by barge in the coming year as well as quoting producers who say that their costs to ship by rail or truck are twice what it costs to ship on the river (Rose 1). The argument for continuation of barge traffic, then, is that it allows for competitive farming and promotes agricultural production in the Pacific Northwest. In an article from the *Tri-City Herald* in November 2004, Jeff St. John writes that "K" Line and Hyundai Merchant Marine provide two-thirds of the cargo shipment from the Port of Portland to Asian ports and that by the end of the year neither company will service the Port of Portland any longer (St. John 1). International shipment of goods has subsequently shifted from barge to train or truck. In efforts to attract Asian shipping companies back to the Port of Portland the Columbia River Channel Coalition embarked on a new dredging initiative in June 2005.

The channel deepening project will deepen the existing navigable channel from 40 feet to 43 feet. This, in theory, will update the channel to support the newest generation of trans-Pacific container ships. None of those types of container ships have navigated to the Port of Portland due to the shallow depth of the current channel. Efforts to increase the depth will also purportedly increase the economic activity through the Port of Portland. The project is estimated to remove 1.4 million cubic yards of sediment at a cost close to \$10.58 million (*Channel Deepening, Project Overview*). According to the Columbia River Channel Coalition, there is an

economic return of \$1.66 on every \$1 invested in the project, 40,000 jobs with an average annual salary of \$46,000 are affected by this project, and annual state and local tax revenue totaling \$208 million is generated by maintaining the maritime industry in the area (*Channel Deepening*). It is unclear how these numbers were generated, but it is safe to say that the costs were purposely left out of the discussion in order to garner support for the project. Part of the project proposal includes restoration of “470-839 acres of wetlands habitat at Shillapoo Lake (pending private land acquisition and prior restoration by others), enhance 38 miles of spawning habitat through tide gate improvements, and improve shallow water circulation for migrating salmon” (*Channel Deepening*). The key stipulation that has yet to materialize is the private land acquisition. This is an unexplored potentially sensitive issue that may stymie any efforts at wetland restoration.

On the environmental side of dredging to accommodate barge traffic are a number of studies and opinions about disruption of sediment, complications in dredging procedures, and disposal of dredged material that raise concern about the health of the biota in the river as well as the humans interacting with the river on many levels. According to information provided by the Central Dredging Association (CDA), “Dredging is a necessary activity in man's development” (*Environmental Guides 1*). Although a hugely debateable assertion, this statement illustrates the mentality that dams, barges, and thus dredging are more often considered necessary than potentially replaceable. To their credit, the CDA includes in its evaluation of environmental impact a statement about the largely unknown and unpredictable consequences of dredging.<sup>3</sup> Although some aspects of dredging are vaguely discussed, a few things are specifically articulated as problematic to the environment whenever a dredging project is

---

<sup>3</sup> “The marine environment is a complex combination of natural features and phenomena, supporting a diverse but largely concealed population. Because of this complexity it is extremely difficult to predict the effects of man-made changes and short-term operations. Comprehensive and detailed investigations of the environmental characteristics are frequently an essential prerequisite for any planned dredging activity, together with an assessment of all the potential pros and cons” (*Environmental Guides 1*)

undertaken. The most obvious of these is the issue of sediment. Sediments generally found in ocean ports can be categorized as either deep or surficial sediments.<sup>4</sup> Due to major toxic sediment awareness, much of the surficial sedimentation is hardly harmful when disturbed. The deeper sediments are those of primary concern with dredging. These sediments often have higher levels of contaminants such as oil, grease, trace elements, and long-lived organic compounds (*Dredging Coastal Ports* 118). The contents of the sediment cause concern because the short and long-term effects of disruption, uptake, and eventual removal are largely unknown depending on the toxicity of the sediment itself. Two options for the dredged sediment are continually discussed in project proposals: sediment containment and sediment dispersal. Containment refers to a part of the dredging process that involves removal of the sedimentation and storage of that potentially toxic sediment at an off-bank site. The complications with this strategy include debates over where the sediment should go, how best to contain it if the toxins are likely to become part of the groundwater, and how to accommodate additional sediment removal as dredging maintenance occurs. The other strategy, dispersal refers to removing the sediment from one area of the river and distributing it over another, larger area of riverbed. This strategy does not mitigate the effects of the initial sediment disruption and potentially moves highly toxic sediment to more environmentally vulnerable areas.

As of 1985, several investigations into the environmental effects of dredging were completed. In 1974, the National Oceanic and Atmospheric Administration (NOAA) initiated the Marine Ecosystems Analysis (MESA) Program. NOAA specifically emphasized the study of the removal of dredged material that is potentially toxic (*Dredging Coastal Ports* 124). In 1980

---

<sup>4</sup> Deep sediments are those “typically representing the major fraction forming the lower layers of the sediment column and known to have been in place for times that are long compared to the local history of industrialization.” Surficial sediments are “the more mobile fraction, found at or near the surface of the sediment column and typical of incoming sediments.” (*Dredging Coastal Ports* 117)

Congress mandated a 5 year, \$30 million study on the effects of dredging and the disposal of dredged materials (Dredged Material Research Program). In a study completed in Oregon in 2004, no conclusive evidence about fish behavior or productivity could be authoritatively declared. The study's conclusion does note that the behavior of the white sturgeon observed:

[M]ay place limitations on the response of fish to changes in habitat quality. This could confound attempts to evaluate habitat perturbations on sturgeon populations based on habitat only because it should be expected that some high quality habitats may not always be occupied by white sturgeon and that disturbance to habitat that results in a reduction of habitat quality may not immediately result in fish dispersal. (*Site Fidelity* 42)

This study is one of a number of inconclusive but enlightening pieces that inform the discussion of river dredging.

As invested in the river deepening project as the Columbia River Channel Coalition is the Northwest Environmental Advocates (NWEA) who have compiled information on the other side of the discussion about deepening the river. Contrary to the modest 1.4 million cubic yards of sediment proposed for removal according to the information from the Channel Coalition, the NWEA say that it will be closer to 20 million cubic yards (*Channel Deepening Project, NWEA*). Among the concerns articulated by the NWEA are the various listed endangered species, contrary efforts in salmon protection and restoration, noise and activity involved with dredging, loss of upland habitat, poor quality and availability of habitat, removal of bedrock from the river bottom by means of explosion, and a long list of other environmental concerns, few of which have an attachable dollar sign correlated with cost (*Channel Deepening Project, NWEA*).

The primary concern when evaluating costs and benefits of river dredging versus environmental protection is that on the agriculture and transportation side there is a specific amount of money associated with either course of action. That is to say that the proposals have quantifiable effects for these interested parties. This does not mean that the calculations of cost

are comprehensive, merely that there is more readily available information about how much it costs to ship grain by truck or rail rather than by barge. The complication with estimating environmental costs is that they are hardly so quantifiable. The discussion could include numbers of species populations depleted or made extinct by efforts to maintain river depth, but these amounts do not have a convincing dollar amount attached to compete with the “low-cost” of river transportation.

Although there are many regulating authorities for the Columbia River and its various uses the inability to pass enforceable legislation is not exclusively a question of jurisdiction. The federal government claims rights to regulate the river based on the interstate commerce clause of the U.S. Constitution. Each state claims exclusive jurisdiction of the water within its borders, and yet each seek reparations for the harmful behavior of other states that alter the river’s behavior farther downstream. But this issue of industry versus environment is without borders. This problem is one that cannot be solved by streamlining regulation but requires a complete shift in ideology. In order to achieve any type of comprehensive or agreeable solution to river dredging to maintain industry there must be a change in the lens through which conservation and industry are viewed.

Currently, agriculture is highly subsidized, dam maintenance is highly subsidized, water diversions for farmers are protected, additional diversions are perpetually considered, and railways are moderately subsidized. Essentially, the federal government’s investment in protecting its own creations is somewhat artificial. Espousing neo-liberal economic beliefs in global comparative advantage and simultaneously clinging to agricultural security dilemma-type behavior is a perplexing problem for those interested in nature conservation.<sup>5</sup> Continuing to

---

<sup>5</sup> The idea of global comparative advantage essentially says that some countries should produce agricultural goods while others should produce secondary goods and that in trading with each other both will be better off. The

view negotiations in this light will eternally halt any move towards protecting the environment. The underlying interest of the industry surrounding dredging and barge traffic is profit. As long as the industry is profitable, there will be barge traffic and dredging. Is it impossible to think that someday the subsidies for these industries will disappear? Perhaps, but a more likely and hopeful scenario is that the subsidies will transfer to more sustainable types of production. An enormous amount of money is spent on the barges, dams, and current water management. If in fact an enormous amount of money will be spent on maintaining this system, the most convincing argument for change is that the amount of money it would cost to “jump ship” and pursue alternatives for transportation is in fact *less* than the amount it costs to stay in this rut. It seems unreasonable to expect future environmental studies to attach dollar signs to conservation that are as compelling as the dollar signs attached to agriculture. However, it is more likely that a new system protecting the interests of agriculture will gather more support.

The only ones left out of this picture are the barge companies themselves and the various ports that those barges service. The economic costs for these sectors are likely far higher than the cost to agriculture. A potential solution would be for the government to subsidize the transition from production and management of barges to a more sustainable avenue such as the rail industry or even another little known alternative.

To a certain extent, the bottom line for these sectors is also profit, and if the money is provided by the government, perhaps the incentive for pursuit of more sustainable production and transportation will evolve. Water markets and water banks are one avenue by which compromise can be reached. According to the National Academies Press, “Water markets and

---

security dilemma refers to a theory that states are primarily interested in security, and that international interdependence compromises that security. In this example, that means that subsidizing agricultural production is important to national security. Some would argue that the security dilemma is a thing of the past and that the discussion is not about exporting all agriculture, just about finding less environmentally costly avenues for that industry.

water banks were developed as a means to reallocate water from lower-value uses to higher-value uses, or to environmental uses” (*Managing the Columbia River* 159). The authors note that the marginal value of water can be determined for uses included agriculture, municipal, industrial, hydropower, recreation, navigation, and waste assimilation. However, the marginal cost for the so called “passive value” of water cannot be determined in an acre-foot calculation. Included in passive uses is environmental protection. If water markets are to shift water diversions and allocations to higher-value uses, it certainly seems important to determine the acre-foot value for passive uses. This approach to water allocation creates a market for willing buyers and sellers to exchange water rights at a price that reflects the value of the water being put to use (*Managing the Columbia River* 159). Since the value for environmental and other passive uses is unknown and likely to remain so, a better approach to water markets might be a redefinition of what “higher-value” means. Regulations may manifest themselves in a quota that involves a certain amount of the profit from any diversions from the river be spent on river restoration and protection. This would immediately increase the cost of diversions from the river thereby limiting the number of frivolous diversions and more fairly calculating the cost for questionable river activity.

The challenges involved with environmental protection and river dredging are not irreconcilable. However, as early as 1985, the predictions about hindrances to environmental protection warned that without decreasing the number of jurisdictional bodies, an amenable solution was unlikely.

From the environmental standpoint, the primary difficulties associated with procedural and institutional matters are the lack of responsiveness to the flow of information about environmental effects—both positive and negative—and lack of assessment of the implications for present criteria. In the case of dredging and dredged material disposal, it appears that far more is known about environmental effects and probable cause than is incorporated in the regulatory criteria and environmental practices. Streamlining the

regulatory process had the potential to improve not only port management but also the incorporation of scientific results in environmental criteria. *Dredging Coastal Ports* 134

The danger with streamlining regulation is that it creates a monopoly of opinion. There are fewer outlets for independent research and opinion and essentially one mouthpiece for the strongest and most effective lobbying groups. It would be monumental for the result of streamlining regulation to be an effective, neutral, just, and effective body that equitably allocates the water of the Columbia River. It is impossible to avoid the appearance of favoring either the barge industry or the environmentalists when proposing such a body, as the two groups are deeply entrenched in uncompromising practices unless legally mandated to behave otherwise. It is only through exploration of underlying interests and espousal of those held in common that the barge industry will reconcile its practices, up to and including ceasing barge transportation, and the environmental protectionists will be heard without dollar delineated arguments about Columbia River conservation.

### Works Cited

- Casavant, Ken. "Shipping Wheat: Truck or Barge." March 1995. BlueFish.org. 21 Nov. 2005. <<http://www.bluefish.org/shipwhea.htm>>.
- "Channel Deepening Project." 14 April 2003. Northwest Environmental Advocates. 21 Nov. 2005. <<http://www.northwestenvironmentaladvocates.org/programs/8B%20CD%20is%20bad.html>>.
- "Channel Deepening Project." Columbia River Channel Coalition. 21 Nov. 2005. <<http://www.channeldeepening.com/index.asp>>.
- "Container Barging: A Low Cost Transportation Solution." 28 Nov. 2005. Port of Portland. 21 Nov. 2005. <[http://www.portofportland.com/cntner\\_brgng\\_prfrm\\_ind.aspx](http://www.portofportland.com/cntner_brgng_prfrm_ind.aspx)>.
- Dredging Coastal Ports: An Assessment of the Issues. Washington: National Academy Press, 1985.

Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival. Ed. National Research Council of the National Academies. Washington, D.C.: The National Academies Press, 2004.

“Preface to the Environmental Guides.” 2000. Central Dredging Association. 21 Nov. 2005. <<http://www.dredging.org/publications/preface.htm>>.

Rose, Michael. “Barge Traffic Headed for All-Time Record.” Portland Business Journal 29 Aug. 1997.

“Site Fidelity, Habitat Associations, and Behavior During Dredging Operations of White Sturgeon at Three Tree Point in the Lower Columbia River.” U.S. Department of the Interior, U.S. Geological Survey. 2004.

St. John, Jeff. “Portland Shipping Decreases Barge Traffic.” Tri-City Herald 23 Nov. 2004.

## Appendix A: Ken Casavant “Shipping Wheat: Truck or Barge?”

County <sup>1</sup>	Train Options			Truck/Barge	Breakdown			Wheat Shipped (1000 bushels)	% shipped by Truck/Barge
	1-Car	3-Car	25/26-Car		Truck	Barge	Put-Thru Charge		
<b>Whitman</b>	37.15	32.31	25.85	<b>33.74</b>	11.29	17.45	5.0	32,148	78.9
<b>Walla Walla</b>	36.95	30.78	24.36	<b>28.59</b>	9.30	14.29	5.0	17,756	80.8
Lincoln	42.10	38.75	33.83	<b>41.51</b>	21.50	15.01	5.0	13,101	19.8
Adams	36.52	33.32	28.21	<b>33.47</b>	13.41	15.06	5.0	10,634	65.4
Grant	40.84	37.64	32.51	<b>40.23</b>	20.81	14.42	5.0	8,822	35.2
<b>Columbia</b>	39.18	32.78	25.18	<b>28.64</b>	7.26	16.38	5.0	4,789	92.6
<b>Garfield</b>	41.30	33.30	25.70	<b>28.81</b>	6.50	17.31	5.0	4,270	83.5
Douglas	42.17	39.36	34.41	<b>47.10</b>	28.00	14.10	5.0	2,847	18.6
Spokane	39.31	34.20	28.36	<b>42.18</b>	20.31	16.87	5.0	1,359	2.9
<b>Franklin</b>	36.00	32.80	27.70	<b>29.90</b>	10.55	14.35	5.0	1,021	92.7
Yakima	31.50	28.30	25.70	<b>35.60</b>	16.50	14.10	5.0	907	22.1
Chelan	40.50	37.20	32.20	<b>47.10</b>	28.00	14.10	5.0	508	0
Benton	31.73	27.87	N/A <sup>2</sup>	<b>29.93</b>	10.83	14.10	5.0	410	69.5
Okanogan	47.50	44.30	39.20	<b>47.10</b>	28.00	14.10	5.0	334	0
Stevens	45.80	42.40	N/A <sup>2</sup>	<b>46.36</b>	26.00	15.36	5.0	325	6.2
Kittitas	31.50	28.30	N/A <sup>2</sup>		22.00			200	0
<b>Average</b>	38.75	34.60	29.48	<b>37.65</b>	17.52	15.13	5.0	<b>99,431</b>	<b>Total</b>

<sup>1</sup> Counties in **bold** border on the Lower Snake River.

<sup>2</sup> An omission of a rate means that mode was not offered in the corresponding county.

<sup>3</sup> Yellow background denotes counties that prefer truck/barge.

<sup>4</sup> Rates to Columbia river ocean elevators are used for comparison since nearly 80 percent of wheat from the 16 counties in the study area is shipped to those elevators.

<sup>5</sup> Conversion: 36¾ bushels in a metric ton.