

Quagga mussels are clogging Hoover Dam, colonizing lakes and rivers

March 2 2009, By Dan Egan

It took some of America's best engineers, thousands of laborers and two years of around-the-clock concrete pouring to build the 726-foot-high Hoover Dam back in the 1930s. It took less time than that for the tiny, brainless quagga mussel to bring operators of this modern wonder of the world to their knees.

While federal lawmakers continue to squabble over how to stop overseas ships from dumping unwanted organisms into the world's largest freshwater system, the Great Lakes' most vexing invasive-species problem has gone national.

And so is the pressure to change the way the lakes' shrinking overseas shipping industry operates. An average of fewer than two ocean ships per day now arrive in the Great Lakes during the nine-month shipping season, yet the industry is still responsible for most of the invasive species introductions into the lakes since the St. Lawrence Seaway opened 50 years ago.

"Some people think we just have a handful of ships coming in and that it's just a Great Lakes problem, but it's not," says Jennifer Nalbone of the conservation group Great Lakes United. "Our invasions are spreading like wildfire across the continent."

Zebra and quagga mussels have been making a particular mess of the Great Lakes ecosystem and economy since they were discovered in the late 1980s. The filter-feeding machines have cost this region billions of

dollars by plugging industrial water intake pipes, starving fish populations and spawning noxious algae outbreaks that have trashed some of the Midwest's most prized shoreline.

For nearly two decades the western U.S. was spared this havoc.

No more.

The first quagga mussel west of the Continental Divide was discovered on Jan. 6, 2007. It was likely a stowaway hiding on the hull or in the bilge water of a Midwestern pleasure boat pulled across the Great Plains, over the Rockies and down a boat ramp at Lake Mead near Las Vegas, where a marina worker found some suspicious shells clinging to an anchor.

"We didn't think much about it," says Bob Gripentog, general manager of the Las Vegas Boat Harbor & Lake Mead Marina. "There was just one or two. Literally."

When the find was confirmed to be quaggas, biologists knew it meant big trouble for an arid region of the country that would wither without its complex plumbing system of hydroelectric dams, reservoirs, irrigation tunnels, pump stations, canals and aqueducts.

They just didn't know how quickly that trouble would come.

What took decades to unfold in the Great Lakes has played out in a matter of months in Lake Mead. Quaggas can lay eggs six or seven times a year in the warmer water, compared with once or twice a year in the Great Lakes.

If you drained Lake Mead above Hoover Dam, says National Park Service biologist Bryan Moore, it would reveal that brown canyon walls

that were mussel-free just two years ago are now black with quaggas at densities of up to 55,000 per square meter.

The pattern for most biological invasions is a population explosion followed by a crash to stable, sustainable levels. Thus far, the mussels show no sign of declining.

Divers report them smothering everything on the lake bottom, from beer cans to a downed B-29 bomber. The rapacious, razor-sharp invaders are bloodying Lake Mead marina workers and are so thick in some places they've even sunk buoys.

And they're spreading into fresh waters.

As of February, zebra and quagga mussels turned up in 33 bodies of water across Nevada, Arizona, California, Colorado and Utah.

U.S. Bureau of Reclamation researcher Leonard Willett works in the lower intestines of Hoover Dam, in a windowless office converted into a war room to beat back the clustering mussels with chemicals, heat and even bacteria. He says common sense tells him this little speck of a critter shouldn't be a threat to something as grand as this concrete dam, which is thicker than the lengths of two football fields.

Yet Willett is in a nonstop fight against a foe that is clogging the dam's cooling pipes like plaque in the arteries of a heart-diseased patient.

If he loses, the generators will overheat, and a power plant that can supply electricity to half a million homes will shut down.

"You wouldn't think that a little fingernail-sized mollusk could stop or

slow down a dam this size, but when you see what these little critters can do, it is amazing," he says. "They can quickly start shutting down even the largest infrastructures."

About a half-hour down the road from Hoover Dam, Ron Zegers, director of the Southern Nevada Water System, pulls up a video on his computer. The grainy images taken by scuba divers reveal mussel colonies beginning to clog the Lake Mead intakes for the two giant pipes that turned Las Vegas from a dusty railroad town into ... Las Vegas.

"Last year we didn't have a problem at all," he says.

This year his agency is looking at spending up to \$20 million to build a chemical system to keep the waterworks mussel-free, and that excludes annual operation and maintenance costs that will include sending divers to plunge more than 100 feet below the Lake Mead surface to periodically scrape mussels off the water intakes.

Zegers, who used to live in Illinois, says he is familiar with the problems invasive mussels can cause. But he says it is a different deal out West because of the climate and the way water is used and delivered.

He points to some Las Vegas-area golf courses that rely on untreated water drawn directly from Lake Mead. Because the golf courses are open for business all year, the pipes don't have a chance to dry out and kill invading mussels. That leaves them primed to get plugged. It's a similar story for farmers.

Nobody can put an exact price tag on what all this will cost the West, but in his testimony to Congress last summer, Ric De Leon of the Metropolitan Water District of Southern California noted that the annual pipe-clogging cost for mussels in the Great Lakes is about \$100 million.

He predicted costs in the West could exceed \$250 million annually because of the extensive waterway networks lacing this dry side of the continent. He noted there are about 1,800 public water systems in the West drawing on surface water to serve 47.5 million people.

De Leon doesn't expect the mussels to ever be eradicated from the West. "We just want to try to keep them at a level where they don't interfere with our ability to convey water."

It's not just water-consuming businesses that are going to pay the bill for this unnatural disaster spawned by the relatively tiny Great Lakes overseas shipping industry.

Great Lakes oceangoing ships primarily haul steel and grain, and the whole enterprise is worth \$55 million a year in terms of transportation savings, according to a 2005 Joyce Foundation-funded analysis of overseas cargo flows on the Great Lakes. In other words, it would cost the region that much more if overseas ships weren't allowed into the Great Lakes and their cargo were instead hauled by some other mode, such as truck, rail or Mississippi River barge.

In contrast, Lake Mead Marina manager Gripentog predicts the costs to the West's recreational boating industry alone will be immense in the coming years. Mussels are smothering everything under the waterline at his 1,400-boat marina, making simple maintenance on boats and floating docks expensive, time-consuming and dangerous.

"The financial impact is huge, but it trickles through so you don't see it all at once," he says. "You're talking hundreds of thousands of dollars (at this marina) over three or four years. And it's going to get worse."

It's already pretty bad for marina dock worker John Koeller, who figures he cuts himself 10 to 15 times a day because anything he plucks from the water "is like grabbing something that's covered in broken glass."

The worst is when hot weather hits _ which is, of course, much of the year _ and he can't wear a protective wetsuit while working in the water.

His thumb freshly sliced up from a morning's work on a dock truss, Koeller lifts his T-shirt to reveal arms scored by mussel shell scars. He says there are some days he comes out of the water so bloody "it looks like you've been attacked by a shark."

Bob Walsh, a lanky and laconic spokesman for the Bureau of Reclamation, turns to a Milwaukee Journal Sentinel reporter after listening to colleague Willett tick off all the troubles mussels have suddenly caused dam operators.

"It would have been nice," he deadpans, "if you had kept them on the other side of the Rockies."

We had the chance.

The first zebra mussel was discovered in the Great Lakes in 1988, and its cousin, the slightly larger quagga, turned up the following year.

But warnings that the mussels could be on their way into the lakes had been sounded for decades before then, including a 1981 Canadian government report detailing the hazards of ocean vessels dumping their ship-steadying ballast water at Great Lakes ports. It zeroed in on zebra mussels - which at the time were plaguing Britain and Russia - as a species uniquely suited for surviving an open sea journey in a ship's

ballast tanks.

Nearly three decades later, Congress has yet to force ships to stop dumping this never-ending biological pollution.

The Great Lakes are now home to at least 185 non-native species. A new one is discovered, on average, about every six months, and in recent decades most have arrived as hitchhikers aboard oceangoing vessels.

History shows that once an invasive species becomes established in the Great Lakes, it likely will never be eradicated. That doesn't mean the lakes - or the nation - have already seen everything the outside world can throw at them. The viral fish-killing disease known as VHS, for example, was not detected in the Great Lakes until 2005.

Zebra and quagga mussels are the marquee name today.

Tomorrow it might be the monkey goby, one of the species singled out by the U.S. Environmental Protection Agency in a January report that identified 30 organisms that have yet to colonize the lakes but are medium- to high-risk candidates to do so - if more isn't done to protect the lakes.

The primary protection the lakes have at the moment is a requirement that ships exchange their ballast water with mid-ocean saltwater before arriving at the gates of the St. Lawrence Seaway, a step that scientists say goes a long way toward reducing unwanted freshwater species, but not all the way.

A national ballast bill that would require all ships entering U.S. waters to install treatment systems to kill ballast dwellers passed the House last summer. It was supported by many Great Lakes conservationists, but it stalled in the Senate over concerns by some who said it was not tough

enough.

Among them was Nina Bell, executive director of the Oregon-based Northwest Environmental Advocates, a group that has chosen to use the courts to push the federal government to treat ballast water like any other industrial pollutant spilling from a pipe.

Bell says many Westerners have yet to awaken to the fact that the Great Lakes ballast problem is now their problem.

"There are very, very few people who consider the Great Lakes invasive species issue to be a national problem," she says. "The people who are running the irrigation systems and the drinking water systems and other infrastructures have their eye on the issue, but everybody else is kind of oblivious."

Great Lakes advocates aren't happy to see the misery spread, but they are hopeful it will alert lawmakers in other regions of the country to the damage being done.

"An invasion into the Great Lakes," says conservationist Nalbone, "is an invasion into the heartland of North America."

Dozens of conservation groups have said they support a moratorium on overseas freighters in the Great Lakes if the ballast problem cannot be solved with a new law.

Left on their own, quagga and zebra mussels expand their range when the microscopic juveniles catch rides on river or lake currents. That means every waterway on the Colorado River downstream from Lake Mead is likely to be infested eventually.

The waters above Lake Mead, however, are also vulnerable because

mussels can be carried in the bilge water and hulls of recreational boats.

The Park Service, which figures the mussels have been in Lake Mead since 2005, is trying to protect the rest of the West's waters by requiring boats that have been docked in a slip to be decontaminated with jets of scalding water before departing Lake Mead. A killer hotwash costs about \$40 for a small boat and up to \$200 for a houseboat.

The rules are targeted directly at guys such as Curtis Clark, a retired oil fields worker originally from Pennsylvania who now travels the West in his pumpkin-colored Ford Ranchero trailing a 26-foot MacGregor sailboat.

"They've got to do something," he says of the new rules as he prepped his boat on the shore of Lake Mead. "Look at the frustrations we have going on here."

Lake Mead biologist Moore says the majority of boaters are cooperative like Clark, but there are still plenty of scofflaws.

"You can't control every boater," he says. "It only takes one guy that doesn't care, and there are a lot of those guys."

That's got states such as Utah taking drastic steps.

Sitting in his Ogden police chief's chair at the bottom of the mountain that hosted the 2002 Winter Olympics downhill, part-time legislator Jon Greiner pulls up a computer map of the U.S. freckled with red dots representing mussel-infested waters. He points to the Great Lakes, where dots meld into swaths of red over what should be blue waters.

"We don't want to look like this," he says.

So Greiner sponsored a bill last year that gives Utah law enforcement workers authority to stop and detain a boat if it might be coming from infested waters. State officials also now have the authority to close entire lakes to boaters to check the mussels' spread.

These are some heavy-duty measures for an anti-regulation state.

"I was floored by how quickly they acted on this issue," says Mark Vinson, a biologist with the U.S. Geological Survey who recently moved to Wisconsin after spending 17 years on the faculty at Utah State University.

Vinson said he worked with the Utah Division of Wildlife Resources on a number of other invasive species issues over the years, trying to persuade state lawmakers to spend money and pass laws to slow their spread, and they got nowhere. Then quagga mussels showed up in Lake Mead. "And it was boom," he says, "instant money."

Their motives, he figures, also have to do with money.

"It wasn't just a sporting or recreation or aesthetic issue," he said. "It was industry."

Radical steps are being pondered elsewhere.

Californians are considering poisoning a 175-acre reservoir south of San Francisco recently confirmed to be infested with an isolated colony of zebra mussels.

The hope is to kill the population before it becomes a launching point to spread invasions into area waters. Estimates for the plan range from hundreds of thousands of dollars to \$5 million, and there is no guarantee it will work. The biggest body of water to be successfully poisoned for

zebra mussels is a 12-acre quarry in Virginia.

Lorri Gray, regional director for the Bureau of Reclamation in Boulder City, Nev., meanwhile, worries about the ecological damage the mussels could do to dozens of native species already suffering from the dam construction projects during the past century.

This is more than an ecological concern. The federal government plans to spend about \$1 billion in the coming decades to help these species recover, and zebra and quagga mussels have a history of ravaging native species in the waters they invade. In Lake Michigan, for example, prey fish numbers are less than 10 percent of what they were before the invasive mussels arrived.

Gray also frets for the farmers downstream who could lose the irrigation water.

"The last thing they need is another operation and maintenance cost or burden," she says.

That has her thinking big.

She's thinking it might be a good idea to bring in some sterilized mussel-eating Asian carp.

She's thinking black carp, specifically, which are the biggest of the four species of Asian carp that are loose in the Mississippi River basin and threatening to invade the Great Lakes.

Black carp can grow to nearly 5 feet long and weigh 150 pounds, thanks to human-sized molars in the backs of their throats that make them mussel-crunching machines.

The fish are, however, also an invasive species and are illegal in most cases to transport across state lines.

But Gray is desperate.

"That may be a good thing or a bad thing," she says. "But that's something we're willing to explore."

Lake Mead marina manager Gripentog says he expects the Great Lakes region to consider equally radical measures to keep the next mollusk, virus or fish from making a fresh mess in his backyard.

He says a Great Lakes-specific fleet that could pick up overseas cargo somewhere near the East Coast might do the trick. He says it's no crazier than what Westerners are being forced to do now.

"Transferring cargo between boats, that's probably costly," he says. "But in the long run that's probably cheaper compared to what average people are having to deal with."

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