

# U.S. brine shrimp industry could be in peril if Great Salt Lake keeps shrinking

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BENJAMIN ZACK/Standard-Examiner

Brine shrimp harvesting camps, bottom, and mineral collection ponds, background fill the northeast corner of the Great Salt Lake.

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If you want to get a sense of what a bizarre, globally interconnected economy we live in, look no further than the tiny brine shrimp living in the Great Salt Lake.

Americans chow down around four pounds per person of shrimp and prawns a year. In 2014, we imported 567,551 tons of shrimp to eat. We consume more shrimp than any other seafood, including tuna and salmon.

And that might not be possible if not for the non-charismatic, durable brine shrimp living in the Great Salt Lake — and the people fishing for them.

“Shrimp, when they’re first born, don’t have good survival rates if fed artificial feed,” said Don Leonard, CEO of the Great Salt Lake Brine Shrimp Cooperative. “The easiest way to understand it is, we provide baby food for baby shrimp and fish.”

Leonard’s industry harvests brine shrimp eggs, or cysts, because those eggs have evolved to endure some pretty intense situations.

(<http://www.sciencedirect.com/science/article/pii/S0094576575900958>) They can sit dormant for months or even years, then hatch with just a little water. They’ve even hatched after traveling through outer space. (<http://learn.genetics.utah.edu/content/gsl/artemia/>)

Once people figured out cysts could also be canned, shipped and hatched to feed baby shrimp, seafood farming suddenly became possible.

“There aren’t many places close to the U.S. where shrimping occurs naturally. You have to have fairly warm water,” said Gabriel Lozada, an associated professor in economics at the University of Utah.

So, brine shrimpers on the Great Salt Lake began shipping cysts to warm places like Thailand and Ecuador, and those places shipped farmed prawns back to the U.S.

“The eggs are very tough ... they’re pretty lightweight, and not expensive to export throughout the world,” Lozada said. “Then all you have to do is open the can and put eggs in the water. Lo and behold, they’ll hatch. It’s a very convenient food source.”

Since the mid-1980s, U.S. consumption of shrimp has more than doubled. Now, 90 percent of the shrimp (<http://www.bls.gov/opub/btn/volume-3/shrimp-disease-in-asia-resulting-in-high-us-import-prices.htm>) on our plates is imported.

At one point, the Great Salt Lake supplied almost all of the world’s cyst supply for farmed shrimp but competition has since sprung up in countries with fewer environmental regulations and labor costs. Most of the 17 companies operating on the Great Salt Lake now mostly pool their resources as members of the Great Salt Lake Brine Shrimp Cooperative.

But Utah still supplies somewhere between one-third to half of the world supply. That means a lot of the shrimp consumed in the U.S. indirectly comes from the Great Salt Lake.

“Name another industry in Utah that supplies one-third of the world’s product,” Leonard said.

And if brine shrimp harvesting on the Great Salt Lake collapses, it could drive up the cost of seafood worldwide, Lozada said.

Today, brine shrimp harvesting contributes just under \$57 million to the state's economy. But as the Great Salt Lake shrinks, the vitality of the brine shrimping industry is threatened.

The low water is already taking its toll. Leonard said the co-op spent \$2 million dredging harbors for their boats.

"It hits us the most operationally," he said. "We have large boats we need to get on and off the lake with a lot of product on board. It's a shallow lake anyway."

The brine shrimp harvest season is short, generally running from October to January. The brine shrimp harvesters actually approached the state in the 1990s and asked them to regulate their industry. The fear was overfishing.

"As an industry, we don't want to wake up one day and read the headline 'industry depletes the lake,'" Leonard said. "I defy you to find another industry, anywhere, that went to the government and said 'please regulate this resource.'"

Once the Great Salt Lake Ecosystem Project (<http://wildlife.utah.gov/gsl/>) (GSLEP) biologists, part of the Utah Division of Wildlife Resources, find 20 cysts per liter or fewer in the lake's water, they call off all brine shrimp harvesting, no matter what.

If the brine shrimp industry disappears, apart from losing a multi-million dollar industry, the state's biologists could also lose an important funding source.

The state collects royalties on the brine shrimp harvests, which are used to fund GSLEP. Beyond counting shrimp populations, that program has led to research on the Great Salt Lake ecosystem to help better understand the lake than Utah ever has before.

"Early on, I don't think there was much interest (in the lake). People didn't think there was that much out here," said Maureen Frank, a graduate student at Utah State University who studies birds on the lake with help from GSLEP. "Until commercial shrimp harvesting began, it was like ... why would we care what's out there?"

## MINIATURE COWS

Harvesters aren't the only ones depending on brine shrimp to thrive. Millions of migratory birds eat them, too. The Utah Division of Wildlife Resources, through GSLEP, regularly samples the lake to determine how many shrimp there are.

As the water in the lake drops, the salinity increases. So does the water temperature. Brine shrimp can handle some pretty warm, salty water, but the algae they eat can't.

"Think of them as miniature cows — they eat the phytoplankton, all this algae, out of the water," said Kyle Stone, a GSLEP biologist, during sampling last summer.

Brine shrimp eggs are tenacious, but one bad year can mean fewer algae, a crash in brine shrimp populations and a lot of damage to the harvesting industry.

"If it were to drop a few more feet, I'd be concerned about the salinity levels," Leonard said. "There is an ideal range of salinity for brine shrimp, and we're at the upper end of that."

Adult brine shrimp can survive in water with 30 percent salinity (<http://wildlife.utah.gov/gsl/brineshrimp/salinity.php>) but ideally need salinity levels at around 15 percent to produce the optimal amount of cysts. To start hatching, the eggs need to be at around 10 percent salinity, which is why they often float — to reach the fresher water at the top of the lake.

The Great Salt Lake's southern half is at around 15 percent salinity. The lake's north arm, cut off from any freshwater sources by the Union Pacific railroad causeway, is between 26 and 28 percent salinity. There are no brine shrimp in the north arm.

A dropping lake also means more exposed beach, which isn't great for the cysts, either. While they can survive tough conditions, UV light destroys viability.

"All those brine shrimp eggs that sit at the surface potentially wash up on shore and get stranded there. It takes them out of the system, essentially," said Jim Van Leeuwen, who's worked with GSLEP for 15 years.

And if the brine shrimp populations aren't stable, there are more global consequences.

"You might have more fishing pressure if people move away from farmed shrimp to wild shrimp," Lozada said.

That could harm sea turtle populations and other sensitive, for example, where other nations don't have special regulations

"The economy is this really complicated web," Lozada said. "When you disturb one part of it, it can be hard to figure what the effects are going to be on all the other parts."

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