



C L E A R W A T E R

# Navigator

W I N T E R 2 0 0 5

**REVIVAL!**  
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## H U D S O N R I V E R R E P O R T C A R D

### AN ECOSYSTEM IN PERIL

PLANKTON COUNTS FALL DRASTICALLY

Every two weeks between April and December, Michael Pace and his colleagues from the Institute of Ecosystem Studies in Millbrook head for their sampling station near the Kingston-Rhinecliff Bridge. They've been doing this since 1987, building a set of plankton data that starts before the invasion of the zebra mussel and chronicles its impact. One look at the graphs on this page tells the whole story.

The reasons, according to Pace, are simple. Billions of zebra mussels filter the entire volume of the Hudson River every 1-4 days. The river is well-mixed, and all 150-odd species of plankton are found at all depths, hence there is no refuge for them other than eventual drift into the brackish section of the river below the Beacon-Newburgh Bridge (zebra mussels are not salt-tolerant). The zebra mussels take plankton in with the water they are filtering, and ingest anything smaller than 1/100 of a centimeter.

Plankton are the foundation of the Hudson River food web. There are two types: tiny plants called phytoplankton and somewhat less tiny animals called zooplankton (pronounced *zoh'-oh*, not *zoo*). Phytoplankton fix carbon dioxide in the water column and present it in edible form for grazing by the zooplankton. Larval fish dine on the



Small zooplankton, such as this rotifer, have been decimated by zebra mussel filter feeding.

smallest of both types, and as they grow they adapt their feeding preferences to successively larger zooplankton.

It follows, then, that as the zebra mussels vacuum up the smallest organisms they are in hot competition with larval fish of all species. In last spring's *Navigator* shad article, we reported that researchers were observing young-of-the-year shad heading for the wintertime North Atlantic at less than 75% of their pre-zebra mussel weight.

When 80-90% of the food supply has disappeared, the word that comes to mind is famine. The Hudson River's young fish are being starved. And there's nothing we can do about it, except possibly prevent it from happening again.

It may already be too late. There are new invasive species moving through the Great Lakes that have the potential to colonize the Hudson, displacing native species and further altering our already-threatened ecosystem. "We don't think the zebra mussel is the last card on the table," said Pace. "There are others. They could be five years out, or ten years – and they could have significant impacts."

The good news – if there is any – seems to be that the ecosystem may be stabilizing in its weakened state. Several native animals currently out-competed by zebra mussels have not become extinct, as was once feared, and are surviving, albeit at very low population levels. The remaining 10-20% of planktonic biomass also may be safe because at current levels there isn't enough food density to sustain continued population growth among zebra mussels. But with food scarce, fish mortality rates rising, and new threats on the way, have we seen the last of the major ecosystem changes? Probably not.

– Andy Mele, Executive Director

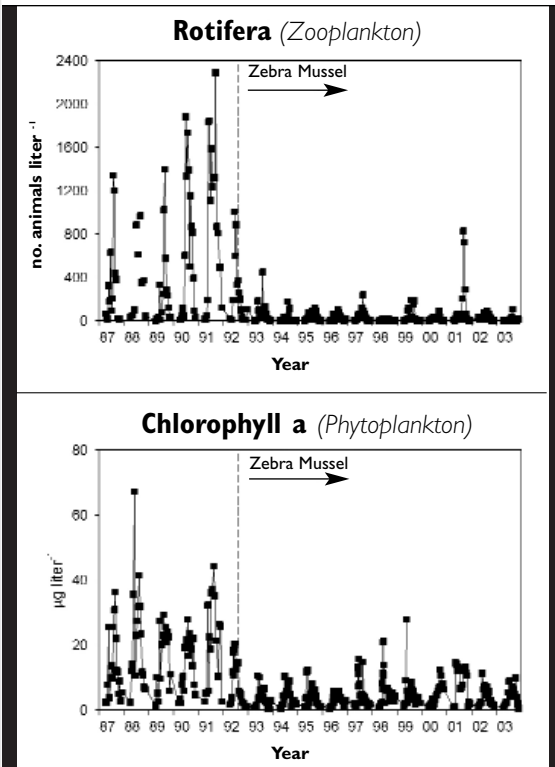


Photo and graphs courtesy of the Institute of Ecosystem Studies.