



RIVER DREDGING: AN IMPORTANT
INDUSTRY IN WESTERN PENNSYLVANIA

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*Allegheny Institute Report #01-05
July 2001*

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Key Findings

The river dredging industry is responsible for removing 4.5 million tons of sand and gravel from the Ohio and Allegheny Rivers. This aggregate is then processed into raw concrete and asphalt, which goes into projects such as commercial and residential building, as well as road and bridge building and maintenance. During the Pennsylvania Department of Environmental Protection's permit renewal process, a public comment period was held in which citizens could express concern over this long standing practice. Some of the comments aired centered around contamination of drinking water supplies, and the taking of endangered species of freshwater mussels. Regarding these issues, this report finds:

- An industry study concluded that even though river water does mingle with ground water in the wells, it does not negatively affect the quantity or quality of the drinking water. The DEP has publicly stated that the dredging should not have any adverse effect on the water supply.
- Given the industrial history of the two rivers, the lock and dam system and industrial pollution, it is difficult to accuse the river aggregates industry as being chiefly responsible for the decline of the mussel population in the Allegheny and Ohio rivers.
- A 1998 environmental impact study, commissioned by the U.S. Army Corps of Engineers, determined that the presence of mussels is similar in areas undredged, dredged recently, and dredged long ago.

Another issue that has been raised by opponents of the dredging industry is the idea that this activity is not in the public's interest. They claim that less environmental damage could be done by obtaining aggregate from alternative sources, such as land-based quarries. The findings of this paper conclude that:

- Replacing yearly river aggregate production would require 400,000 truck trips from sources as far away as Lake Erie and Central Pennsylvania.
 - Independent studies show that carbon monoxide emissions per ton-mile of cargo moved by truck are 10 times greater than the ton-mile emissions created by towboats and barges. Nitrous oxide emissions per ton-mile by truck are 20 times those resulting from waterway transport.
- The dredging industry employs over 200 persons and generates \$35 million revenues. Using a multiplier of 2, the benefits to the region are 400 jobs and \$75 million in economic activity.

Introduction

On December 26, 2000, the Pennsylvania Department of Environmental Protection (DEP) issued permits to four area companies so that they can remove sand and gravel from the Allegheny and Ohio rivers. These permits were extensions of previously issued 5-year permits that were set to expire at the end of 2000. However, one month later, January 24, 2001, the new permits were suspended by the DEP. The reason provided for the retraction was that the department had not allowed for a public comment period prior to the renewal.

However, one month later, two of the firms successfully petitioned an administrative law judge to intervene on the suspended permits. The judge, citing mounting losses for the firms, agreed to a one-month extension, until March 16. He then again issued two more one-month extensions, which would be valid until the DEP makes a final ruling on May 16.¹ Meanwhile, the DEP executed its public comment period that expired on March 19. During the comment period, the DEP heard two main complaints: dredging near water wells could possibly contaminate drinking supplies for the towns that use them; and dredging could harm the habitat of endangered species of freshwater mussels and fishes.

Regarding the first issue, the DEP heard arguments from residents of Springdale Borough, which has drinking water wells, located 500 feet from the banks of the Allegheny River. In January 2000, Springdale officials had ordered a dredging company, Pioneer Mid-Atlantic, to stop dredging operations near the town's wells fearing contamination of the water. The Borough argued that bacteria, which would require additional and more expensive treatment, could enter their water supply. Pioneer voluntarily complied and then commissioned a study to determine if dredging had any impact on water supplies.

The study found that Springdale's wells tap into ground water contained in sand and gravel that is recharged mostly with ground water that seeps into this natural aquifer. The study concluded that even though river water does mingle with ground water in the wells, it does not negatively affect the quantity or quality of the water. The DEP has publicly stated that the dredging should not have any adverse effect on the Borough's water supply. In any event, the DEP has launched its own study, which is due out mid-2001.

The second issue that was raised deals with the aquatic life found in the Allegheny and Ohio Rivers, specifically endangered freshwater mussels. The mussels in question are the rare (and inedible) clubshell and northern riffleshell. Sections below will discuss in further detail the crux of this situation.

¹ A final ruling was issued on May 24 in which the DEP lifted the suspension on river dredging. However, instead of 10-year permits, the DEP reduced the permits' duration to 5 years. Over the course of these next 5 years, more studies are to be conducted.

Industry Overview

Before the problems can be addressed, the basic question must be asked: What is river aggregate and how is it used? The first part of the question has a simple answer; it is sand and gravel (igneometamorphic rock) that was deposited in the region upon the departure of the glaciers at the end of the last ice age. It is abundant in the region around the Allegheny and Ohio River valleys, but is quite deep underground. The most accessible area is under the rivers where there are 20 to 30 foot deposits about 25 feet below the water's surface. Therefore, it is most economical to retrieve the aggregate from the riverbeds from the Allegheny and Ohio Rivers.²

Once the aggregate is removed from the river, about 4.5 million tons annually, it is then processed and transformed into either concrete or asphalt. Aggregate makes up 90% of concrete and 95% of asphalt. However it is the quality of river aggregate that sets it apart from its substitutes. River aggregate meets the most stringent engineering and chemical content specifications for durability and skid resistance. According to the Industry, the Pennsylvania Department of Transportation (Penn DOT) is expected to consume about 62% (2.8 million tons) of the aggregate for highway repair and resurfacing during 2001. The rest will be used in local road and bridge projects, as well as in commercial and residential construction.

Limitations on the River

The river aggregate dredging industry does not have carte blanche in its operations. The DEP has placed several restrictions on where gravel and sand can be removed. In addition to obtaining a permit to operate on the river, a separate permit must be obtained for each area that is to be dredged. Before the "sub-permit" can be issued, the dredger must perform what is termed a "mussel protocol". This involves a detailed search of the area to be dredged for freshwater mussels. The protocol, which had been approved by the DEP and implemented for years, requires a "brailling method". With this method, the firm would section off an area and then cross it with fishing lines and "fish" for mussels. If a line crossed over the mussel, it would clamp down on the line, be brought to the surface and identified. If the presence of the endangered mussels were discovered, the company would not be permitted to dredge.

The brailling method had been the long running standard in the industry. Most of the permits currently held by dredgers were obtained using the braille method. However, in 1999 the industry and the DEP worked together to form a new protocol, which requires the use of divers. Therefore, any new sub-permit requires that the area scheduled for dredging be inspected by divers at an average cost of \$20,000 per half mile. (Extrapolated out, it would cost roughly \$4 million per year to have divers cover the entire 100-mile stretch of the two rivers.³)

² The Monongahela is not dredged for aggregate because its bottom is primarily mud and silt. In fact the Allegheny and Ohio are the only rivers in the Commonwealth that are dredged for aggregate.

³ Due to DEP regulations, not all 100 miles is available for dredging. This is the length of the two rivers in Western Pennsylvania.

One discrepancy remains with the change in protocols. If a sub-permit was issued under the brailling protocol, the only ones that will be honored will be ones where dredging work has already begun. If dredging work has not yet been started, that sub-permit becomes null and void. If a company wants to dredge an area (with an old sub-permit granted under the brailling protocol), they will have to apply for a new sub-permit under the new diving protocol. This extra step may prove to be an additional burden on the dredgers.

During the comment period, the environmental group Clean Water Action brought up the notion that the dredgers have carte blanche with the amount of aggregate that they can take out of the rivers. According to the CWA's position paper, "...with permits in place, these companies are essentially granted possession of the lion's share of the sand and gravel in the rivers between the Ohio/West Virginia border and Clarion County."⁴ The CWA is advocating that limits should be placed on the amount of aggregate within each permit. They reason that without such restrictions all of the aggregate will be removed and the bottom will be devoid of marine habitat.

However, the industry cannot remove whatever aggregate they want from any part of the river. The areas of the river where dredgers are allowed to operate are restricted to sections that theoretically would not contain habitat that is suitable for freshwater mussels--namely, deep water. Mussels are filter feeders that need swift moving water to survive and colonize. Because they are more commonly found in shallow, faster moving water, current restrictions prohibit companies from dredging within 150 feet of the 6-foot depth line and within 500 feet of river islands.⁵ These measures were designed to keep dredgers away from mussel habitats, allowing the species to grow and proliferate.

Given the restrictions faced by firms in the Industry, how much of the 100-mile stretch of the two river bottoms are dredged each year? According to the Industry, less than one percent of the available area in the two rivers is dredged. This is less than one mile per year. The Industry estimates that it cultivates about 40 to 200 acres per year (at most 0.3 square miles).⁶ At this rate, it will, theoretically, take the dredging industry over 300 years to cultivate the entire 100-mile stretch of the two rivers.

Environmentalists vs. the Dredging Industry

Endangered Mussel Species

The reason given for the DEP's suspension of the permits in January 2001 was due to a lack of a public comment period. During the comment period Clean Water Action

⁴ Clean Water Action position paper addressed to the Pennsylvania Department of Environmental Protection. March 1, 2001

⁵ A United States Department of the Interior dive team has found a live northern riffleshell in 14 to 15 feet of water near Pool 8 on the Allegheny River.

⁶ The Industry claims that it dredges at *most* 40 acres per year. However, a 1998 DEP report claims that dredging occurred on 200 acres.

(CWA) accused the Industry of violating the Endangered Species Act.⁷ The rationale for the accusation is that dredgers are "taking" endangered species because their activity is destroying the habitat of these rare freshwater mussels.

The dredging industry has heard this criticism before. In 1980, they commissioned the first Environmental Impact Study to determine the effects of dredging on freshwater mussels. That study concluded that dredging had no appreciable impact on the condition of mussels. However, due to the increased restrictions and the availability of more technically advanced methods, a new EIS was commissioned by the U.S. Army Corps of Engineers in 1998.⁸ The main conclusions of this study regarding mussel habitats are that dredging leaves the river bottom similar to the condition that existed prior to the dredging and, in fact, the resulting environment that is more hospitable to aquatic life not less. Furthermore, the study found that the presence of mussels is similar in areas that were undredged, dredged recently, and dredged long ago.

In order to conduct the study, Tetra Tech Inc., utilized side-scanning sonar to map the bottoms of the rivers creating a very detailed map. In addition, they sent divers to the bottom to perform hands-on inspections and videotaped the results. According to the Industry it is "the most complete record ever created". This statement begs the question: How do we know what *was* in the river, prior to dredging? What was the vibrancy of the native freshwater mussel population? What was responsible for their decline (if there was one)? The answers to these questions may never be known with certainty. However, given Western Pennsylvania's industrial past, there are some suspects.

One of the reasons for Pittsburgh's rise during the Industrial Revolution was its use of the rivers to transport coal and steel to and from the mills. In order to accommodate barges, the rivers were dammed to raise the water level. The lock and dam system that was built for commerce created pools of slow moving water. It is believed that slow moving water does not wash a sufficient amount of nutrients over the mussels. As a result the mussel population may have been reduced due to a lack of food.

As mentioned above, mussels are filter feeders that require swift moving water to not only eat, but to reproduce. Mussels have a reproduction cycle that requires the assistance of fish. Fish act as a host, which take the mussel's fertilized "eggs" and spreads them across the river's bottom. It has not been ascertained if a certain species of fish is required for a certain species of mussel. However, if that is the case, the loss of a certain fish species could lead to the loss of its dependent mussel species.

Even if that were not the case, if any fish could act as a host for any number of mussels, an obstruction in the fish's territorial movements would limit the expansion of mussels. The lock and dam system also restricted movement of fish from one pool to another.

⁷ The CWA is also accusing the state DEP, the Army Corps of Engineers, and the US Department of the Interior.

⁸ The study was initiated by regulatory agencies including the Army Corps of Engineers, the DEP, the Pennsylvania Fish and Boat Commission and the U.S. Fish and Wildlife Service. It was paid for by the Industry at a cost of \$1.3 million. It has not yet been released to the public.

Therefore, mussel species that would have normally spread their colonies along the length of the river are now confined to a smaller section.

A second problem confronting the indigenous freshwater mussel (and other aquatic life) population was the presence of pollutants. As the mills along the river continued to produce their product, they also continued to pollute the environment by dumping waste into the rivers. Mussels are filter feeders that are very sensitive to pollutants in the water. Industrial chemicals and acid drainage from mines were damaging to aquatic life in the rivers, particularly the freshwater mussel.

It is not disputed that river pollution was quite damaging to the native freshwater mussels in our rivers. However, bad news for the Pittsburgh area (the decline of the steel industry) has been good news for the mussel population. Although the locks and dams are still in place, the water quality of the rivers has been greatly improved over the last 30 years. The cleaner water is providing a healthier habitat for mussels as well as all aquatic life.

One form of aquatic life that seems to be enjoying the clean water is the zebra mussel. The zebra mussel is not native to these rivers, or even North America. The zebra mussel was introduced into the Great Lakes from foreign vessels carrying the mussels via their ballast water. Over time, the zebra mussel has spread throughout the Great Lakes region including the Allegheny and Ohio rivers. These zebra mussels tend to affix themselves in and around native mussel colonies and either starve them out or suffocate them. Therefore, the zebra mussel poses a very serious threat to the future of native mussels such as the clubshell and northern riffleshell.

Given the above factors, the lock and dam system, industrial pollution, and foreign invaders, the native mussel species faced many threats to their existence. Therefore, it is hard to accuse the river aggregates industry as being chiefly responsible for the decline of the mussel population in the Allegheny and Ohio rivers.

Shoreline Erosion

Another issue raised by environmentalists is shoreline erosion. According to Clean Water Action dredging in the rivers could cause shoreline subsidence for those property owners along the Ohio and Allegheny Rivers. The argument follows that dredging in the center of the river (150 feet from the 6 foot depth line) will cause the river bed to shift and fill in the area left by dredgers. Gently sloping beaches along the shoreline have reportedly fallen into the water and left a cliff-like edge in their place.⁹ As a result of this shifting, opponents claim that the 6-foot depth line changes (water becomes deeper closer to the shore), which increases the area available for dredging.

However, while conducting underwater surveys for the Environmental Impact Study (EIS), divers found no evidence that such activity is taking place. In fact, dredging has changed the terrain of the river bottom from a smooth surface to one that is "hilly" and

⁹ Hopey, Don. "Deep Questions arise about River Dredging". *Pittsburgh Post-Gazette*. June 23, 1997.

the areas have been found to offer shelter for some fish species. In areas that were dredged years ago and even recently, the shoreline and the river bottom have remained intact. Even if the shore were eroding into the river, one would think that the river would become shallower, not deeper as CWA contends, thereby pushing the 6-foot depth line further into the river. Which of course would decrease the area in which dredgers would be allowed to operate. If the claims offered by CWA were backed by substantial evidence, a property owner affected by such erosion would have been expected to come forward during the public hearing period to contest the activity. None did. In fact studies done by the Corps of Engineers have concluded that dredging is not linked to shoreline erosion.

Is Dredging in the Public's Interest?

Finally, CWA claims that the proposed activity is not in the public interest. The group alleges that dredging is providing profit to a few private individuals at the expense of a public resource. They argue that the companies are paying the Commonwealth a small sum to extract this public resource and then are allowed to sell it at a much higher price, in some instances back to the state itself in the form of highway contracts. Not only do these environmentalists disagree with this form of capitalism, they also disagree with the construction of highways. As the group states in its paper, "as the type of gravel being (dredged) is only used for superhighways, we would argue that new superhighway construction in western Pennsylvania itself is not in the public interest, as it will simply result in further sprawl with all of its negative effects." Which begs the question, are they trying to stop dredging as a means to stop sprawl, or are they really concerned about the aquatic ecosystem of the rivers?

In any event, is the dredging of the two rivers in the public's interest? What about the claim that the dredging industry is paying a low price to extract sand and gravel from the riverbeds and reselling it at a much higher price? Each company does pay the State Fish and Boat Commission a \$0.25 royalty fee for each ton that is extracted, about \$1.13 million per year. However, to make the statement that all they do is turn around and sell the material, without any costs, is not a fair assessment of what the industry does.

The dredgers take sand and gravel from the rivers and process it, so that it can be used in the production of cement and asphalt. The act of removing the aggregate from the riverbed, cleaning it and processing it (sometimes on site) is not costless. The industry removes 4.5 million tons from the rivers and receives roughly \$35 million per year. This breaks down to an average price of \$7.78 per ton. It is unreasonable to assume that \$7.53 (\$7.78-\$0.25) is pure profit. In addition, with the new diving protocols being put into place, costs to the companies are going to rise and further erode any profits they may be enjoying.

As much as environmentalists may disagree with the construction of new "superhighways", the fact remains that concrete and asphalt are building blocks of our economic infrastructure. They pave and resurface our highways and build our office

buildings and homes.¹⁰ The new sports stadiums for the Steelers and Pirates required approximately 215,000 tons of concrete, while regional road projects annually require 3 million tons of concrete. Without concrete (and the aggregate that comprises it) we would not be able to enjoy the quality of life that we do at present. Therefore, the argument can be made that this industry does take a public resource to serve a public purpose.

Of course there are substitutes for river aggregate. However, for the most effective anti-skid asphalt, Penn DOT prefers to use asphalt made from river aggregate. Other sources of this type of aggregate are found in Lake Erie and small quarries in Central and Northeastern Pennsylvania. In order to transport this aggregate from Lake Erie to Southwestern Pennsylvania a truck would have to travel 110 miles. Or if the truck were traveling from quarries in Central Pennsylvania, it would have to travel 100 miles over the road to reach the Pittsburgh area. However, aggregate that is extracted locally does not only go into the local economy. Sand and gravel are transported by barge to parts of eastern Ohio and northern West Virginia, where it is converted to concrete and asphalt for use in those areas. Therefore trucks would have to travel additional miles to reach these consumers. River transportation, as compared to other modes of transportation, provides not only low cost transportation, but has environmental and public safety advantages as well.

Ironically, the environmental groups who would put an end to dredging in order to protect the waterways would create real damage to air quality in the region. If the sand and gravel used by the construction industry in this area had to be transported over the highways and surface streets, the resulting air pollution would dwarf the towboat related emissions.

First of all, the average distance to transport the materials by truck would be several times the current average river distance because they would come from Lake Erie or Central Pennsylvania. Second, it takes 40 trucks to equal one 850-ton barge. In order to replace the 4.5 million tons of river aggregate from these alternative sources, it would take 400,000 truck trips per year.¹¹ Third, studies by the Maritime Administration show that carbon monoxide emissions per ton-mile of cargo moved by truck are 10 times greater than the ton-mile emissions created by towboats and barges. Nitrous oxide emissions per ton-mile by truck are 20 times those resulting from waterway transport.

In total, taking into account the greater mileage, the number of trucks and the higher emissions levels from trucks, the region's air would have roughly 50 times more carbon monoxide and 100 times more nitrous oxide dumped into it compared to the present levels produced by waterways transport.

In addition to the particulate matter (dust) thrown up by the additional 400,000 truck-trips per year, heavily loaded rigs cause additional damage to the roadways. It is estimated

¹⁰ It is interesting to note that before the roadways in the Pittsburgh area were paved with concrete or asphalt, they were paved with cobblestone, an aggregate that was removed from the rivers.

¹¹ Based on one 22-ton truck making a round trip.

that one heavily loaded rig does about 10,000 times more damage than an automobile. The additional congestion on the roadways (over 1,000 truck trips per day) increases the chance for accidents with cars. Unlike trucks, barge tows operate in a generally uncongested environment and move slowly enough that other waterways users have plenty of time to avert collisions and other serious accidents.

Therefore it is in the public's interest to extract sand and gravel from the riverbeds and use the waterways to transport the aggregate across the region. To shift to alternative sources and deliver the materials via truck would be detrimental to the environment as well as economically expensive.

Within the dredging industry, there are approximately 200 persons directly employed. If the CWA is successful in shutting down this industry these persons will be unemployed. With a multiplier of 2, we find that around 400 persons could have their jobs affected by closing down this industry. It is also estimated that the industry is directly responsible for \$35 million in economic production to the region. Again, using a multiplier of 2, losses to the region could approach \$70 million.

Finally, to complete the picture, the cost of construction would rise to reflect the higher transportation cost of the sand and gravel being imported from outside the region. As a result, the cost of commercial and residential construction will increase, leaving residents of the Commonwealth worse off. Therefore, it can be successfully argued that removing aggregate from the riverbeds of the Ohio and Allegheny Rivers is an activity that is in the public's interest.

Conclusion

The dispute arising from the Department of Environmental Protection's suspension of the dredging industry's permits brought some issues to light. The environmental group Clean Water Action raised a series of concerns such as water supply contamination, the protection of endangered mussel species, and serving the public interest.

During the DEP's public comment period, several residents of the Springdale community came forward and expressed concern over the safety of the town's drinking water. The wells are located within 500 feet of the riverbanks in an area that was being dredged. The concern centered on the possible contamination of the drinking water with river water. A study conducted by the dredging company in question revealed that the sand and gravel surrounding the town's water supply acted as a natural aquifer, preventing contamination. The DEP has publicly stated that the dredging should not have any adverse effect on the Borough's water supply.

Regarding the endangered mussels, the clubshell and northern riffleshell, current protections are in place to restrict the areas in which the dredgers are allowed to operate. These restrictions are designed to keep dredgers away from suitable mussel habitats. In

fact a recent environmental impact study concluded that mussel populations were similar in areas that were never dredged, dredged recently, and dredged long ago.

With the constant changes to the area's rivers, pollution, the lock and dam system, and foreign mussel species, it is difficult to accuse the dredging industry of being solely responsible for the decline in the clubshell and northern riffleshell. In fact, the dredgers have agreed to a strengthening of the mussel protocol, which will cost them thousands of dollars per year, as an assurance that they are not damaging the habitats of the endangered mussel species.

The final concern is one of public interest. Is the act of removing sand and gravel from the river bottoms (public domain) by a private company a matter of public interest? Would it be more environmentally sound to supply the area's construction needs with aggregate from land-based quarries? The above findings suggest that in fact, this is an activity that is in the public's interest. In order to substitute land based aggregate, or even Lake Erie aggregate, there would be increased costs to not only consumers but to the environment as well. To replace the 4.5 million tons of aggregate from these other sources would require approximately 400,000 truck-trips per year. The trucks employed would cause more pollution than would the use of barges to transport sand and gravel around the area. More trucks on the road would lead to congestion and damage to our highways.

The dredging industry does act in the overall public's interest by providing western Pennsylvania, eastern Ohio and northern West Virginia with low-pollution, low cost sand and gravel for area construction needs.