

Lesson 15

Species Introduction: A Case Study



Learning Outcomes

After completing this lesson, you will be able to:

- describe potential threats to an ecosystem caused by an introduced species
- discuss potential economic consequences of introducing new species to an ecosystem



Learning Activity

Read the Information Bulletin “Zebra Mussels in North America” and answer the following questions:

1. Describe some of the economic problems that have been created by the introduction of zebra mussels to North America.

4. How do zebra mussels affect an ecosystem?

5. Why is Manitoba a likely target for zebra mussel invasion?

6. What can you do to help prevent the spread of zebra mussels?

Zebra Mussels in North America

Zebra mussels have caused millions of dollars of damage in Europe, the Great Lakes region of Ontario, and the United States. This damage includes:

- Plugging cooling water systems of boat motors;
- Clogging water intakes of private cottages, towns, cities, and industries;
- Severely reducing recreation at beach areas due to the accumulation of sharp shells and foul odours from decaying, dead zebra mussels; and
- Reducing species of algae and microscopic aquatic animals which are important in the food chain.

Colonies of zebra mussels have formed layers up to 1.5 metres (five feet) thick in some water use facilities. Over 700,000 zebra mussels per square metre of surface were located in 1989 within the water intake canal of a power plant near Lake Erie. The flow of drinking water was reduced by 60 per cent, requiring costly repairs and the emergency shutdown of non-essential services in one Michigan city.

These huge colonies of zebra mussels filter tremendous amounts of water removing small particles such as algae. In Lake Erie, the increased water clarity is providing greater light penetration, causing rooted aquatic plants to flourish. As a result, underwater plants are now clogging some harbours. In addition, the preferred food of zebra mussels is green algae. In certain areas of Lake St. Claire, green algae has virtually disappeared, resulting in increased occurrences of the toxin producing blue-green algae.

What are zebra mussels?

The zebra mussel (*Dreissena polymorpha*) is a small animal that resembles freshwater clams. Zebra mussels grow up to five centimetres (two inches) in length and may live up to five years. Their name originated from the brown and white striped colour of its shell. One mature female zebra mussel can produce up to 40,000 eggs per year for a total of 150,000 eggs during its life span. Typically, they become sexually mature in their second year. Eggs are released into the water by the female and are fertilized by nearby males.

Are zebra mussels in Manitoba?

No. Nor have zebra mussels been reported from any of the watershed that flows into Manitoba. They have been located in Lake Superior at Thunder Bay and Duluth, and in the Upper Mississippi River at St. Paul, Minnesota.

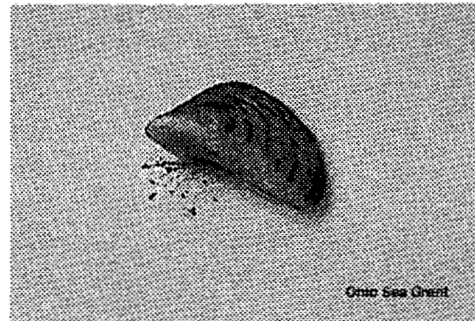
In June 1999, dead zebra mussels were found in Manitoba on the hull of a boat traillered from Orillia, Ontario. The mussels were recognized by an alert marina worker who contacted the proper authorities. The boat was thoroughly cleaned before launching into the Red River.

Each year, Manitoba Conservation, in co-operation with the Canadian Coast Guard, examines hundreds of navigational and marker buoys for zebra mussels. Buoys from many Whiteshell lakes, the Winnipeg River, the Red River, and the south and north basin of Lake Winnipeg are examined. The City of Winnipeg monitors near its water intake and Manitoba Hydro monitors its facilities on the Winnipeg and Red rivers. No zebra mussels have been found in Manitoba waters.

Many southern prairie rivers are at high to moderate risk of successful zebra mussel colonization should they be introduced accidentally into these waters. Rivers and lakes in eastern Manitoba (for example, in the Whiteshell Provincial Park) are at lower risk.

Why do zebra mussels spread so rapidly from one body of water to another?

Laboratory studies have shown that adult zebra mussels can survive out of water, in moist conditions, for up to two weeks. They attach to boats or other equipment being transported from one body of water to another and spread to new areas.



Zebra mussel larvae can also survive long periods of time in water with sufficient oxygen. As a result, larvae may be unknowingly transported in live wells, bilge water, residual engine cooling water, or floating pontoons, and infest new waters. Because of the large number of tourists, pleasure boaters, and anglers moving between the infested waters of the Great Lakes, or the Upper Mississippi River systems, and Manitoba, there is a high probability that zebra mussels could invade Manitoba lakes and streams.

All surface waters flowing into Manitoba eventually flow north as part of the Hudson Bay drainage basin. Land-bridges to the south and east of this basin are natural barriers which protect the province from watersheds infested with zebra mussels. The land-bridges, however, are short in distance, and traillered watercraft could easily transport zebra mussels into our watershed. Zebra mussels could enter Manitoba through either the Red River system from the south or the Winnipeg and Rainy River systems from the east.

Where did zebra mussels originate?

Until recently, they were found only in Europe. Native to the Caspian, Black, and Azov seas of eastern Europe, they were initially discovered in the Caspian Sea in 1769. During the past century they have migrated through central and western Europe. It is thought that zebra mussels were transported to North America in the ballast water of an ocean-going vessel. This ballast water was then discharged in Lake St. Clair, Ontario, likely in early 1986. Scientists first discovered a population of zebra mussels in Lake St. Clair in 1988.

How far have zebra mussels spread in North America?

Since zebra mussels were first introduced into Lake St. Clair, they quickly spread from the Great Lakes to the Erie Canal, Finger Lakes, and the Hudson River area of the eastern United States. They have been found in the Trent-Severn and Rideau Canal areas of eastern Ontario. Zebra mussels can now be found in the Mississippi River from St. Paul, Minnesota, to the Gulf of Mexico delta, including its major tributaries, the Ohio, Illinois, and the Arkansas rivers.

Why are zebra mussels so abundant?

- They colonize surfaces that are not inhabited by other similar organisms and have few natural predators; zebra mussels may be controlled by some natural fish and bird predators such as carp, sturgeon, gulls, and mergansers;
- An extremely successful reproductive strategy ensures that many young zebra mussels will survive even in poor environmental conditions;
- Thread-like filaments form a very strong bond between the zebra mussel and solid surfaces. This allows them to remain attached even in habitats with high water flows, such as water intakes and water lines;
- Zebra mussels can filter large quantities of water to remove food (mainly algae or plankton), and, therefore, can live in a variety of water bodies with a wide range of available food. It is estimated that one adult zebra mussel can filter all of the material out of one litre of water in one day.

What is the Province of Manitoba doing about the zebra mussel threat?

The Province of Manitoba is involved in a number of initiatives to educate and heighten public awareness about zebra mussels. These include highway signage, production of brochures and factsheets, informational articles, and presentations to target audiences. Monitoring for zebra mussels is carried out by the City of Winnipeg at Shoal Lake, Manitoba Hydro stations on the Winnipeg River, and Manitoba Conservation by inspecting seasonal marker buoys from various water bodies.

What can I do to help?

Before leaving infested waters, follow this five-point checklist:

1. Drain all bilge water and rinse bait buckets.
2. Inspect all equipment.
3. Scrape off 'grainy' surfaces (they could be young zebra mussels).
4. Wash your boat with hot, soapy water.
5. Dry equipment in the hot sun for three to five days, then scrape off remaining zebra mussels.

The best method of control is reducing the risk of accidental introduction. Once zebra mussels establish in Manitoba waters, they cannot be eradicated.

If I take these precautions, will it help?

Although it takes time and effort to clean zebra mussels from boating and other equipment, it will save large sums of money for costly repairs and will give researchers an opportunity to find suitable control methods.



If you are a cottage owner, commercial fisherman, angler, lodge owner, or if you work in a water treatment plant, electrical power generating station, or marina, please check equipment, docks, piers, or other underwater structures for the presence of zebra mussels.

If you think you have located zebra mussels in Manitoba or need further information, please contact Manitoba Conservation.

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