

Sediment Strangling River, Fish-A Guided Practice

Directions: As you carefully read the Article from the Muskegon Chronicle entitled "Sediment Strangling River, Fish," respond to the following in your own words.

On the back of this sheet write the definitions to the following vocabulary terms.

Important vocabulary terms: *anglers, aquatic, delta, erosion, hydroelectric dams, sedimentation, silt, and siltation*

1. What does the writer mean when saying that sedimentation is a natural phenomenon?
2. What did each of the following contribute to producing more sediment than would have been normal?

Logging

Hydroelectric Dams

Flood of 1986

3. What does moving sedimentation have to do with the shape of a river?
4. What do anglers say may help?
5. Place the correct information in the chart



Causes of too much siltation	Results of too much siltation	Possible solution

Sediment Strangling River, Fish Muskegon Chronicle

Gale Nobes remembers when he could canoe through the south branch of the lower Muskegon River a few years ago and not see bottom.

Today, that stretch of river in the Muskegon State Game Area is shallow, wide and choked with tons of sand. Buried under the sand are aquatic plants and a rocky bottom that once made that stretch of river look attractive to fish.

"It looks like a beach...you can wade across it," Nobes said of the river's south branch near U.S. 31.

Sedimentation - the movement and depositing of sand and silt in a river - is a natural phenomenon. But an excessive amount of sediment is bad for rivers because it destroys fish spawning areas and hurts water quality, experts say.

The lower Muskegon River is under siege from sediment, according to government studies. Here's why:

- **Loggers in the 1800s** rolled millions of logs down steep banks and into the Muskegon River, which stripped miles of sandy river banks of all vegetation. That practice sent a torrent of sediment into the river.
- **Until recently, hydroelectric dams** built in the river caused dramatic fluctuations in the river's water levels, a process that increases erosion of the shoreline.



- **The flood of 1986** deluged the south branch of the lower Muskegon River with sandy sediment that had accumulated for decades behind the former Newaygo Dam. That dam was removed in the late 1960s, but the flood was the first event capable of moving large amounts of that sediment downstream.

As a result, the south branch of the river, once the main route through the sprawling state game area, is not better suited to wading than boating or fishing.

"The river down there is real sandy. In low water conditions, you'd have to pull a boat through there," said Bill Fuchs, manager of the 10,000 acre Muskegon game area.

Erosion continues to be a problem in the Muskegon River's 2,634-square-mile drainage basin. Experts say excessive amounts of sand and silt are still washing into the river and its tributaries from hundreds of eroding stream banks, farm fields, road crossings and construction sites.

The results of excessive sedimentation are most obvious in the game area, a sprawling delta near the river's end. The sand and silt that have washed down the river over the past century have nearly dried up some branches of the river. They also threaten fish populations and jeopardize the ecological integrity of the game area, a biologically rich delta where the river widens into Muskegon Lake.

"Sedimentation is basically undesirable and detrimental," to the game area, said Nick Kalejs, wildlife biologist at the game area operated by the Michigan Department of Natural Resources.

Stan Peterson, a Muskegon resident who has fished in the river for 35 years, said siltation has destroyed his favorite fishing holes in the south branch.

"Five years ago I was catching salmon and steelhead pretty regularly in the south branch," Peterson said. "But it's gone to pot...it's all filled in with sand."

Sedimentation is a natural phenomenon that takes place in all rivers. Moving sediment downstream is one of the ways rivers change shape and create habitat for aquatic life, said Mike Wiley, associate professor of aquatic ecology at the University of Michigan.

The problem in the Muskegon River, experts say, is the quantity of sediment that has entered the river over the past 160 years. A 1997 study said the Muskegon River is being deluged with a load of sediment five times larger than what would be expected in a river basin its size.

"It's terrible, the amount of sand that's coming down the river," Peterson said. "It's changed the river for the worse."

Sediment sources numerous

Scientists believe excessive sedimentation of the Muskegon River began in the mid-1800s, when



lumber barons turned the waterway into a giant conveyer belt for logs headed to sawmills on Muskegon Lake.

From 1837 to 1905, millions of logs felled in the forests along the river were rolled down steep river banks and into the waterway. That process stripped vegetation from river banks, exposing sandy soils that are prone to erosion.

Huge log jams that clogged the river each spring added to the sedimentation problem by gouging the river banks and sending even more dirt into the waterway, state officials said.

Attachment One

As more sandy soils entered the river, the waterway became shallower and wider, a change that further intensified stream bank erosion.

Hydroelectric dams built in the river after 1906 added to the problem by causing water levels in the river to fluctuate. Each time the river rose, it ate away at the sandy banks and sent more sediment downstream, according to state studies.

Consumers Energy recently agreed to modify operations at Rogers and Croton dams to reduce streambank erosion.

But there are hundreds of erosion sites in the river basin that continue to dump sand and silt into the waterway. Repairing all of those sites will cost millions of dollars, according to some estimates.

Compounding the problem is the long list of contributors to excessive sedimentation in the river.

Soil erosion from farms in the river basin and increasing urban development - which increases the volume of storm water reaching the river - also have contributed to the sedimentation problem, state officials said.

A 1998 study identified 33 erosion hot spots along the river in just Muskegon and Newaygo counties. Other studies have found hundreds more erosion sites in the other counties that border the river upstream of Newaygo.

Controlling erosion at one of the worst eroding stream banks, a towering 2,000-foot-long bank of exposed sand in Newaygo County's Brooks Township, will cost as much as \$1 million, said Nobes, chairman of the Muskegon River Watershed Assembly.

Dam, flood added to problem

Conservationists say removal of the Newaygo Dam in 1969 and the flood of 1986 are to blame for much of the extreme sedimentation plaguing the river in Muskegon County.



When the dam was removed, state officials estimated it would take at least 50 years for sediment to be trapped over the years behind the structure to be carried downstream. The flood of '86, which swelled the river to 11 times its normal size, moved that sediment downstream of Newaygo in a matter of months.

By 1987, government biologists and anglers began to see rapid siltation of the river's south branch. As the south branch has filled in, much of the water it once carried through the Muskegon game area has pushed north, carving new channels across sprawling marshes and pouring into the river's middle and north branches.

Those changes create some trade-offs: Some fish and animals benefit from changes in the river, while others are forced to seek refuge elsewhere. State officials said there are far fewer fish in the south branch of the Muskegon River than there were in the early 1980s, and some birds of prey have abandoned nests along that stretch of water.

"The river channels ought to be moving around in the game area," Wiley said. "The game area is supposed to function as a depositional area for sediment. That gives the game area its ecological diversity."

Some anglers have suggested dredging sediment-choked stretches of river in the game area to restore pre-1986 water depths. "That would be impractical," Kalejs said.

Sedimentation Causes

- **Lumbering** - Stripped sandy river banks of vegetation as logs were rolled into the river. That practice sent a torrent of sediment into the river. Some of those river banks are still eroding.
- **Flood of '86** - Pushed tons of sediment that had been trapped behind the former Newaygo Dam downstream, inundating the lower river with sand. Prior to the flood, experts said it would take until 2020 for sediment that had accumulated behind the Newaygo Dam to reach Muskegon.
- **Dams** - Cause water levels to fluctuate in rivers, streams and dam reservoirs. As the water rises, it sends more sediment into the river by scouring sandy banks.
- **Boat wakes** - Send waves crashing onto the shoreline, washing sediment into the river and dam reservoirs. Those waves eat away at the base of sandy river banks and can cause large river banks to collapse into the water.



- **Development** - Disturbs soils above the river, sending sediment from construction sites and farm fields into the river. Development also increases the amount of storm water entering the river, which increases bank erosion.

Results

- **Destroys habitat** - Excessive sediment suffocates fish spawning areas and hurts fish populations.
- **Warms water** - By filling in the river channel, sediment makes the river wider and shallower. That exposes more water to sunlight and warms the water.
- **Changes course** - Excessive sedimentation fills in natural channels, forcing the river to alter its course. Rivers carve new channels by slicing through previously dry areas, which adds to the sediment problem.

Last century's 'banner trout'...only a memory

A century before chinook salmon were imported to the Great Lakes, the Arctic grayling was the king of sport fish in Michigan.

Anglers flocked to parts of the Muskegon River system and a handful of other Michigan streams in the last half of the 1800s to pursue a colorful trout known for its "gigantic" dorsal fin and "indescribable beauty."

The 1855 discovery of Arctic grayling in the Hersey River, a tributary of the Muskegon River, prompted a fishing frenzy in the Muskegon River, according to historical accounts.

"Few of our fishes have commanded as much interest as the magnificent grayling," wrote Wayne State University scientists Charles Creaser and Edwin Creaser in a 1935 paper. It is regarded by many as the most beautiful of our game fishes.

But the grayling bonanza was short-lived. Fifty years after the fish was first caught in the Hersey River, the grayling had disappeared from the Muskegon River and its tributaries. It was eliminated from all Michigan rivers by 1936, according to state records.

The culprit: man and his abuse of the river.

According to one recent study, excessive sport fishing and logging's effects on rivers, combined with competition from other fish species, doomed the grayling.



Experts say damming the Muskegon and most other Michigan rivers over the past century fundamentally altered aquatic ecosystem's and left waterways uninhabitable for grayling.

"It's a pretty sad story," said Andrew Nuhfer, a Michigan Department of Natural Resources research biologist who has studied the grayling. "It is clear that the Arctic grayling could not adapt to the ecological changes wrought by man."

Biologists say the grayling story should serve as a cautionary tale for people who now live, work and play in the sprawling Muskegon River basin. State officials say development in the river basin threatens to change the Muskegon from a cool-water to a warm-water river, a change that would dramatically alter the river's biological communities.

According to published accounts from the late 1880s, the grayling was a magnificent fish like no other in Michigan.

Migrating here during the last Ice Age and measuring up to 18 inches long, the grayling was coveted for its unusual markings and large dorsal fin. But the fish had a fatal flaw: because it fed near the surface, the fish was easy pickings for hordes of anglers who converged on the Muskegon, Manistee and Jordon rivers in the late 1800s.

"Vast numbers (of grayling) were taken in the Hersey branch of the Muskegon River," according to an 1889 report. "These fishes were slaughtered by the thousands, and no less than a half-dozen wagon loads were hauled away."

Although Arctic grayling still live in some streams in Alaska, Montana, Wyoming and California, it is unlikely they will return to Michigan waters. "Every effort to re-establish grayling in Michigan waters has failed," Nuhfer said.

The Arctic grayling was among five native fish species forced out of the Muskegon River system; the river once supported 97 native fish species, according to state studies.

Other native fish species believed to be eliminated from the river include lake herring, muskellunge, sauger and white bass, according to a 1997 DNR study of the Muskegon River system.

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