Impacts of Zebra Mussels (Dreissena polymorpha) on the Benthic Community in Kashong Bay, Seneca Lake, Ontario County, New York: 1992-94

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INTRODUCTION

On July 13, 1992 a team of researchers from the BFS visited Kashong Bay in order to provide a characterization of the benthic community prior to expected impacts by the then recent introduction of the zebra mussel, Dreissena polymorpha (Harman, 1993a). A transect was erected perpendicular to the shoreline from the eulittoral zone (beach) to 25 feet in depth. Inspection by SCUBA was used to collect the necessary information. Data obtained was supplemented by 4 Ekman dredge samples. 

The results were presented in tabular form indicating distance along the transect from the beach, depth, inorganic substrates, macrophyte distributions, pearly fresh-water mussel (Unionidae) densities, location of dredge samples and percentages of taxa found, as well as numbers of organisms present. 

On September 23, 1993 we returned to the Bay for a brief visit to document any potential impact of Dreissena on the benthic community (Harman, 1994a). On July 22, 1994 we again visited Kashong Bay, swam the transect, collected Ekman samples as well as unionids with attached Dreissena. 

METHODS

The original transect was erected by mooring a series of buoys along a compass bearing of N70°E from the docks of Dr. Ralph DeFelice towards a water tower on the east side of the lake. A line marked at 10 foot intervals was then stretched on the bottom between buoy anchors. SCUBA was used to follow the line in order to ascertain the character of the environment. Observations were recorded on a clipboard with a white matte formica surface with a #2 pencil. Four bottom samples (3 replicates of each) were taken with a 0.09m² Ekman dredge at 0, 5, 20, and 40 feet in depth. Samples were sieved with a 1mm² mesh screen and preserved in 70% ethyl alcohol for examination in the laboratory. In the lab organisms were determined to the various taxa as follows: All groups to Family except Crustacea and Gastropoda, which were determined to species, and the Hindea, platyhelminthes, and Porifera that were identified to the Genus level. 

Populations of pearly fresh-water mussels (Unionidae) and the snail, Goniobasis livescens (Pleuroceridae) were estimated by divers along the transect in 1992 and again in 1994. In 1993 about 45 minutes were spent in the water using SCUBA for informal observations of the benthos. 

RESULTS

Figure 1 provides a comparison of the taxa collected in dredge samples at 0, 5, and 20 foot depths along the transect in 1992 and 1994. There were no zebra mussels present at any of the sites in 1992. At the KB-1: eulittoral (0’depth) dredging area 2.5% of the benthos were zebra mussels in 1994. At that station there were slight increases in the percentages of annelids (Oligochaeta and Hirudinea) and insects (Chironomidae) making up the samples at the expense of the amphipods (Hyallela azteca). Total numbers of individuals decreased.

Figure 1a. Macrobenthic taxa (% of total individuals) collected in dredge sample KB-1 (0' depth) on a transect in Kashong Bay, Seneca Lake, N.Y.

Figure 1b. Macrobenthic taxa (% of total individuals) collected in dredge sample KB-2 (5 feet in depth).
Figure 1c. Macrobenthic taxa (% of total individuals) collected in dredge sample KB-3 (20 feet in depth).

Figure 2. Average number of zebra mussels associated with individual freshwater clams in Kashong Bay, Seneca Lake, 1992-1994.
drastically (in 1992, 59,000 ind./m²; 1994, 2,242 ind./m²). These numbers, made up primarily of *H. azteca*, would be expected to vary dramatically as various physiological and ecological phenomena are impacted by *Dreissena* colonization.

In 1994, in waters 5' in depth (KB-2) zebra mussels composed 49.8% of the benthos whereas *Hyalella* represented 33.2% of the fauna compared to 84% in 1992. The remaining taxa occurred in about the same percentages as they did in 1992. Total numbers of organisms had decreased considerably by 1994 (178,000 ind./m² in 1992; 4,731 ind./m² in 1994).

At KB-3 in 1994, in 20 feet of water, *Dreissena* comprised the majority of the organisms found. *Hyalella* made up only 8.8% of the individuals compared to 85% in 1992. As in the shallower waters there was a drastic decrease in total numbers of individuals, 33,000 in 1992 as compared to 1,083 in 1994.

Collections of unionid clams over the 3 year period illustrate a rapid increase in the numbers of attached zebra mussels (Figure 2). In 1992 no *Dreissena* were encountered. By 1993 unionids averaged 0.63 zebra mussels attached per individual. In 1994 each clam collected had an average of 42.7 *Dreissena* attached to it. Of those 42.3 specimens of *Dreissena* were under one year of age.

Population densities of unionids and pleurocerid snails (*Goniobasis livescens*) along the transect remained stable between 1992-94. In water 5-15 feet in depth; Unionidae 8-9 individuals/m², Pleuroceridae 50-75 ind./m². In waters 15-25 feet in depth; Unionidae 4-5 ind./m², Pleuroceridae 25-50 ind./m².

DISCUSSION

As of the summer of 1994 Kashong Bay was in the early stages of the colonization of zebra mussels even though *Dreissena* dominated the benthic faunal community in waters greater than 3 feet in depth. In eulittoral waters there were few zebra mussels to be seen. This same situation pertained in Lower South Bay in Oneida Lake in the fall of 1992 (Harman, 1993b) when very few specimens of *Dreissena* were found in waters less than 1 m (3 feet) in depth, but individual unionid clams from deeper waters averaged 3,350 attached zebras mussels each. In 1993 an average rock, about 100 cm² (4x4 in.), on the shoreline of Oneida Lake supported about 1000 specimens of *Dreissena* (Harman, 1994b).

REFERENCES


