

Frequently Asked Questions

- **What's the difference between Quagga Mussels and Zebra Mussels?**
 - *Short Answer: Not Much*
 - These are two species within the same genus *Dreissena*
 - Zebra Mussels invaded North America First (in mid-1980s)⁴
 - Quagga Mussels invaded a few years later (1989)⁵
 - There are morphological differences, but they are subtle
 - There are ecological differences, but more research is needed on North American quagga mussels to assess these differences
 - The practical implications of zebra and quagga mussels are essentially identical
- **Where did they come from?**
 - *Short Answer: Eurasia*
 - Zebra Mussels came from the Black and Caspian Sea Drainages
 - Quagga Mussels came from the Dneiper River Drainage in the Ukraine
- **What temperatures can zebra mussels and quagga mussels tolerate?**
 - *Short Answer: Between 1-30°C (33-86°F)*
 - **Heat Tolerance**⁶
 - Zebra Mussels can survive in waters as warm as 30°C (86°F)
 - Quagga Mussels may be able to survive in waters as warm (need more research)
 - **Cold Tolerance**⁶
 - Both zebra mussels and quagga mussels can survive cold waters near freezing, but cannot tolerate freezing.
 - Zebras need waters above 12°C (54°F) in order to reproduce
 - Quaggas need waters above 9°C (48°F) in order to reproduce
 - **Temperature Preference**⁶
 - Zebra Mussels survive and reproduce best in waters near approximately 18°C (64°F)
 - Quagga Mussels survive and reproduce best in waters slightly cooler, approximately 16°C (61°F)

- **What other physiological tolerances do zebra and quagga mussels have?**⁶
 - **Salinity:** needs to be low (< 5 PPT)
 - **Calcium:** needs to be high (> 25mg/liter)
 - **pH:** needs to be high (in the range of 7.4 – 9.5)
 - **Oxygen:** both species can temporarily survive low oxygen concentrations
 - Zebra mussels need > 25% of full oxygen saturation to grow and reproduce
 - Quagga mussels are more tolerant of low oxygen concentrations than zebra mussels
 - **Water Velocity:** needs to be low (< 2 m/sec)⁷
 - **Substrate:** both species prefer hard surfaces
 - Quagga mussels can tolerate living in soft sediments, but zebra mussels seldom do
- **What do they eat?**
 - *Short Answer: Algae and bacteria in the water column*
 - Both species are filter feeders
 - Quagga mussels are more efficient filter feeders than zebra mussels
- **What eats zebra mussels and quagga mussels?**
 - *Short Answer: No natural predators in North America*
 - Many species do eat these mussels, including diving ducks, red-eared sunfish and some catfish, but predators cannot keep up with the explosive reproductive potential of these invasive mussels
- **What Depths can you find zebra and quagga mussels?**
 - *Short Answer: At any depth, but quaggas mussels can be found deeper*
 - Zebra mussels are typically found from just below the surface to about 12 meters (40 feet)
 - Quagga mussels are typically found at any depth as long as oxygen is present
 - Both species prefer to avoid light and are usually found in shaded areas or below the depth that light penetrates water
- **Why aren't they a problem in Europe?**
 - *Short Answer: They are, but most Europeans have been dealing with them for over 200 years. Their industrial facilities were designed with these in mind.*

- **How do they spread?**

- *Short Answer: Larvae flow downstream. Adults attach to recreational boats and equipment (anchors, bait buckets, etc).*
 - Eggs and larvae will naturally flow downstream of established populations.
 - Larvae can also be transported in water carried by recreational boats, trailers, and other aquatic equipment.
 - Adults can also be spread by recreational boats, trailers, and aquatic equipment.
 - Adults can survive out of water for weeks if temperatures remain cool and humidity remains high.
 - Quagga mussels were probably transported overland at least 1000 miles from their source population (most likely the Great Lakes)
 - Resident boats (those boats that are moored or held in a slip) are much more likely to harbor zebra and quagga mussels than day boats (boats that are removed from the water after each use).

- **How can we prevent additional spread?**

- *Short Answer: Educate boaters.*
 - Preventing downstream invasions is practically impossible.
 - Convincing recreational boaters to clean their boats and equipment before transporting them to new waters is essential.
 - Simple steps are necessary every time a boat is retrieved from a lake or other water body:
 - Remove all aquatic plants, animals, and mud from everything that came in contact with water.
 - Drain all water, including bilges, live-wells, cooling water from the motor.
 - Clean and dry everything that came in contact with water
 - Dispose of any live bait.
 - If mussels are seen attached to a boat or other recreational equipment, it must be decontaminated using more stringent guidelines.
 - A decontamination protocol is attached.

- **Where can I learn more?**

- www.100thMeridian.org
 - The 100th Meridian Initiative is a cooperative effort between state, provincial, and federal agencies to prevent the westward spread of zebra mussels and other aquatic nuisance species in North America. The associated website is the official coordination point for information regarding zebra and quagga mussel spread to the western United States.

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