

Science Tech Trek: Great Lakes Invaders

Teacher Post Trip Guide



Post Trip Overview

After completing their Science Tech Trek, students will have the opportunity to reinforce and extend their understanding of how invasive species impact the flow of energy in a system with post-field trip learning activities in the classroom. Teachers will guide their learners through a review of the flow of energy in a Great Lakes system. Then, learners will get further explore invasive species and discuss how invasive mussels impact native species.

Supported Amplify Science Lessons

5th Grade Amplify Unit: Ecosystem Restoration

Lessons:

- 1.7 Modeling Food Webs
- 2.5 Energy in Ecosystems

Supported NGSS Standards

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.

Science and Engineering Processes	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models <ul style="list-style-type: none"> • Develop a model to describe phenomena. (5-LS2-1) 	PS3.D: Energy in Chemical Processes and Everyday Life <ul style="list-style-type: none"> • The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) 	Systems and System Models <ul style="list-style-type: none"> • A system can be described in terms of its components and their interactions. (5-LS2-1) Energy and Matter <ul style="list-style-type: none"> • Energy can be transferred in various ways and between objects. (5-PS3-1)

Supported Common Core Standards

CCSS.ELA-LITERACY.RI.5.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS.ELA-LITERACY.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.

STT Central Phenomenon Questions	Science Tech Trek Learning Objectives
How do invasive mussels/invasive species impact the Lake Michigan ecosystem?	Students will be able to... <ul style="list-style-type: none"> • Explain the flow of energy and matter in the Great Lakes • Use investigative tools/techniques to explore questions about the living world • Use data analysis and modeling techniques to understand ecological problems.

- Observe animals, investigate scientific questions, and use tablets to document their explorations

Post-Trip Guide

Logistics

Facilitated by classroom teacher at school

Time: 20-30 minutes

Learning Objectives

Students will be able to...

- Explain the flow of energy and matter in the Great Lakes
- Analyze data from a model of a Great Lakes ecosystem
- Predict how invasive species impact populations of native species

Materials

- Printed Science Tech Trek summaries (examples on last page)
- Pencils
- Whiteboard/chalkboard and markers/chalk, or large paper and markers

Prep

- Print two copies of each Science Tech Trek summaries (one for each partner)

Facilitation Outline

Quick Outline

1. Reviewing learning objectives and flow of energy
2. Considering invasive species and their impact
3. Assessing Learning

1. Reviewing Learning Objectives and Flow of Energy

8-10 minutes

- Review the learning objectives for students' investigation of energy flow in the Great Lakes.
- Remind students of what they did during their Science Tech Trek:
 - Learned about native species of fish in the Great Lakes
 - Explored the flow of energy from the sun to plankton to fish in the Great Lakes
 - Examined how invasive mussels impact populations of native fish in the lakes
- Review the flow of energy in the system that students studied, writing it on a board or in a place within students' view:

Flow of Energy:

Sun → Phytoplankton → Zooplankton → Yellow Perch → Walleye

Guiding Questions:

- Where do phytoplankton get their energy? (*from the sun, phytoplankton use photosynthesis to convert sunlight into energy*)
- What do zooplankton eat to get their energy? (*zooplankton eat phytoplankton*)
- What do yellow perch and walleye eat to get their energy? (*yellow perch eat zooplankton, and walleye eat the yellow perch*)
- Can a change in one level of the flow, affect the other levels? How does it affect them? (*yes, a change in one level could affect the other levels because they eat them for food*)
- Explain that a decrease in energy, or food, causes a decrease in the number of individuals of a species.

2. Considering Invasive Species and Their Impact

8-10 minutes

- Review what invasive species are:
 - Guiding Questions:
 - What is an invasive species? (*a species that is not native to an ecosystem and can often be harmful to the native species of that ecosystem*)
 - What is the invasive species that you focused on in the Great Lakes? (*invasive mussels*)
- Make sure students have their Science Tech Trek summaries and a writing utensil.
- Have students work with a partner to analyze their data from the “Planko” model they observed during their Science Tech Trek, and answer questions 1 and 2 on the front page of their summaries. Then, have a few students share their answers with the whole group.
- Discuss questions 3 and 4 on the back page of students’ summaries as a whole class.
 - Guiding Questions:
 - What do yellow perch eat? (*zooplankton*)
 - What do invasive mussels eat? (*phytoplankton and zooplankton*)
 - If the yellow perch have less zooplankton to eat, will their numbers increase or decrease? Why? (*the number of yellow perch will decrease, because they will have less to eat*)
 - Summarize how the invasive mussels are negatively impacting the native species in the Great Lakes ecosystem.
- Have students think of and record a question relating to invasive species. Then, have students share out their questions and guide students in conducting a brief search online to see if they can find answers to some of their questions.

3. Assessing Learning

4-10 minutes

- Have students complete the True or False section of their summary.
- Review answers with the whole group.
- Share photos of your students’ post-trip learning with #SheddLearning via Twitter, Instagram, or Facebook! Or email the photo with your school name to learning@sheddaquarium.org and for Shedd to tweet from @SheddLearning.



Student A.

Number of Invasive Mussels	Number of Phytoplankton
0 groups	1
1 groups	2
2 groups	0
3 groups	1

Number of Invasive Mussels	Number of Zooplankton
0 groups	2
1 groups	1
2 groups	2
3 groups	3

1) What happened to the number of phytoplankton as more invasive mussels were added?

2) What happened to the number of zooplankton as more mussels were introduced?

3) Why do you think the population numbers changed as more invasive mussels were added?

4) Walleye eat yellow perch and young yellow perch eat zooplankton. Predict what could happen to the number of walleye as invasive mussels increases.

5) After analyzing the data, think of a question you have related to invasive species. Write it below.

True or False? Explain your choice.

1) The clearest water is the healthiest lake water. T or F

Explain your answer: _____

2) There are microscopic plants and animals in the water that feed the fish in Lake Michigan. T or F

Explain your answer: _____

3) All energy for life comes from the sun. T or F

Explain your answer: _____
