Target Grade/Subject
This teaching unit will be used in a high school Environmental Science class. This course is considered an elective course and is typically taken by students in grade levels 11 and 12. Students will have had biology and often chemistry prior to taking this course. This course is set up to increase student awareness about the impact of the human animal on other organisms. Students are expected to understand that living and nonliving things interact in complex ways and that changes in the environment will impact the types of organisms found in an area. Students are asked to make many decisions regarding the concept of sustainability, dealing with both the responsibility to the environment and to human life. Students need to understand that they can make changes through their everyday choices.

Lesson Overview
This lesson will be used to look at the environmental impact of Great Lakes Shipping. Types of problems will be listed and students will be broken into groups to focus on each problem. The problem will be explained, including; causes, current policy, cost to clean up, who is responsible, and potential solutions. Students will discover that other modes of transportation can create far more environmental damage than shipping.

My hope is that by incorporating a lesson that deals directly with the integrity of a resource so close to them, they will be more inclined to take ownership of this resource. They will gain a sense of responsibility for the products that are produced from raw materials that must travel through this system, they will understand the economic impact of continued use of the Lakes for commerce and will want to be a part of finding solutions to current environmental issues that threaten not only the Lakes, but the economic stability of our state.

This lesson will take 2-3 class periods; One day to introduce, brainstorm, and research environmental issue (Create Power Points) and one-two days to share and complete assessment. Class length: 72 minutes

Sources
1. Internet Resources/Computer
2. *The Great Lakes: Fragile Seas*
   National Geographic Society Educational Services. ISBN 0-7922-1909-0
   Format: VHS Date: 1991
   Subject: Highlights native traditions, history, pollution, recreation, shipping, fishing, and exotic species.
   Length: 60 min Level: Grades 5-12
   To Purchase: National Geographic Society
   http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info:doi/10.1289/ehp.113-a164
4. Blank Web to help students research issue

Learning Objectives
Students will be able to:

- Identify basic environmental concerns generated as the result of the shipping industry
- Determine the consequences of these concerns if not addressed
- Present potential solutions to the problem and organizations that may be able to assist
- Persuade the “government” (teacher) that their concern must be addressed immediately, therefore receiving funding or mandating legislation.

**Benchmarks: Michigan Content Standards**

**Science Content Expectations, HSCE:**
- **B1.2A** Critique whether or not specific questions can be answered through scientific investigations.
- **B1.2B** Identify and critique arguments about personal or societal issues based on scientific evidence.
- **B1.2C** Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
- **L3.p4A** Recognize that, and describe how, human beings are part of Earth’s ecosystems. Note that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. *(prerequisite)*
- **B3.4C** Examine the negative impact of human activities.

**Social Studies Content Expectations:**
- **Content Standard 1:** All students will describe, compare, and explain the locations and characteristics of places, cultures, and settlements. *(People, Places and Cultures)* Describe how major world issues and events affect various people, societies, places, and cultures in different ways
- **Content Standard 5:** All students will describe and explain the causes, consequences, and geographic context of major global issues and events. *(Global Issues and Events)* Explain the causes and importance of global issues involving cultural stability and change, economic development and international trade, resource use, environmental impact, conflict and cooperation, and explain how they may affect the future.

**English/Language Art Content Expectations:**
- **STANDARD 1.5** Produce a variety of written, spoken, multi-genre, and multimedia works, making conscious choices about language, form, style, and/or visual representation for each work
- **CE 1.5.4** Use technology tools (e.g., word processing, presentation and multimedia software) to produce polished written and multimedia work (e.g., literary and expository works, proposals, business presentations, advertisements).

**Materials Needed**

1. Computers with internet access
2. VCR/TV
3. Paper/pen and pencil
4. Blank Web – Issue researching inserted
5. Addresses for letter writing (You can find addresses for real people and have students write letters or contact them via email, or just have students write to teacher)
**New Vocabulary**

Invasive Species  
Dredging  
Sediments  
Bioaccumulation

**Focus Questions**

1. How are Great Lakes impacted by human actions (primarily shipping industry)?

2. What can be done to address environmental issues?
   - Identifying the issue, addressing importance, looking for viable solutions (Decision Making)

**Procedure**

Large Group – overview and decision of what issues of concern should be researched

- Following Lesson One in which students learned about the Great Lakes Shipping Industry past and present, the discussion will focus on environmental concerns as a result. Students should be reminded that shipping is a vital part of the economic stability of Great Lakes states and cannot just be stopped. We will need use Decision making to look at the values, pros, and cons of this issue.

- Watch National Geographic Video Great Lakes, Fragile Seas and reflect on what was seen.

- Use Concept map to map out potential issues to be concerned with (dredging, invasives, water quality, shore line degradation, air pollution from ships and/or industry, bioaccumulation, climate change/water levels)

Small Group – Place students into small groups and again use concept map (already filled out) to give students guidance in researching issue. They should think about what they know or think they know. They will then conduct research and create a Power Point presentation. This presentation will be written as both informative and persuasive. This will “teach” the issue and provide students with the knowledge to persuade the “government” to fund their concern (prioritize in their favor)

Presentations – persuade government of priority in addressing issue

Individual – write letter to organization to address issue, express concern, and identify ways to become involved in creating a permanent solution (stewardship).

**Assessment:**

Have students write a letter to the appropriate organization regarding the issue they researched, or another issue of interest. Letter should address student concerns, inquire about current status of issue (what is being done), and ask what they can do as a concerned citizen living in the Great Lakes Region.