

A Report on Invading Species LOW LEVEL 1

A

A Report for the Ministry of the Environment Invading Species: The Zebra Mussel

Key Characteristics

Zebra mussels are brown in colour and have yellow or white stripes. They are very tiny as they are about the size of a human’s fingernail. The mussels are believed to have come from boats that emptied their waters into the Great Lakes after having visited the Caspian Sea. Zebra mussels were easily able to adapt to freshwater areas.

Because there are only a few predators to the zebra mussels, they were easily able to survive in their new environment. Some predators of the mussels are birds which include the goldeneye and the merganser, and fish which include the drum and the goby. Unfortunately, these do not get rid of enough of the mussels.

The zebra mussels eat algae, bacteria, zooplankton, and phytoplankton found in the water. The large amount of food has allowed them to reproduce more rapidly as one female can produce an average of about 40, 000 offspring per year.

Zebra Mussels in Great Lakes



B

Scientific Analysis of the Problem

Zebra mussels appear to clean the water of toxins, but they just collect them within their bodies. This collection of toxins is called bioaccumulation. Therefore, the toxic substances remain in the environment. This poses a risk to the predators of the zebra mussel. The predators such as fish or birds that eat them can become ill and die. The mussels also eat the plankton necessary for insects and fish to live.

Not only do they pose a threat to the species of the area, they also attach to waterways and pipes, clogging them up and causing a lot of damage. This includes pipes of water treatment centres.

Zebra Mussel Population in a Small Water Body, 1991-2000



Predictions for the Future

If zebra mussels continue to eat the food supply of fish, the fish industry will decline. This will make companies lose thousands if not millions of dollars.

C**Recommendations**

I have been researching the effects of zebra mussels on Ontario's environment. I have found several possible ways of getting rid of them. One of the ways to get rid of the mussels could be to use chemicals such as chlorine to kill them. Unfortunately, this will probably alter or kill other important species and is probably not the safest way of killing them. Another idea is to deprive them of oxygen, but this too may pose a threat to other species in the area. The safest way to get rid of the zebra mussels would be to remove them manually. This can be very tedious, but will help to keep other species alive. I would also recommend that people check their boats, nets, etc. for the mussels before venturing out in the water to prevent the further spread of the zebra mussels.

D**Bibliography**

- Arora, A., Fraser, D., Di Giuseppe, M., Lisser, B., Ritter, B., Vavitsas, A. (2003). *Nelson Biology 12*. Toronto: National Library of Canada Cataloguing in Publication Data.
- Jones, A. (2003). Lets Keep Zebra Mussels Out! Retrieved May 16, 2003, from the World Wide Web: http://www.se.gov.sk.ca/media/Saskatchewan%20Environment-newsline/Zebra_Mussels.htm
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- Zebra Mussels. (2003). Zebra Mussel. Retrieved May 14, 2003, from the World Wide Web: <http://www.nsf.gov/sbe/nuggets/011/nugget.htm>

LOW LEVEL 1

Teacher's Notes**Knowledge/Understanding**

- The student demonstrates limited understanding of how the invading species has adapted. He or she describes a few characteristics (e.g., “The zebra mussels eat algae, bacteria, zooplankton, and phytoplankton found in the water. The large amount of food has allowed them to reproduce more rapidly”), but he or she fails to explain how they are adaptations.

Inquiry

- The student analyses the actual or potential problem with limited effectiveness. He or she states a few effects (e.g., “they also attach to waterways and pipes, clogging them up”), but the student gives only vague indications of the seriousness of the problem (e.g., “causing a lot of damage”).
- The student predicts the future impact of the invading species with limited effectiveness. The zebra-mussel population numbers are for a small, unknown body of water, and are not projected into the future for the Great Lakes as a whole. The student indicates that “the fish industry will decline”, but he or she predicts the magnitude of the impact in very vague terms (i.e., “This will make companies lose thousands if not millions of dollars”).

Communication

- The student communicates information in graph/chart/table format with very limited clarity. The graph is a plot of year versus population, rather than the more conventional population versus year, for a “Small Water Body”. The linear graph appears to result from the non-linear scale used on the population axis. Therefore, the graph does not successfully establish linear growth in the population over time.
- The student communicates ideas and information with limited clarity. The report is organized into reasonable sections, but the ideas within them are disjointed and lack detail. The report includes relatively few scientific terms, and the attempt to explain bioaccumulation is unclear.

Making Connections

- The student recommends and justifies a course of action of limited effectiveness. He or she suggests approaches to controlling the mussels (e.g., “deprive them of oxygen”), but gives little indication of the advantages and disadvantages of each method, or of how it could be implemented. The student suggests that “The safest way to get rid of the zebra mussels would be to remove them manually”, but he or she does not indicate how or when this should be done. The student does not consider the magnitude or expense of manual removal, simply describing it as “very tedious”. The student does not suggest any concrete steps that The Ministry of the Environment should take to get people to “check their boats, nets, etc. for the mussels”.

Comments

This work is representative of a low level-1 performance. The student demonstrates a limited degree of achievement of the expectations in the Knowledge/Understanding, Inquiry, and Making Connections categories of knowledge and skills. The student also demonstrates a limited degree of achievement with respect to one criterion in the Communication category. However, with respect to the other criterion in the Communication category, the student demonstrates a very limited degree of achievement.

Next Steps

In order to improve his or her performance, the student needs to:

- provide more specific details of adaptations;
- convey the seriousness of the problem more clearly;
- use more comprehensive population estimates to predict the future impact;
- use a linear population scale on the graph;
- expand on and connect ideas;
- explain scientific terms clearly;
- provide a recommendation that is well researched, explained, and justified.