

# Zebra Mussels May Clog Irrigation Systems

A fact sheet from the Michigan Sea Grant College Program

Light and dark striped zebra mussels have spread to all of the Great Lakes and are moving into inland waters in the Great Lakes region and beyond. Zebra mussels are believed to have been accidentally introduced into the Great Lakes in the mid-1980s via ballast water from Europe.

Any hard underwater surface such as boat hulls, water intake pipes, rocks and even native clams and other zebra mussels can be covered by layers of mussels in a short time. Therefore, recreational boaters, industrial plants and municipal water treatment facilities have been affected by the zebra mussel.

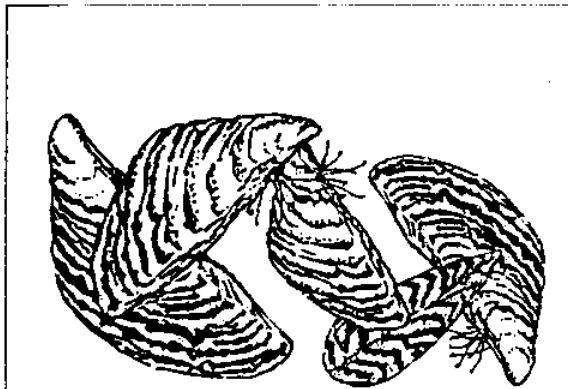
For several years now, zebra mussels have proliferated in the warm, shallow waters of Saginaw Bay. While this has concerned many Bay area residents, businesses, and municipalities, the farmers of the Saginaw Valley have not been affected. But with Saginaw Bay's growing zebra mussel population, bay water used for irrigation may transport the mussels inland.

Tom Coon, a fisheries and wildlife scientist at Michigan State University, is studying the potential for zebra mussels to travel inland via irrigation systems and is searching for solutions to aid farmers if they become besieged by mussels.

## Irrigation Systems at Risk of Infestation

Any grower who uses surface water from a lake, stream or ditch that is infested with zebra mussels is at risk. The majority of farmers worldwide use overhead systems to irrigate crops. However, in the Saginaw Bay region some farmers use subirrigation (underground) systems. Subirrigation is possible in the Saginaw Bay area because of the good soil drainage and dense network of drain tiles. Only a few regions in the world are able to support subirrigation.

Some subirrigation systems draw bay water into drainage ditches and then pump the water through underground drain tiles to the fields. Zebra mussels in the bay,



Mussel populations may increase during a warmer season, and as farmers increase their use of irrigation, the chance of mussels infesting the irrigation systems will increase.

particularly in their microscopic larval stage, may migrate into these drainage ditches and drain tiles. Most drain tiles are made out of pipe approximately 4 inches in diameter and could become quickly clogged by colonizing zebra mussels.

Since subirrigation systems cost on the average \$500 to \$1000 per acre and cleaning or replacement of pipes is difficult and expensive, zebra mussel infestation could be detrimental to farm profits.

Farmers who use overhead irrigation systems may also be faced with the unwelcomed immigrants. The pipes leading from the ditch to the overhead rig could be prime targets for the mussels. "In the former Soviet Union this has been a big problem," said Coon. "Agricultural producers there have been

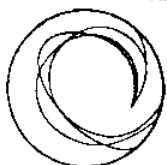
working for years to keep the mussels out of intake pipes."

## European Experience Tapped

In 1992, Coon travelled to the Netherlands, Poland, and Germany to consult with scientists who have studied zebra mussels for more than 30 years. "The Europeans have a wealth of knowledge to share with us," Coon said, "and this has direct implications for Michigan farmers."

In a portion of the Netherlands polder region growers use subirrigation systems similar to Saginaw Bay area systems. Coon discovered that zebra mussels are not a problem in the polders. The mussel larvae may not be as abundant there as they are in Saginaw Bay, and the drain tiles in the polders are made of polyvinyl chloride (PVC) pipe, which has a smooth surface which may deter mussel colonization.

Most of the tiles in Michigan are made of clay or polyethylene, and the latter are corrugated rather than smooth. "And that's what mussels like—nooks and crannies to attach to," Coon explained. In laboratory experiments, Coon and his colleagues discovered that the mussels do indeed attach to polyethylene pipes.



The Michigan Sea Grant College Program is a cooperative program of Michigan State University and the University of Michigan designed to support greater knowledge and stewardship of the Great Lakes and ocean resources.  
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## Natural Control Eludes Researchers

The majority of U.S. municipalities and industries drip a small amount of chlorine into water at the intake valve to remove mussels from intake pipes. Since water is treated before it is discarded, the chlorine is not a pollution problem. Farmers, however, cannot use the same method. In agricultural irrigation systems the water drains away and returns to the natural water system—either the source lake, other surface water, or groundwater.

In 1992, Coon looked for alternatives to chlorine control. In particular, he studied the mussels' tolerance to high ammonium levels and low oxygen levels, both of which are sometimes present in irrigation systems. But in his laboratory experiments, Coon discovered that the mussel larvae can tolerate both high ammonium levels and low oxygen levels. "It doesn't look like we have any natural means of control," said Coon.

## Weather Affects Mussels

Cool, wet summers appear to depress zebra mussel populations in the bay—as was evident in 1992. "From our observations, it appears that 1992 was not a good year for zebra mussels," Coon said. "Settlement occurred later in the summer and wasn't as high as 1991." Data in Lakes Erie and St. Clair confirmed these observations.

Because it was a cool, wet summer, farmers had little need for irrigation. As a result, Coon saw little movement of zebra mussels into drainage ditches. "In future years, if the weather turns dry and warm, the growers should worry," said Coon. Mussel populations may increase during a warmer season, and as farmers increase their use of irrigation systems, the chance of mussels infesting irrigation systems will increase.

## What Farmers Can Do

Due to the potential for zebra mussels to infest irrigation systems, as well as the possibility that irrigation systems might transfer zebra mussels from infested to uninfested waters, researchers suggest that farmers do not operate their irrigation systems with water from surface sources that have zebra mussel larvae.

If possible, farmers are advised to switch to groundwater, which does not become infested by zebra mussels. Another option is to install sand filters or mechanical filters (such as those currently used in drip and trickle irrigation) at the surface water source.

Farmers who have systems at risk of zebra mussel infestation should seek information from the sources listed at right on fluctuating levels of mussels in surface water sources. Farmers can then determine when they should shut down their irrigation systems, switch to an alternate water source, or use physical controls such as filters.

## For More Information

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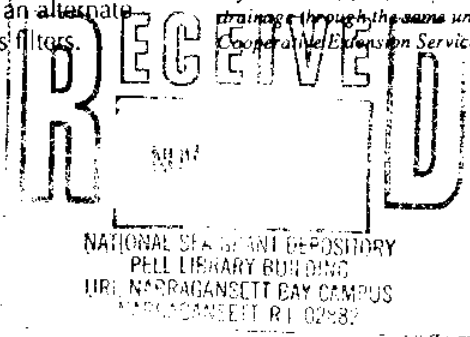
### Michigan Sea Grant Zebra Mussel Information Office

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Or contact County MSU Extension or Soil Conservation Service (SCS).

Source: Futures magazine, Summer 1992; upwellings newsletter, Fall/Winter 1992-93; and interview with Tom Coon.

Reference: Belcher, H.W., February 1991. Subirrigation: irrigation and drainage through the same underground pipe. Michigan State University: Cooperative Extension Service, acis no. 579, file no. 18.23.



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