

Coordinated by Wayne State University, Michigan Technological University & Belle Isle Conservancy with funding from the MI Departments of Natural Resources, Environmental Quality, & Agricultural and Rural Development

Preventing the Spread of Invasive Species in Michigan

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Lesson Overview

This lesson is intended to be taught at the beginning of the school year. Many of the vocabulary words will be used across science topics. It is also a learning activity that can easily be used again for introducing topics. Introduce vocabulary words one at a time and post vocabulary posters with words, definition and sentences.

Target Grade/Subject: Grades 1-5, Science vocabulary

Time: 50-60 min.

Learning Objectives

At the end of this lesson, students will be able to:

- correctly use the vocabulary words as they engage in the eight practices of science and engineering.

Michigan Science Standard Addressed

3-LS4-3 Biological Evolution: Unity and Diversity

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

4-LS1-1 From Molecules to Organisms: Structures and Processes

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

List Materials & Quantities Needed

- 8.5 x 11 plain paper one per student
- markers
- magnets or tape to post the posters
- sticky notes (optional)
- computer and projector (optional)

Advanced Preparation

- 7 small posters (12x14) one for each vocabulary word (See lesson for poster content.)
- two posters(12x14) One for ‘types of hints’ & one with ‘game rules’ or print handouts of each (See lesson)
- cards with vocab words (one set of 7 for each group of six students)

New Vocabulary

Native

invasive

model

patterns

phenomena

variables

non-native

ballast water

Focus Question(s)

Introduction

Did you know we have space invaders right here in Michigan? However, they are not from outer space. But they are stealing space from plants and animals that live in Michigan. These invaders or invasive species are taking over causing some Michigan plants and animals to nearly die out. We are going to learn some new terms to help us understand this problem and what we can do about it.

Classroom Activities

Teacher may want students to sit in a circle.

Introduce words one at a time and post vocabulary posters with words, definition and sentences. Reveal one poster at a time.

Process for introducing each term:

1. Teacher defines each word (see below)
2. Teacher uses each word in a sentence (also provided below)
3. Ask students for examples. Instead of raising hands to respond, students stand. Teacher calls on three students who remain standing. The others sit down. Teacher addresses any misconceptions and may ask for more examples. Responses could be listed on the poster or added using sticky notes. Posters will remain up and used as a reference. While the teacher records responses students can turn to a neighbor and teach each other the meaning of the word.

Native species

Define: A species that occurs in an area naturally; it has lived in an area for thousands of years.

Use the word in a sentence: The white river crayfish is a native species to Michigan; it occurs here naturally.

Ask students for examples.

Non-native

Define: Species that has not naturally occurred in a habitat that has been introduced to an area by humans.

Video definition show first two minutes of clip: <https://www.youtube.com/watch?v=J-ftiWffNTc>

Use the word in a sentence: Humans introduce non-native animals, such as goats, because they will be helpful to us.

Ask students for examples.

Invasive species

Define: "A plant or animal that is non-native (or alien) to an ecosystem, and whose introduction is likely to cause economic, human health, or environmental damage in that ecosystem. Once established, it is extremely difficult to control their spread."

<http://detroitaquarium.weebly.com/invasive-species.html>

video for upper ele (6:15 min.): <https://www.youtube.com/watch?v=yIgysZ5Hho8>

video for lower ele (6:37 min.): <https://www.youtube.com/watch?v=UyvPxU6LUu0>

Use the word in a sentence: The sea lamprey is an invasive species that attaches to fish leaving round scars if they detach before killing the fish.

Ask students for examples: What can other invasive species do?

Ballast water

“Silent Invaders” Ballast Water 2013

<https://www.youtube.com/watch?v=KYIJdhw8NcA> 2:54 min video about ballast water & Great Lakes

Define: “Ballast water is taken onto or discharged from a ship as it loads or unloads its cargo, to accommodate changes in its weight.”

Use the word in a sentence: The ship empties its ballast water when it takes on cargo.

Ask students for examples: What kinds of invasive or non-native species are transported in ballast water?

Phenomenon

Define: Observable events that we, as scientists, try to explain or make sense of.

Use in a sentence: A phenomenon I want to investigate is people releasing pets, such as gold fish, into the Great Lakes. <https://www.michigan.gov/invasives/0,5664,7-324-67973-410611--00.html>

Ask students for examples: What is a phenomenon you would like to investigate?

Models

Define: lists and simple sketches, or three-dimensional representation, generally in miniature, to show the construction or appearance of something. (dictionary.com)

Use in a sentence: Making a model of a trout fish with a sea lamprey attached for my science project helped me explain how invasive species can harm Great Lakes fish.

Ask students for examples: What types of models have you created? How did they help you better understand a concept?

Patterns

Define: regularly occurring shapes or structures and in repeating events and relationships

Use in a sentence: The stripes on the side of a zebra or the stripes on the side of a zebra mussel are patterns that help us recognize that they are different from our native species.

Ask students for examples: Describe a pattern you have observed.

Variable

Define: ‘Scientists design an experiment so that they can observe or measure if changes to one thing cause something else to “change” in a repeatable way. The things that are changing in an experiment are called variables.’ (sciencebuddies.org)

Use in a sentence: The things that are changing in an experiment are called variables. I want to find out if zebra mussels can filter algae out of water. The variables are the number of mussels added to the water and how many algae are in the water, measured by how green the water is.

Ask students for examples: What else can we change in the experiment? (use different numbers of mussels; use different types of algae; do the experiment at a different temperature; and so on).

Introduce game:

Somewhat similar to [Headbands](#), group of six or fewer sit in a circle.

1. One student holds vocabulary cards, showing one card without looking at it.
2. Others take a turn describing / defining the word for holder to guess. This is a reciprocal teaching technique. The card holder does not ask the questions, but listens to the hints. This will involve each child in the process instead of just answering yes or no questions. The goal is for each child in circle gives a different hint.
3. Holder only guesses after each child has given a hint. (even if s/he knows the answer after one or two hints)
4. If the holder doesn't guess correctly s/he can look. Put the card on the bottom of the pile and pass to the next person.
5. The person to the holder's left becomes the new holder.
6. Play continues until the teacher calls time.

Rules:

No letter or rhyming hints.

Everyone gives a hint before the holder takes a guess.

Avoid passing.

Holder guesses after everyone has given a hint. S/he gets to look after guessing.

Types of Hints:

Fill in the blank

What the word does

Definition

Non Example

Teacher can model different types of hints. Types of hints could also be posted for reference.

An example using the term *zebra mussel*:

Fill in the blank: The _____ clogs water treatment and power plant pipes.

What the word does: This species has become invasive in the Great Lakes, it attaches to native species, 'reducing their ability to move, feed, and breed, eventually killing them.'

(http://greatlakesmapping.org/great_lake_stressors/2/zebra-and-quagga-mussels)

An example using the term *variable*:

Definition: The things that are changing in an experiment.

Non Example: Something that is kept the same throughout an experiment.

Other clues that could work are drawing a quick picture, acting out the word, giving a synonym or antonym

Students play game and teacher monitors groups. Listen for any misconceptions.

Conclusion: Whole group. Ask students for hints they heard or used during game that were new and helpful. Add new examples to poster. Address misconceptions.

For online games about invasive species:

<http://detroitaquarium.weebly.com/kids-corner.html#invadergames>

Assessment of Student Learning

Using a 8.5 x 11 sheet folded in quarters students write one word in each quarter square. They are to use the word in a meaningful sentence and draw a picture for each. This is a good way to check for understanding.

Fold a piece of white copy paper into quarters. In each square, write one of the science terms. Write a meaningful sentence using each word and draw a picture. The science terms must be spelled correctly. Each sentence needs to show that you understand what the word means. You may not copy the poster sentences.

Sources Consulted

Belle Isle Aquarium <http://detroitaquarium.weebly.com/invasive-species.html>

GLEAM: Great Lakes Environmental Assessment and Mapping Project.

http://greatlakesmapping.org/great_lake_stressors/2/zebra-and-quagga-mussels

National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Next Generation Science Standards <https://www.nextgenscience.org/>

Science Buddies www.sciencebuddies.org

Smithsonian Marine Station. <https://www.sms.si.edu/irlspec/Nonnatives.htm>

Native Species

species that occurs in an area naturally; it has lived in an area for thousands of years.



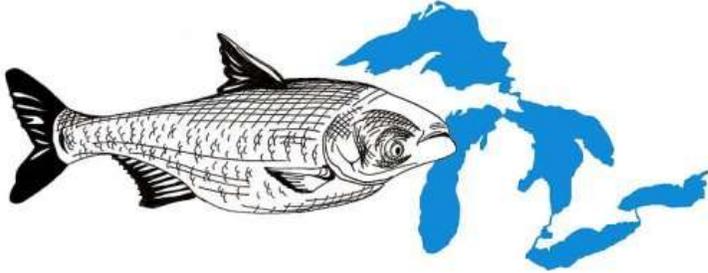
Non Native Species

Species that has not naturally occurred in a habitat that has been introduced to an area by humans.



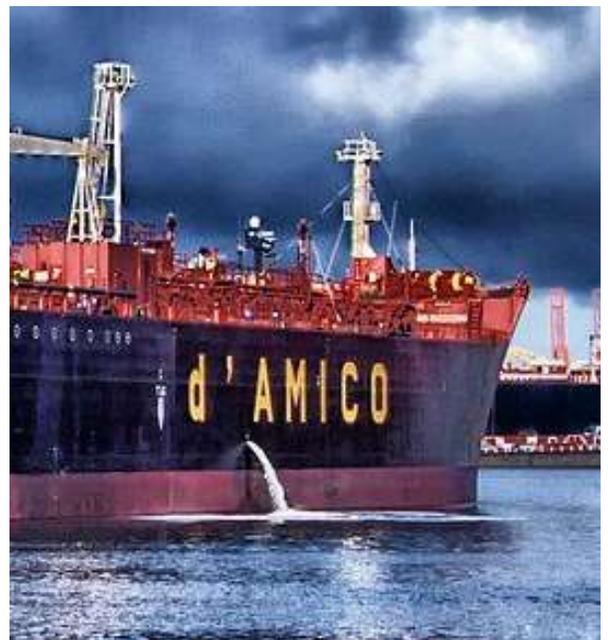
Invasive Species

“A plant or animal that is non-native (or alien) to an ecosystem, & whose introduction is likely to cause economic, human health, or environmental damage in that ecosystem. Once established, it is extremely difficult to control their spread.”<http://detroitaquarium.weebly.com/invasive-species.html>



Ballast water

Water taken onto or discharged from a ship as it loads or unloads its cargo, to accommodate changes in its weight.”



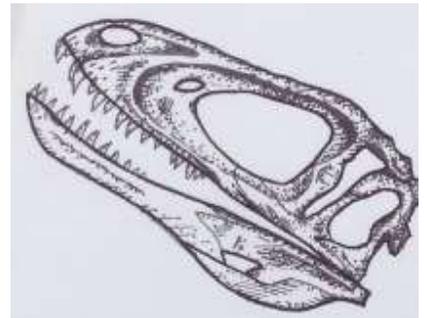
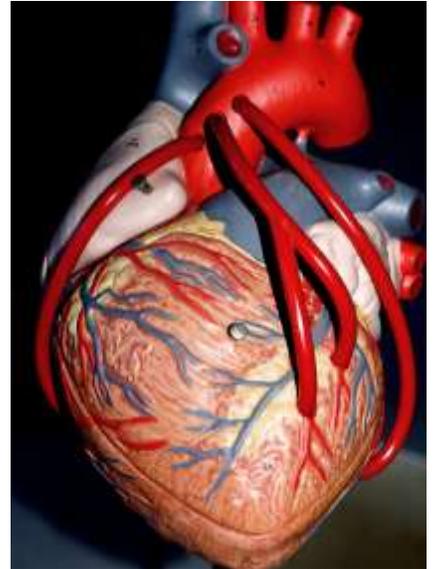
Phenomenon

observable events that we, as scientists, try to explain or make sense of.



Models

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Patterns

regularly occurring shapes or structures & in repeating events & relationships



Variables

things that are changing in an experiment are called variables.' (sciencebuddies.org)



Rules:

- No letter or rhyming hints.
- Everyone gives a hint before the holder takes a guess.
- Avoid passing.
- Holder guesses after everyone has given a hint. (S/he gets to look after guessing.)

Types of Hints:

1. Fill in the blank
2. What the word does
3. Definition
4. Non Example