Zebra And Quagga Mussels are Invasive Species that can be Destructive to an Ecosystem due to Competition for Resources with Native Species.

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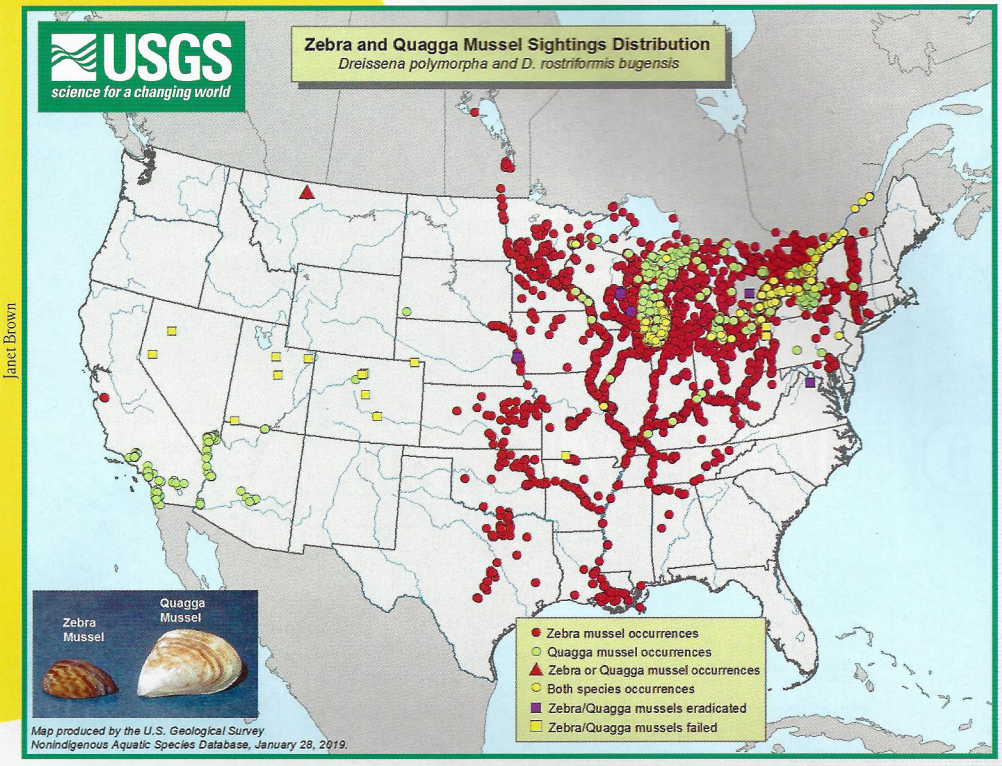


The filtration of zooplankton by the mussels can negatively impact the feeding for some species of fish. Zebra and quagga mussels can attach to hard surfaces and build layers on underwater structures and are known to clog pipes including those in hydroelectric power systems.

The reproducing population of quagga mussels that continues to expand to all areas of Lake Powell has an interesting history that does not originate in Utah, but in fact, was brought in to the United States through the ballast water of ships entering the Great Lakes in the 1980s. These aquatic invaders quickly spread to many bodies of water in the Eastern United States before making their way to the western part of the country. By the early 2000s Arizona, California, Colorado, Nevada, and Utah had confirmed the presence of larval quagga mussels in their lakes and reservoirs. In January 2008, zebra mussels were also detected in several reservoirs along the Colorado River system such as Lakes Mead, Mojave, and Havasu. Beginning in 1999 Lake Powell began to visually monitor for the mussels. In August 2007, preliminary testing was positive for quagga larvae in Lake Powell. These tests were deemed false positives, but adult quagga mussels were found in 2013.

Quagga mussels have more recently spread into the Escalante and San Juan arms of Lake Powell. Adult mussels can be obvious near the surface in all parts of the lake, but they are less numerous and harder to find near inflows. Mussels continue to be found in the river below the dam as well. Quagga mussels were identified in sampling locations between Glen Canyon Dam and Lees Ferry in November 2014, although their distribution is patchy and highly influenced by fluctuating water levels and location-specific flow regimes. Mussel larvae (veligers) pass through the Glen Canyon Dam and seek to attach to substrates in the river.

The US Geological Survey released new data in January 2019 that shows zebra and quagga mussel occurrences across the country to be most dense in the northeast. Quagga mussels according to the USGS data have expanded across southern California into southern Nevada, Arizona, and southern Utah from the Baja coastline. In 2016, mussel reproduction was detected in all areas of the lake. It is a safe assumption that the quagga mussels found in Lake Powell today are likely the result of visiting vessels from the mussel-infested waters of California, Nevada, and Arizona.

There are no current technologies or treatments that would allow for the eradication of the invasive mussels in an open water environment the size of Lake Powell. When mussels were still isolated in the southern portion of the lake, options to slow the spread of mussels within Lake Powell, such as restrictions on boat movements, were considered. However, due to questionable efficacy, significant disruption to visitors and lake operations, and the difficulty of enforcing restrictions, these options were not implemented. Veligers are also dispersed upstream by wind-generated currents and were always expected to colonize the entire reservoir regardless of any boat movements.

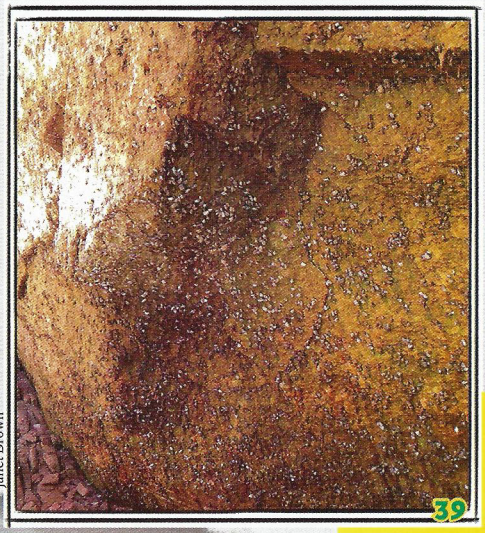
The Aquatic Invasive Species (AIS) Program at Glen Canyon National Recreation Area has transitioned from a focus on prevention of mussels being introduced into the lake, to a focus on containing the spread of quagga mussels from Lake Powell to other bodies of water. Boaters are still contacted on the ramp, but a higher priority is placed on boats leaving to assure they have taken the necessary steps to protect other waters and comply with the law.

The NPS identified and ranked the relative risks of different pathways for both the introduction of aquatic invasive species to Lake Powell and the potential spread of quagga mussels from Lake Powell. For the spread of adult mussels, long-term slipped and moored watercraft have been identified as a high-risk vector. Short-term come-and-go watercraft have been identified as a lower risk for spreading adult mussels. The NPS has developed appropriate strategies to prevent mussels spread for each of these classes of boats.

ALL VESSELS AND EQUIPMENT BEFORE LAUNCHING:
Required self-decontamination (Clean, Drain, and Dry). If visible mussels or other invasive species are identified the vessel will be prevented from launching until the threat can be removed.

ALL VESSELS AND EQUIPMENT BEFORE LEAVING:
Required self-decontamination—Clean and Drain before leaving the area; Dry before re-launch. Professional decontamination will be required if the boat is going to be launched without adequate dry time. (See state laws for specifics).

SLIPPED AND MOORED VESSELS:
Required to be inspected and if necessary, professionally decontaminated in accordance with Arizona and Utah state laws and as a condition of slip rental.



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