

Are Mussels on a Zebra Dangerous?

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Lesson Overview: When it comes to invasive species, what role do the zebra mussels play in the aquatic ecosystem **of the Great Lakes**? If it is a negative effect, then what can we do to combat the problem? If it is a positive effect, then what can we do to assist in encouraging the positive effects?

Introduction/Teacher Background Knowledge:

I work as a special education teacher for grades 6th-8th all subjects. I just found out last year how fun Science can be! Students actually like Math and Science! In my next career, I would love to be the Math or Science teacher for elementary or middle school.

Target Grade & Subject: 5th-6th grade/Science

Duration: one class period session (50 min)

Instructional Setting: classroom

Advance Preparation:

Preview videos, save video links, picture saved, copy worksheet for video w/ key, staple packets.

Packets to include:

Teacher-created worksheet (to make sure students are comprehending the video/direct instruction)

Map of zebra mussel infestation in the United States (to allow students to see that Michigan has a very dense population of the zebra mussel)

Zebra Mussel coloring sheet

vocabulary terms

teacher-generated timeline

writing and construction materials

teacher-made exit tickets.

Learning Objectives:

By the end of the lesson the students should be able to:

a) Distinguish what an invasive species is,

b) Interpret the effects of zebra mussels in our ecosystem,

c) Communicate findings to an audience by: i) creating a slogan discouraging the growth of zebra mussels, ii) drawing three ways that zebra mussels can be transported; iii) write one way to prevent each, or (differentiated instruction) assemble a timeline explaining the brief history of zebra mussels in the United States.

Performance Expectations Addressed (<http://ngss.nsta.org/Professional-Learning.aspx>)

WHST.6-8.2-write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes (MS-LS1-5)

SL.8.5-integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest (MS-LS3-1),(MS-LS3)

RI.5.7 - Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-LS2-1), (5-PS3-1)

MS-LS2-1- Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Materials & Quantities Needed: (~25 students)

Computer/projector

construction paper/fabric scraps

writing materials

teacher-generated invasive species zebra mussels worksheet to go with the video: The Spread and Impact of Zebra Mussels <https://youtu.be/PhPvAblvpXs>

Map of zebra mussels infestation in the United States,

Teacher generated copies of timeline,

Vocabulary terms, coloring sheet, exit tickets

Guiding Question(s): Are Zebra Mussels an invasive species? If so, how does this invasive species impact humans and the aquatic's ecosystem (negatives and positives)? What can we do to assist in getting the message out about the zebra mussel?

5E Model

ENGAGE:

Teacher will engage students by having a big picture of a zebra mussel on the overhead projector and ask the students, "Raise your hand if you know what this is, or its name?"

Teacher will pick a handful of students for their answer (answers will vary; Answer: Zebra Mussel). **Teacher will** praise students for answers and give the correct answer if it was not given.

Teacher will then asks, "Where do you think the zebra mussel lives?" (answers will vary; most will say water). If noone says correct answer (praise those that tried) and, if need be,

Teacher then asks, "What body of water do you think the zebra mussel lives in, do you think we can find zebra mussels in our swimming pools?" (answers may vary but, someone should guess the right answer; Answer: lakes/rivers/freshwater).

Teacher asks, "Do you think zebra mussels live in Michigan?" (answers vary/thumbs up yes/thumbs down no; Answer: Yes)

Teacher asks, "Do you think zebra mussels live in Detroit?" (answers very/thumbs up yes/thumbs down no; Answer: Yes)

Teacher responds, "Those of you that said yes, you are correct, Zebra Mussels do live in Detroit. I can say that I went to a professional development at Belle Isle over the summer and scraped zebra mussels right out of the Detroit River!"

Teacher asks, "Do you think zebra mussels are good for the water's ecosystem?"

Teacher will take 2 opposing responses; have student who says no, explain why they think no and the student that says yes, explain why they think yes.

Teacher responds, "Unfortunately the answer is yes and no, but more no than yes." "Let me explain..."

teacher will then introduce the term **invasive species** and that the **zebra mussel** is considered to be an invasive species. **Teacher then** directs students to turn to vocabulary sheet and tell them that there is some vocabulary they need to be introduced to for the video lesson.

Teacher begins to read vocabulary terms as s/he gets video clip ready to play.

Teacher will then put on the 15m video, The Spread and Impact of Zebra Mussels.

Teacher tells students to hold questions until the end of the video, the video may answer some of your questions (**duration: 20-25**)

Expected prior knowledge:

Students should have a novice foundation of what an ecosystem is. **Ecosystem**: a biological community of interacting organisms and their physical environment.

EXPLORE:

Teacher will use small group work, video, presentation, illustrations, comprehensive worksheets, student generated questions, maps, community stewardship,

Supporting students during exploration:

Please see attached Zebra Mussel Comprehension Worksheet. This will be directly guided by teacher while students watch video. **Teacher will** quietly "work the room" to make sure students stay on task and answer the questions that are in the video. The questions are in order of the video.

EXPLAIN:

Students will have the opportunity to create a slogan, pictorial illustrations on promoting knowledge about the zebra mussels and how to minimize their spread, or brief historical timeline of the zebra mussels in United States.

ELABORATE:

Teacher will pick 2 students from each group to speak in front of the classroom about how to prevent the spreading of zebra mussels, the slogan or illustration that they created, and/or the timeline they created (~1min each). Although all students may not get to report out in the same day, to further facilitate sharing, students' works will be posted in or outside of the classroom. To further elaborate, students will have an Exit Ticket: please see attached supported materials for exit tickets

Supporting students during elaboration:

Supported Inquiries will vary and be based on student statement and responses during elaboration. This will also be used as an opportunity for the students' peers and teacher to ask questions that allows for the students to elaborate on their findings.

EVALUATE:

In addition to the teacher guided worksheet and video, students will be divided into 3 groups of 6. Within each group the student will have a partner and will work on the objective according to what group they are in.

The three groups consist of:

Gr1: History- (differentiated instruction) timeline of zebra mussels in the US; students cut out and paste the timeline in order (Info taken from video). (teacher/aide guided)

Gr:2 Prevention/Cure- draw three ways that zebra mussels can be transported and write one way to prevent/slow down each.

Gr3: The Message- create a slogan discouraging the population growth of zebra mussels in Michigan.

Exit Tickets- before students leave, they have to answer and turn in exit ticket on their way out the door. Teacher will stand at door and collect to ensure compliance.

Supporting students during evaluation:

1. "Are Zebra Mussels an invasive species, why?"
2. "Do Zebra Mussels have a mostly positive or negative effect on the aquatic's ecosystem, how?"
3. "How do Zebra Mussels negatively effect humans?"

New Vocabulary

ecosystem- community of interacting organisms and their environment

invasive species- non-native species, that when introduced into the ecosystem, may cause environmental harm and/or harm to humans

ballast water- water carried in ships to improve stability and balance in the water

natural dispersal- when mussel larvae are carried by water currents or when adult mussels detach and move,

assisted dispersal- when people transport the mussel larvae and adults from one body of water to another

primary settlement- when the mussels attaches to hard objects

secondary settlement- detaches from hard object and then reattaches to a new hard object,

zebra mussel- a small, striped freshwater mussel

Safety Considerations:

students will be responsible for adhering to the student code of conduct for safety.

Sources

Illinois-Indiana Sea Grant. 7/26/13. "The Spread and Impact of Zebra Mussels ."

<https://youtu.be/PhPvAblvpXs> 12/15/17

US Department of Agriculture. 5/24/16. "What is an Invasive Species." invasivespeciesinfo.gov

Proceedings of The Fourth International Zebra Mussel Conference, Madison, Wisconsin, March 1994

The Introduction and Spread of the Zebra Mussel in North America. Charles R. O'Neill, Jr., New York Sea Grant and Alan Dextrase, Ontario Ministry of Natural Resources.

Keith Waag. Spring 2014. "The Distribution, Density, and Hot Spot Analysis of Zebra Mussels (*Dreissena polymorpha*) in the US."

<https://sites.google.com/site/kwaaggis1/home/the-distribution-density-and-hot-spot-analysis-of-zebra-mussels-dreissena-polymorpha-in-the-us>

Supporting Materials: see attached

Name _____
Date _____ Period _____

Zebra Mussel Timeline: A Brief History

Directions: cut, match, and paste the date with the correct event.

A freight dumped it's ballast water in Lake St. Clair	First mussel discovered in Lake St. Clair	Zebra Mussel Crossed Into New York State through the Erie Canal	Zebra Mu fested m waters, es The Great
1993	1991	1986	198

Name _____
Date _____ Period _____

The Spread and Impact of Zebra Mussels: A Comprehensive Look

Directions: Please answer the following questions as you watch this video. This worksheet is worth 100 pts and is due by the end of the period.

Multiple Choice: please choose 1 answer (10 pts)

1. The Zebra Mussel invasion of North America most likely began around 1986 when:

- a freight dumped its ballast water into Lake St Clair
- a Zebra carried them on its back
- someone caught some while fishing and took them home as pets

2. Adult Zebra Mussels were first discovered in Lake St Clair in the summer of:

- a. 1998
- b. 1978
- c. 1988

Vocabulary: draw a line to match the vocabulary term with the correct definition (10pts)

3. Natural Dispersal _____ when mussel larvae are carried by water currents or when adult mussels detach and move
4. Assisted Dispersal _____ when PEOPLE transport the mussel larvae and adults from one body of water to another
5. Primary Settlement _____ DETACHES from hard object and then reattaches to a new hard object
6. Secondary Settlement _____ when the mussels ATTACHES to hard objects

Making Connections: after reading the question circle ALL possible causes:

7. How are Zebra Mussels Spread? (circle all that apply) (10pts)

- sneezing aquatic weeds transferring water from one body to another
wet feet bait buckets attaching themselves to hard movable objects

8. How are Zebra Mussels dangerous to humans? (circle all that apply) (10pts)

- toxic decaying flesh in water re-releases unused bacteria into water
they know karate getting cut on sharp broken shells
can beat us in arm wrestling clog waterlines/pipes

wildlife consumption and then humans eat the wildlife

True or False? Read each statement. Write T if statement is true, or write F if statement is false (5pts)

9. It is expensive to monitor and maintain Zebra Mussels. _____

10. Zebra Mussels help the ecosystem by eating most of the phytoplankton. _____

11. Zebra Mussels can be effectively maintained in their environment. _____

12. Zebra Mussels can attach to other clams. _____

Bonus: (3pts)

What body part do adult mussels use to assist them in traveling? _____

Exit Tickets

True or False An invasive species is a non-native species, that when introduced into the ecosystem, may cause environmental harm and/or harm to humans.	True or False An invasive species is a non-native species, that when introduced into the ecosystem, may cause environmental harm and/or harm to humans.	True or False An invasive species is a non-native species, that when introduced into the ecosystem, may cause environmental harm and/or harm to humans.
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please put name, date, and period on back of ticket

Vocabulary Terms

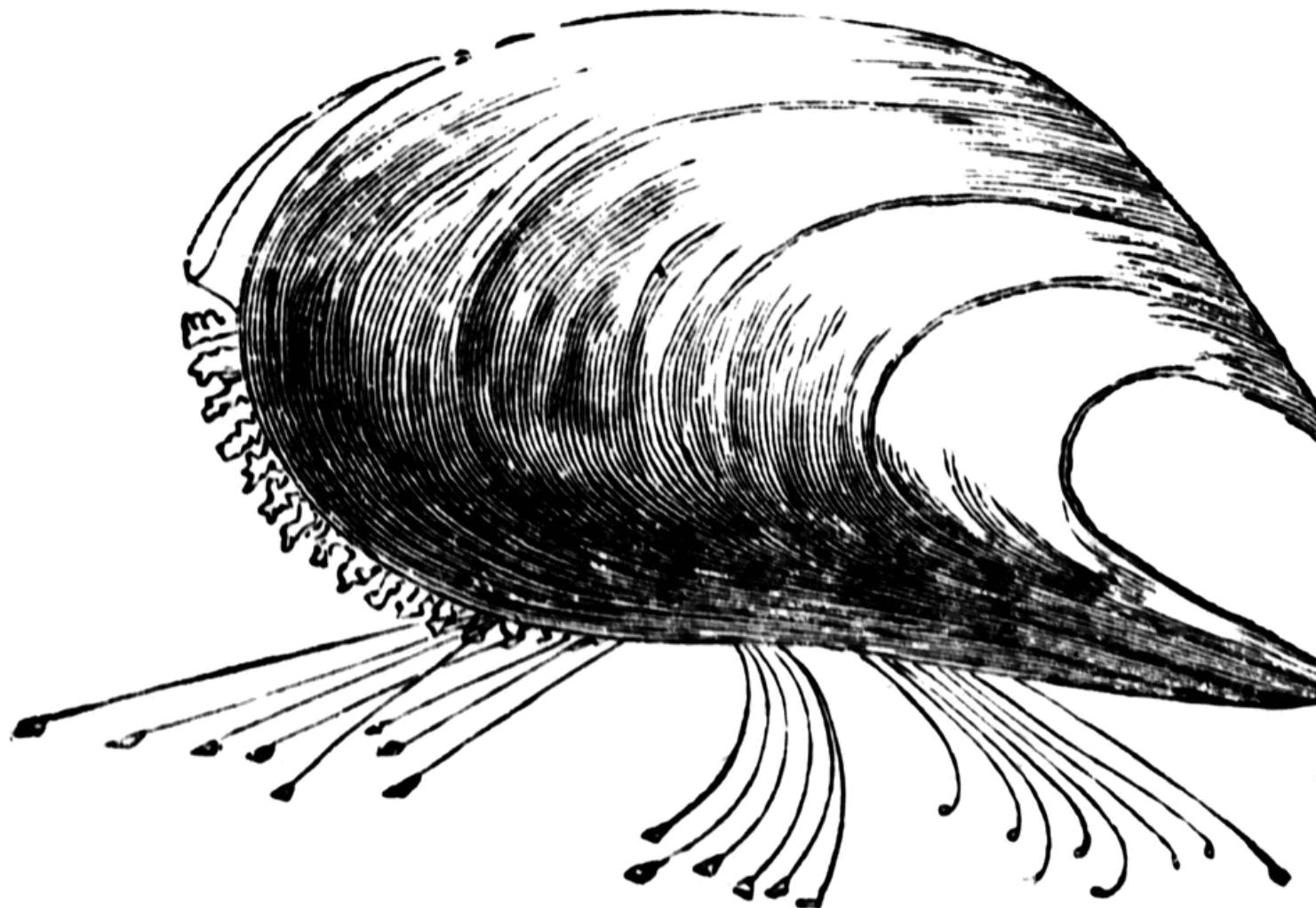
ecosystem- community of interacting organisms and their environment

invasive species- non-native species, that when introduced into the ecosystem, may cause environmental harm and/or harm to humans

ballast water- water carried in ships to improve stability and balance in the water

natural dispersal- when mussel larvae are carried by water currents or when adult mussels detach and move

assisted dispersal- when people transport the mussel larvae and adults from one body of water to another



primary settlement- when the mussels attaches to hard objects

secondary settlement- detaches from hard object and then reattaches to a new hard object

zebra mussel- small freshwater mussel

Zebra Mussel Coloring Sheet



Use the picture to engage students

Name _____
Date _____ Period _____

Zebra Mussel Timeline: A Brief History

Directions: cut, match, and paste the date with the correct event.

A freight dumped it's ballast water in Lake St. Clair	First mussel discovered in Lake St. Clair	Zebra Mussel Crossed Into New York State through the Erie Canal	Zebra Mu fested m waters, es The Great
1986	1988	1991	199
1993	1991	1986	198

Name KEY
Date _____ Period _____

The Spread and Impact of Zebra Mussels

Directions: Please answer the following questions as you watch this video.
This worksheet is due by the end of the period.

Multiple Choice: please choose 1 answer

1. The Zebra Mussel invasion of North America most likely began around 1986 when: (@ 1:27)
 - a. a freighter dumped its ballast water into Lake St Clair
 - b. a Zebra carried them on its back
 - c. someone caught some while fishing and took them home as pets

2. Adult Zebra Mussels were first discovered in Lake St Clair in the summer of: (@ 1:44)
 - a. 1998
 - b. 1978
 - c. **1988**

Vocabulary: draw a line to match the vocabulary term with the correct definition

3. Natural Dispersal ND when mussel larvae are carried by water currents or when adult mussels detach and move (@2:00)

4. Assisted Dispersal AD when PEOPLE transport the mussel larvae and adults from one body of water to another (@ 2:08)

5. Primary Settlement SS DETACHES from hard object and then reattaches to a new hard object (@ 3:40)

6. Secondary Settlement PS when the mussels ATTACHES to hard objects (@3:30)

Making Connections: after reading the question circle ALL possible causes:

7. How are Zebra Mussels Spread? (@4:36)

sneezing
aquatic weeds

transferring water from one body to another
wet feet
attaching themselves to hard movable objects
bait buckets

8. How are Zebra Mussels dangerous to humans? (@6:06& @12:30)

toxic decaying flesh in water
re-releases unused bacteria into water
they know karate
getting cut on sharp broken shells
can beat us in arm wrestling
wildlife consumption and then humans eat the wildlife

True or False?: read each statement, write T if statement is true, or write F if statement is false

9. It is expensive to monitor and maintain Zebra Mussels. (@7:50) **T**

10. Zebra Mussels help the ecosystem by eating most of the phytoplankton. (@ 9:13) **F**

11. Zebra Mussels can be effectively maintain in their environment. (@ 8:40) **F**

12. Zebra Mussels can attach to other clams.(@11:15) **T**

Bonus:

What body part do adult mussels use to assist them in traveling? (@ 3:55) **Foot**

Exit Ticket

Answer: **true**