**Asian Carp: Non-Native or Invasive?**

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Target Grade: Middle School Science (6-8)

Topic: Invasive Species

Time: 2-3 class periods (60 minutes each)

**Lesson Overview:**

In this lesson, middle school students will examine the issue of Asian Carp in the Great Lakes and use research to determine if the Asian Carp should be classified as Non-Native or Invasive, based on the current information we have about Asian Carp in other waterways in the United States. Students will look at many factors, including Asian Carp’s role in the food web and effect on human health and the economy.

**Sources Consulted:**

* [Potential Impacts of Asian Carp in Lake Erie](https://coastalscience.noaa.gov/news/lake-erie-food-web-balance/)
* [What Makes a Species Invasive? NWF Article](https://www.nwf.org/Educational-Resources/Wildlife-Guide/Threats-to-Wildlife/Invasive-Species)
* [High Stakes of the Great Lakes Video](https://www.youtube.com/watch?v=k3N5t70aJ2A)

**Learning Objectives:**

*After the lesson, students will be able to:*

1. Compare and contrast the definitions for non-native and invasive species.
2. Conduct research online on Asian Carp to take a position on whether Asian Carp should be classified as a non-native or invasive species.
3. Formulate a position and present it to your class in writing or oral presentation.

**Michigan Standards Addressed:**

**Science**

**MS-LS2-4** Ecosystems: Interactions, Energy and Dynamics. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**MS-LS2.A** Interdependent Relationships in Ecosystems: Predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.

**MS-LS2-2** Ecosystems: Interactions, Energy and Dynamics. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**SEP: Science and Engineering Practices**

* Asking questions and defining problems
* Engaging in argument from evidence

**DCI: Disciplinary Core Ideas**

* 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.
* MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
* MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**CCC: Cross Cutting Concepts**

* Cause and Effect
* Stability and Change

**English Language Arts Standards**

**Grade 6-12**

1. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (Writing Standards for 6-12).

2. Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (Writing Standards for 6-12).

3. Draw evidence from literary or informational texts to support analysis,reflection, and research.(Writing Standards for 6-12).

4. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.(Writing Standards for 6-12).

5. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. (Reading Standards for Informational Text 6–12)

**List of Materials**

* Computer access to links or printed articles.

**Room Arrangement or Special Needs**

Students are grouped together for the activities and presentation (3-4 students/group).

**New Vocabulary**

Non-Native Species: Species that have been introduced into an ecosystem that they have not historically been a part of (synonyms: alien species, nonindigenous species, introduced species)

Invasive Species: A non-native species in an ecosystem that may cause harm to the economy, the environment or human health.

Food Web: A system of interconnected and interrelated food chains

Producer: An organism that can make its own food

Consumer: An organism that must eat other organisms to obtain energy

Decomposer: An organism that breaks down dead and decaying organic matter as an energy source

***Guiding Question: Should Asian Carp be classified as a non-native or invasive species?***

***Engage***

Students may already have an opinion about asian carp based on prior knowledge. Students may write what they already know or share in small groups about what they already know about asian carp (what they are, where they are from, impacts on ecosystem, role in ecosystem). Currently, Asian Carp are not in the Great Lakes, but they may be soon! The teacher may take a moment to collect all these thoughts, show pictures of the fish and encourage discussions.

***Explore -* Activities**

1. Know/Need to Know: Students will be asked to compare and contrast the terms non-native and invasive. Probe students to determine their level of understanding.
2. **Reading Option 1:** [What Makes a Species Invasive? NWF Article](https://www.nwf.org/Educational-Resources/Wildlife-Guide/Threats-to-Wildlife/Invasive-Species)
	1. Students will discuss what makes a species invasive, rather than just non native.
	2. Discuss the main issues with invasive species and why people are concerned with them
3. **Reading Option 2:** [**I**nvasive or Just Non-Native?](http://www.modeldmedia.com/features/non-native-species.091522.aspx)
4. Explore a Food Web: Using a food web (from a text, online, etc) discuss the roles that exist within a food web, including producers, consumers, decomposers, etc.
	1. Example Food Web: [Lake Erie Food Web](https://www.glerl.noaa.gov/pubs/brochures/foodweb/LEfoodweb.pdf)
	2. Ask students to identify roles in the food web
	3. What role do you think Asian Carp play in freshwater lake food webs?
	4. Look at this potential Lake Erie Food Web if Asian Carp were to be introduced. How does this affect Lake Erie? [Potential Impacts of Asian Carp in Lake Erie](https://coastalscience.noaa.gov/news/lake-erie-food-web-balance/)

***Explain -* Research: Non-Native or Invasive?**

In small groups, students will use web resources and knowledge from the explore activities to determine if Asian Carp should be classified as non-native or invasive in Michigan. Students may see that Asian Carp are already classified as invasive in areas they already have populated. Put students in the position of defending the case for making Asian Carp an invasive species when and if they migrate to the Great Lakes. They will prepare a presentation of their findings and the sources they used. Teacher discretion can be used (based on available resources) as to how the students can document their findings. Options include:

* 1. Google doc online and sources
	2. Worksheet with findings and sources

***Elaborate -* Students Share**

1. Students will present the case for Asian Carp being classified as non-native or invasive. Teachers may decide if they want to do small group share outs or in class presentations.
2. If there is a division within the class, teachers may choose to do a debate style presentation to allow students the chance to discuss and argue for their claim.

***Evaluate -* Apply Knowledge**

1. Remind students of the guiding question.
2. Discuss whether or not there was a class consensus on non-native vs. invasive
3. Show the video: [High Stakes of the Great Lakes Video](https://www.youtube.com/watch?v=k3N5t70aJ2A)
4. Find a list of organisms in Michigan that are currently considered non native and invasive. Are there any organisms on the list currently classified as non native that have the potential to become classified as invasive? Teacher may choose to make this a worksheet or graded assignment, or a discussion.

**Teaching Resources**

**Food Web Practice**

*Using any food web, have students classify different organisms into these roles:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Producers | 1st Level Consumers | 2nd Level Consumers | 3rd Level Consumers | 4th Level Consumers | Scavengers |
|  |  |  |  |  |  |

***Some organisms can have more than one energy role!***

**Research Document: Should Asian Carp Be Classified Non-Native or Invasive?**

*Students should be encouraged to find several facts before making a determination about the Asian Carp classification. Teachers can set a minimum. These facts will be used later for the student share out.*

|  |  |  |
| --- | --- | --- |
| Research Data, Facts or Information | Does this fact support Asian Carp being classified as Non-Native or Invasive? | Source Cited (URL copy/paste) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Michigan Non-Native and Invasive Species**

|  |  |  |  |
| --- | --- | --- | --- |
| Michigan Invasive | Why is it invasive? | Michigan Non-Native | Why isn’t it invasive?Does it have the potential to become invasive? |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Rubric for Group Research and Presentation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Grading Criteria | Basic0-5 points | Emerging6-7 points | Proficient8-9 points | Advanced10 points |
| Group cites data or research facts from credible online sources | No sources used or sources were not credible | 1-2 sources were used, some had questionable credibility | The minimum of 3 sources were used and most were credible | Three or more sources were used and all were highly credible |
| Group takes a position on Asian Carp classification | No position is taken |  | A position was taken, but it was not clear what the position was.  | A position was clearly taken |
| Group supports position with research based facts | No position is taken and no facts are presented to support a position | Position taken but supported with very few facts (1-2) | A position was taken and is supported with 2 facts. | A position was clearly taken and is supported with 3 or more facts.  |

**We would greatly appreciate your feedback using this lesson plan! Please visit** [**https://www.biaquariumstem.org/survey.html**](https://www.biaquariumstem.org/survey.html) **to complete a short survey about your experience.**