

## Quagga Mussels and Zebra Mussels in Seneca Lake

### Introduction

Zebra Mussels (*Dreissena polymorpha*) were known to have invaded Seneca Lake in the early 1990's, followed soon afterward by the invasion of their distant cousin, the quagga mussel (*Dreissena bugensis*). Both of these species of mussels come from Eurasia. They are considered invasive because of their potential to cause economic and ecological damage to Seneca Lake. For more information about the impacts of these species see the references listed below.

While participating in Science on Seneca, students will see these mussels in the sediment dredge samples they collect. To distinguish the species you need to look closely at the hinge. Zebra mussels have a flat hinge and lay flat on the palm of your hand while the quagga's hinge is oval shaped and will tip. See the images below to view the different species.



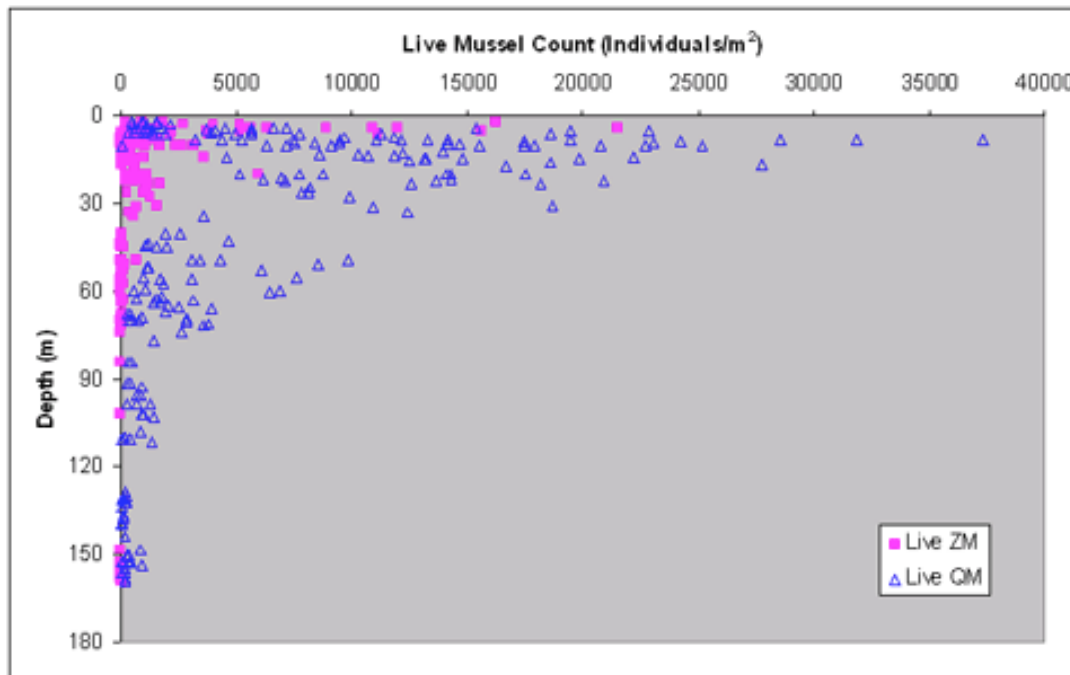
**Zebra Mussel left**

**Quagga Mussel right**

During the summer of 2007, scientists from the Finger Lakes Institute studied the distribution and density of quaggas and zebra mussels in Seneca Lake. The scientists collected dredge samples from over 100 sample sites around the lake. They cleaned and rinsed the samples using screens and counted live vs. dead, quagga and zebra mussels for each sample collected. The power point reference below shows Dr. Bin Zhu, Finger Lakes Institute research scientist, sifting through the sediment sample and rinsing it out to collect the mussels. After collecting the mussels, the scientists then used mathematical formulas to extrapolate the densities of mussels per square meter. Graph 1 below shows the densities of live quagga and zebra mussels at different depths in Seneca Lake.

### Graph 1 - Quagga and Zebra Mussel Densities in Seneca Lake

ZM= Zebra Mussels  
QM= Quagga Mussels



### Lesson Objectives

This lesson introduces students to the ecology of zebra and quagga mussels and how they each compete for habitat and resources in lake systems. After reading the lesson introduction and linked reading, they will be asked to answer questions about the differences between the two species and their distribution in Seneca Lake.

### Standards:

MST Standard 4 - Living Environment Key Idea 1, 2, 5, 6

**Student Activity:** Using the information in the lesson introduction, the linked essay on [zebra and quagga mussels](#), the [facts sheets](#) from the USGS; answer these questions.

1) After viewing graph 1 - what can you say about the distribution of quagga versus zebra mussels in the lake? Which species is more abundant?

*Quagga are more abundant in Seneca Lake. They have a wider distribution pattern as well - more can be found at depths greater than 30 meters.*

2) Why do scientists study zebra and quagga mussels in lake systems?

*Because they are invasive species scientists are concerned about their impact on the food web, as well as the economic impact they might have on society, clogging water intake pipes and contaminating drinking water supplies.*

3) How do adaptations of these species influence their ability to out compete other native species?

*They can reproduce prolifically; they start out in a planktonic stage so they float in the water and once they reach a juvenile stage, attach themselves to any substrate and colonize. They do not have many predators; they can out-compete other species such as daphnia for planktonic food.*

4) How do these species compete with each other?

*The zebras and quaggas share the same niche in the lake, they both attach to substrates on the bottom of the lake. They eat the same food source.*

5) From the reading, name three factors that allow quagga mussels to out-compete the zebra mussels in Seneca Lake.

*They may be able to adapt to cooler water temperatures, they have a lower rate of respiration so can survive in waters that have lower oxygen concentrations, because of their size they store more energy and can use that energy for reproduction.*

[Paper on Quagga and Zebra Mussels](#)

[Power Point on Research about Quagga and Zebras on Seneca Lake](#)

[USGS Fact Sheets](#)