

Great Lakes Ecology



Mike Mansour
John Page Middle School
The Lamphere Schools
Madison Heights, MI

Target Grade and Subject: Gr. 8 - General Science

Unit Overview

Each year during the first semester we review all benchmarks that were taught from the 5th thru the end of the 7th grade in science. In addition, we are responsible for two new benchmarks covering light and energy. Sometimes this appears to be an overwhelming challenge. Students have not had formal instruction on ecosystems nor weather since the fifth grade. Much of my instruction is in response to the previous year's MEAP results. If my students didn't do well in plant parts for example, I normally focus more attention on that target during my first semester's review. This year's previous results indicated that all of their ecosystems benchmarks were low. Therefore, doing a special unit on the Great Lakes makes sense. My experience on Lake Superior and your expectation to submit a week-long unit were significant in writing this unit.

I have six sections of science this coming year or 152 students. This unit will take at least two weeks. But as with other new units, I anticipate many alterations as the week progresses.

Duration Two weeks or ten class periods

Materials

Five Science cardboard display boards prepared with graphic displays on each board
www.unitedstreaming.com video clips and water lesson plans
Ecology: Organism in Their Environment, and Water Smart
Scrap wood and cardboard tubes to make models of lighthouses
Newspaper articles on Invasive Species, Lighthouses, Loons, The Great Lakes, and the Clinton River and Metropolitan Beach on Lake St. Clair's pollution
Textbook assigned readings
Computer stations (5) with web access
Zebra Mussels and Purple Loose Strife
Maps of the Great Lakes
Maps of the Clinton River Watershed
MiClimb Science Strands and Benchmarks

Introduction of Station and Procedures

My students have used teaching stations once before. This format will be introduced doing Whirlwind Tour of a Science Lab during the second week of the school year. I will need to model their interaction and directions as to how the group is to do each station. Directions will be posted on each station's display board.

Teaching Stations

My plan this coming fall is to integrate several benchmarks into my unit on the Great Lake Ecology. The introduction to my unit will be a series of five teaching stations:

Mapping the Great Lakes
The Loon
Rivers and Streams
Invasive Species
Lighthouses

Students will work in groups of 4 or 5 moving from station to station with the intent to complete two stations a day. These will be timed activities of approximately 20 minutes each. During the following week we will process each station and its content with a "jigsaw" sharing as well as furthering our research with computer based follow-up work. We may have to return to some of the stations to finish up.

Books/Sources Consulted

Objectives

At the end of this unit students will be able to:

1. Identify the Great Lakes,
2. Describe the habitat and life of a loon,
3. Point to and explain one of the major river systems that enters the Great Lakes with a focus on the Clinton River and the food webs that depend on these fresh water systems,
4. Describe Purple Loosestrife and Zebra Mussels and the inherent problems they are causing,
5. Explain the history and purpose of lighthouses and how their light transmission works.

All of these topics will be from a perspective of how humans interact with this environment.

Materials for Each Station

Great Lakes Mapping

The Great Lakes North America's Greatest Inland Waterway poster
Michigan the Great Lakes State
The Watershed Where You Live poster
"The Edmund Fitzgerald-- The Song of the Bell" by Kathy-Jo Wargin

Rivers and Streams

USGS Poster and Lessons
Hazardous Waste: Cleanup and Prevention * poster series
Clinton River Watershed map poster set
Map of the Great Lakes
Wetlands by National Audubon Society
Studying Streams Ryerson Science In Action 1975
A River Ran Wild Lynne Cherry
A Drop of Water Walter Wick
NatureScope "Wading Into Wetlands" NWF 1986

Loons

"Just Loons" a wildlife watchers' guide by Alan Hutchinson
Loons Audio CD
"The Patience of Loons" Boston Globe article by D. Jackson 7/2/04
www.msue.msu.edu/iosco/huronbirds.html

Lighthouses

"Whitefish Point Light Station" Great Lakes Shipwreck Historical Society
Great Lakes Lighthouses by Darryl R. Beers
Lighthouses of the Great Lakes by Rebecca Brehm a poster
Map Showing the Lighthouses of the Great Lakes Avery Color Studios
Great Lakes Lighthouses American and Canadian by W. Oleszewski
A Traveler's Guide to 116 Michigan Lighthouses by Penrose
"Ghostly Lights Return" by Annick Hivert-Carthew 16 short stories

Invasive Species

Laminated Purple Real Loose Strife plants with flowers
Purple Loose Strife Activity Seven from Michigan Sea Grant
Great Lakes Invader: The Sea Lamprey Battle Continues VCR
Invasive Aquatic Plants SeaGrant K. TePas and P. Charlebois
Aquatic Invasive Species Awareness Week Tools for Teachers

Michigan Stands and Benchmarks

Science

Strand III

Use Scientific Knowledge from the Life Sciences in Real-World Contexts

Science/[Strand III](#)

Content Standard 5

All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact. (Ecosystems)

Science/[Strand III](#)/[Content Standard 5](#)

Middle School

Science/[Strand III](#)/[Content Standard 5](#)/[Middle School](#)

Benchmark 1

Describe common patterns of relationships among populations.

Benchmark Clarification

Every organism in an ecosystem is directly or indirectly linked with other organisms in the ecosystem.

Types of interrelationships may include:

- Parasitism, where one organism benefits and one is harmed
- Mutually beneficial relationships, where both organisms benefit (mutualism)
- Competition, within a species or between different species for food, shelter, etc.
- Predator and prey, where one organism (prey) is consumed by another organism (predator)

Students will:

- Investigate producers, consumers, and decomposers
- Explore the relationships existing organisms within an ecosystem.
- Evaluate examples of relationships to determine the types of interrelationships that exist

[Key Concept](#) / [Real World Context](#) / [Instructional Example](#) / [Assessment Example](#) / [Resources](#)

Science/[Strand III](#)/[Content Standard 5](#)/[Middle School](#)/[Benchmark 1](#)

Key Concept

Participants and relationships:

- predator
- prey
- parasite
- competition
- mutually beneficial

Specific MEAP vocabulary will be reviewed at each station related to the benchmarks. Each term will be expected to be copied by the group for continued review and students will be expected to be able to use the word in their final assessment the following week.

Engaging Students - Introduction

As students enter the room, each lab table will have tall clear pictures of ice cold drinking water with lots of ice in the center with clear plastic cups. I will invite everyone to take a drink. Pause to refresh myself as well with this glass of water. Begin by asking how many enjoy having a cold glass of water on a hot day. I will continue this discussion with questions surrounding the source of our Detroit Municipal water system and where they think this water came from. Do they believe it is safe to drink? How did it get to us? After this brief encounter with drinking water, I will introduce the complete unit on the Ecology of the Great Lakes by asking them to jot down answers to a few questions regarding the

five stations they will be exploring using: Loons, The Great Lakes, Invasive Species, and Lighthouses. These will be partially factual and partially open ended thought questions and responses; for example: name the five Great Lakes or what do they know about Zebra Mussels?

Homework Assignments:

Tuesday Parent Share and Water Use

The following is an abbreviated form of the homework assignment I will be giving:

Take your notes home that you have done with today's Great Lakes Ecology stations. Share these notes with your parents. Ask your parents the following three questions about the Great Lakes and record their answers:

Why are the Great Lakes important to America and to Michigan?

Name and describe a time you were on one of the lakes.

Describe how our drinking water and sewage systems work.

In addition, find the water meter in your home and write down the numbers on its face. We will check these numbers in two weeks.

This assignment is due on Thursday.

Thursday

1. Check your water meter again today. Write down the numbers.

2. Drinking Water Comparison Tests - Collect two different brands of bottled water and put them in the refrigerator until they are cold. Also have tap water in the refrigerator to cool. Have three equal glasses with the same amount of water from the two bottled waters and the tap water source. Don't let your volunteers know which water is which. Ask them to taste these three waters to see if they can tell which is the bottled water and which water they prefer. Write down your test results. Try to do this activity with at least two different volunteers. Ask them to sign the volunteer test result form.

This assignment is due on Monday.

Introduction to the Stations

Each group, 1-5, will be assigned to one of the five stations to begin their explorations. They will be expected to complete one station on the first day and two stations on each of the following days. Each station will be displayed on a science fair display board and be arranged around the perimeter of the room on the counter top. Each station will have directions, a focus question, graphics, a chart and or graph, a computer next to it that is on our web server, and various props to engender interest. While at each station students will be required to form a group answer to five key sub-questions. This response sheet will be done on NCR forms in order to make copies for each member as well as for my review. Each member will be required to finish two homework assignments responding to two of the stations. Students will be somewhat familiar with the station method of instruction. They will have recently completed a model, Whirlwind Tour of the Science Lab, done in similar week-long sections.

Station 1: Mapping the Great Lakes

Using a very large map of all the Great Lakes, students will identify the Great Lakes and the St. Lawrence Seaway as it enters the Atlantic Ocean. If possible, I intend to paint a similar map we used on the Lake Guardian of Lake Superior but this time of the whole Great Lakes basin. Students will label the following using printed large labels:

Lakes Ontario, Erie, Huron, Michigan and Superior

Lake St. Clair, the St. Lawrence River, The Atlantic Ocean,

Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Ontario, New York, and Pennsylvania

Detroit, Chicago, Cleveland, Toronto, Buffalo, Duluth, Mackinaw Island, Isle Royal, Cedar Point, Madison Heights, Milwaukee.

Directions:

1. Take a look at the information on the poster.

2. Fill in the map of the Great Lakes with the names of the lakes including Lake St. Clair, the surrounding states, and major cities including Madison Heights, MI, Cedar Point, the St. Lawrence River and the Atlantic Ocean.
3. Color the Clinton River in using the color pencils.
4. Using a Pair – Share Strategy, students will quiz one another on the names and locations of the geographic sites listed above.

Focus Questions

1. What land and water features make up the Great Lakes, why are they important, and what environmental issues are causing problems for this ecosystem?
2. Describe the relationship humans have with the Great Lakes water, plant and animal life forms.
3. What are the states, provinces, cities and states that are on the Great Lakes?
4. Where does the water in the Great Lakes come from, how is it used, and where are three places it goes?
5. Review “The Edmund Fitzgerald- The Song of the Bell” . Record a two sentence review of this famous ship sinking. If time permits, listen to Gordon Lightfoot’s recoding #6 on the CD, The Wreck of the Edmund Fitzgeralds”.

Station 2: Rivers and Streams

After a brief overview of the hundreds of streams and rivers that enter the Great Lakes and their source of water, students will focus on the Clinton River (near Detroit) using maps of its flood plain. They will locate where it begins and where it enters Lake St. Clair. They will be reading an article in the Detroit Free Press on closure of Metropolitan Beach due to pollution discharges and the human health and economic consequences. They will discuss and list three suggested improvements to help avoid continued closure of the beach. At this station students will look at images of bacteria using the electronic microscope that is attached to our computer. They will sketch and name the examples on the program. We will have examples of activities that take place on the Clinton River as well as samples of the water recently gathered near our school.

In addition, they will read the newspaper article on closure of the Metropolitan Beach due to pollution.

Directions

1. Review the Showboard poster and its resources.
2. Take the Water Smart Pre-test as a group.
3. Read the article from the Detroit Free Press on Metropolitan Beach.
4. Look at the computer microscope images of bacteria found in the Great Lakes. Sketch three examples of these bacteria.
5. Locate Madison Heights on the Clinton River Watershed.

Focus Questions

1. How does the water get into the Clinton River? Where does it come from?
2. How does pollution enter the Clinton River?
3. Where does the water from the Clinton River go?
4. How can you help the Great Lakes have clean water?
5. Where does the water in rivers come from and where does it go?
6. Where does our drinking water come from here in Madison Heights.
7. When you flush the toilet what happens to the waste?
8. What relationship does the Clinton River have with Madison Heights?

Station 3: The Patience of Loons

We will be using the story of the loon as a typical Great Lakes species that requires a specific habitat and is protected by laws from man and our cultural intrusions. At this station students will read the brief news paper account from the Boston Globe, The Patience of Loons. We will use the reading strategy, Turn and Talk, pointing out selected main ideas of their assigned paragraphs.

This article will be divided into four sets of paragraphs with specific assignments for each student in the group.

After reading their paragraphs each student will jot down the three important ideas found within their reading and then share these with their partner. Thoughtful responses will be encouraged with the directions.

Group discussion and sharing will follow. Students are then to summarize the groups main points on newsprint and post these on the classroom wall with their names on the newsprint.

In addition this group will peruse the book, Just Loons, and make five observations about the content and pictures in this book. At this station, the group will describe the special habitat needs of loons, its food sources. This group will sketch a food web with at least ten interactions of species. The group will listen to Wails, Yodels, Hoots, and Tremolos from the CD ROM loon recording using a set of common head phones. They will describe their feelings about this recording.

Follow up questions and discussion will focus on the Loons Habitat and the food web it interacts within. Special attention will be given to the vocabulary within the standards and benchmarks. The story of the loons is intended to become a symbol for all plants and animals within our Great Lakes ecosystem. Every attempt will be made to compare the loon to well know animals, White Tailed Deer, wolves, and coyotes for example.

Station 4: Lighthouses

Here students will be making models of a lighthouse using wood dolls, scrap wood, rocks, and a pretend water base on a small frame. I have gathered sufficient scrap lumber to allow all student groups to build one model for each group. At this stations two students will build the model while the rest of the group reads and becomes a "jigsaw expert on the purpose and history of lighthouses" around the Great Lakes. This sub-group will be selecting three specific lighthouse from around the lakes and will be preparing a brief report to share later with the whole class. One person in the group will do research on one ship wreck that happened on the Great Lakes. This person will share their research with their group as well. If possible, I hope to have a recording of a fog horn with lake sounds as well for this group to listen to.

At this station there are small models of Great Lakes Lighthouses and two laminated color posters with notable lighthouses found on the Great Lakes.

Directions

1. Review the materials on the Showboard display.
2. Read the brief history of lighthouses.
3. Select which two students will build the model of a lighthouse. This model is due next week on Thursday for display and explanation. You will find some of the materials near the Showboard. You may want to add an electric working battery operated light to your model.
4. Select two or more members from your group to do Internet research on three lighthouses from around the Great Lakes. Write a two paragraph report on the history of each of these light houses. Try to include a picture or graphic of the lighthouse as well. You should begin your web search today and save your sites for further work next week.
5. One person in your group will do research on one shipwreck that took place in the Great Lakes. Summarize the account of this shipwreck and be prepared to share it with the class next week.

Focus Questions

1. What is the purpose of lighthouses?
2. Why are there so many lighthouses on the Great Lakes?
3. What three significant technical changes have occurred in the history of lighthouses?
4. How are ships navigation guided today?

EXTRA CREDIT on Lighthouses:

In addition to the group work done at this station, students will have the opportunity to read a mystery fiction book on Mysteries of Great Lakes Lighthouses. This is being done with the Language Arts teacher as an interdisciplinary enrichment.

Station 5: Invasive Species

I have gathered samples of Zebra mussels and Purple Loose Strife for their examination. One half of each group will work with either the Zebra mussels or the Purple Loose Strife.

Directions

1. Review the materials displayed on the Showboard. Take notes on three main ideas your group decides are the important points being made here.
2. Look at the Purple Loosestrife plants on the table and the Zebra Mussels in the tray and in the aquarium.
3. Read the small cards from the Department of Natural Resources and list the other Invasive Species found in the Great Lakes region.
4. Log on to the Internet and go to: www.miseagrant.umich.edu/ans
5. Answer the following three questions.

Focus Questions

1. Why is it important for ecologists to study invasive plants and animals and alert the public?
2. How did these organisms get to the Great Lakes?
3. What is being done to control their growth?

OVERALL UNIT ASSESSMENT

Throughout the week I will be making rounds to each group encouraging and observing appropriate cooperative group work. At the end of each day, groups will hand in their responses to the stations they complete as well as keeping their own NCR copy of the response sheet. In addition, the two homework assignments will be evaluated. The following week we will process each station and the related benchmarks. Groups will present brief 5 minute highlights of one of the stations randomly assigned.

The groups will work together to prepare an oral presentation, sharing the highlights and important points of their station. Each member will contribute to this presentation. The group will have a poster or a powerpoint that includes a data chart with appropriate vocabulary from that station's focus.

Author's Note: This unit is a result of my summer week on Lake Superior with Michigan Technology University, the EPA, and the Western Upper Peninsula Center for Science, Mathematics and Environmental Education on the vessel, Lake Guardian. It was because of this program that my appreciation of the Great Lakes will forever be changed. I hope to bring some of the wonder and beauty of this precious environment back to my students at Page Middle School and at Oakland University with this unit and my passion for teaching.