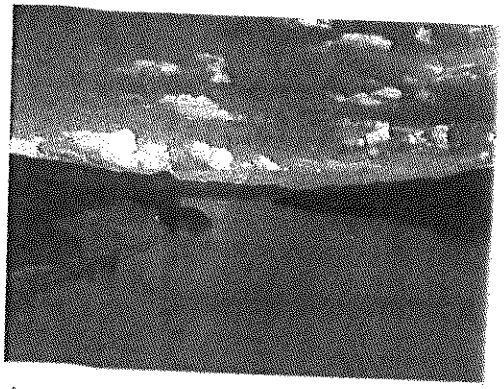
The Short-Term Impact of the Zebra Mussel Invasion

StepRead Lexile9

This StepRead is based on an article provided by the American Museum of Natural History.

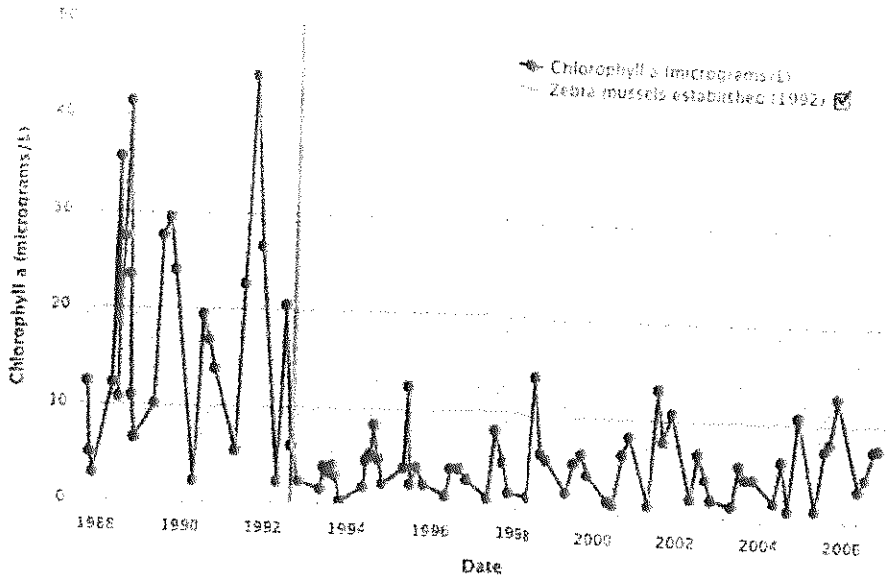
Zebra mussels first showed up in the Hudson River in May 1991. Within a year, there were about 500 billion of them in the Hudson River! If you were to weigh all of those zebra mussels together, they would weigh more than all of the river's fish, zooplankton, worms, shellfish, and bacteria combined.



An estuary is a body of water where freshwater and saltwater meet. The Hudson River is a tidal estuary. There, the saltwater from the Atlantic Ocean meets the freshwater that runs off the land.

The amount of phytoplankton and zooplankton drop quickly

Before the invasion, scientists had predicted the effects of the zebra mussels on the Hudson River. But they were still surprised by what happened. In the years right after the invasion, the number of phytoplankton fell by 80 percent. The number of zooplankton, which eat phytoplankton, fell by 50 percent. And the number of the smallest kind of zooplankton fell by about 90 percent.

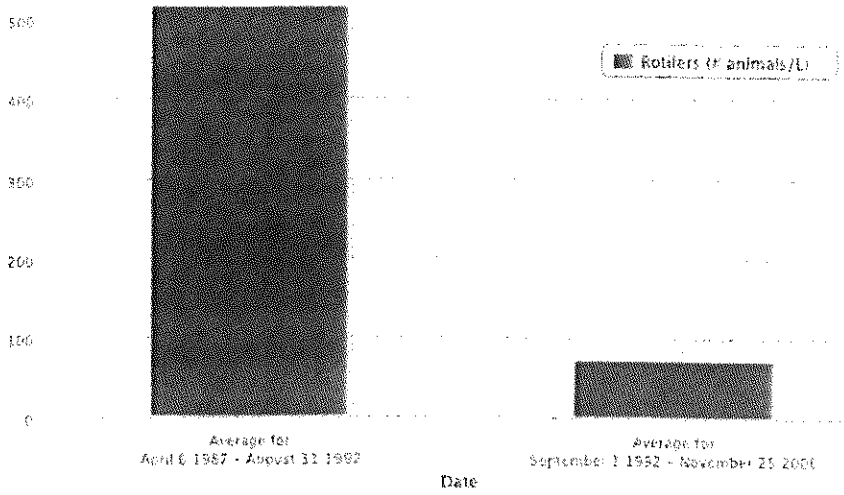


WATCH WHAT HAPPENS

This graph shows the change in the amount of phytoplankton over 18 years in the Hudson River. Since phytoplankton contain chlorophyll, scientists can figure out the amount of phytoplankton by measuring the amount of chlorophyll. The blue line with dots shows the amount of phytoplankton in the river. The gray vertical line shows when the zebra mussel population became established in the river. There was a big change in the amount of phytoplankton after the zebra mussels arrived. What do you think happened?

By 1994, scientists hypothesized that zebra mussels had caused these changes. They knew that the zebra mussel population had become so large that it could filter a lot of water very quickly. Scientists suggested that the

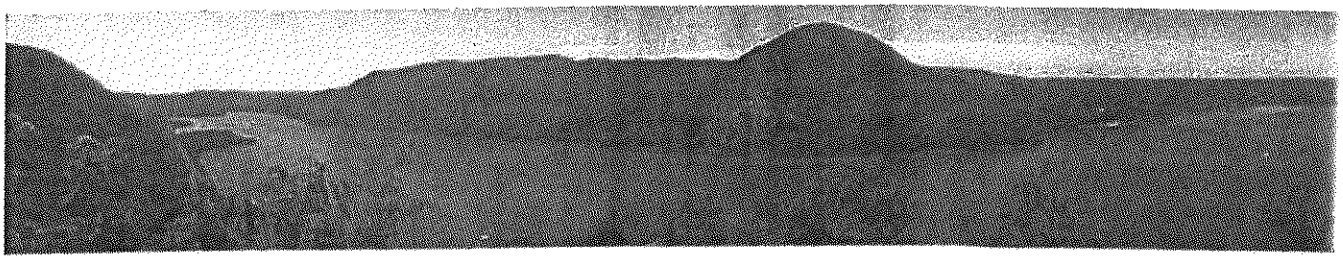
mussels were filtering huge amounts of phytoplankton from the water to eat. Since zooplankton also eat phytoplankton, they had less food. So the number of zooplankton fell too. Over the next few years, the data supported the scientists' hypothesis.



A BIG CHANGE
A rotifer is a kind of zooplankton. This graph shows the drop in the average number of rotifers in the Hudson River after the zebra mussels became established in 1992.

The food web changes

The scientists made other discoveries. They found that the drop in phytoplankton and zooplankton affected the whole food web. The other animals that eat plankton had less food, so their numbers went down. For example, the population of native mussels went from more than one billion to almost none. The number of fish that eat plankton also went down. The average size of these fish went down too.



ALONG THE RIVER
The Hudson River flows for 315 miles through New York. Over 1,000 cubic feet of water pass by every second. Scientists want to understand how the river changes over time and space.

But some populations grew in number. The number of plants with roots, like water celery, grew by up to 40 percent. This growth probably happened because the river's cloudiness, or turbidity, changed. With far less phytoplankton, the water was clearer. This meant that sunlight could reach deeper into the water, helping more plants with roots to grow in the river. Populations of the fish living among these plants also grew in number.

Another surprising result was that the amount of dissolved oxygen in the river fell by about 15 percent. This was not enough of a change to put any animals in danger. Still, it was a huge drop. Scientists think the zebra mussels caused it by consuming a lot of oxygen very quickly. At the same time, the mussels were eating the phytoplankton that produce oxygen.

Questions about the long-term impact

What happens after an invasive species becomes part of an ecosystem? The invasive species might change over time to adapt to its new home. Native species might evolve to live alongside the invader, or even to eat it. Or other new species might arrive that can live easily in the changed ecosystem. Once scientists understood the zebra mussel invasion's immediate impact, they started to wonder about long-term effects like these.