

Preventing the Spread of Invasive Species in Michigan

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Lesson Overview Students will determine what is meant by the terms *Native*, *Non-Native* and *Invasive* species, and compare how these designations are determined. Students will identify species that pertain to each of the designations and give reasons as to why they are categorized accordingly, and explore whether species can/should become “naturalized” to an environment. Some aquatic invasive species can be viewed at the Belle Isle Aquarium in Detroit.

Target Grade/Subject: Grades 6-12, Science/Biology/ Ecology

Time: one class period

Sources Consulted

“**Invasive or just non-native? Why Michigan loves Pacific salmon and fears sea lamprey.**” Model D Media: <http://www.modeldmedia.com/features/non-native-species.091522.aspx> . Published September 20th, 2015. Retrieved: April 16, 2018. [*Annotation:* article looking at how some Non-native species are viewed favorably in the Great Lakes region, while others not]

“**Out of Balance: The story of salmon in Lake Michigan**” SECOND WAVE MEDIA / OCTANE DESIGN. <http://www.secondwavemedia.com/custom/salmon-report/index.html> Published Monday, June 12, 2017. Retrieved: April 16th, 2018. [*Annotation:* Interactive site, exploring the history and introduction of salmon in the Great Lakes.]

“**What Are Invasive Species?**” Belle Isle Conservancy. <http://detroitaquarium.weebly.com/educating-about-invasive-species.html> Retrieved: April 22, 2018.

Learning Objectives

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

1. Define and compare the difference between Native, Non-Native and Invasive Species.

2. Give examples of species that are *Native*, *Non-Native* and *Invasive* in Michigan.

3. Determine whether a species can change its designation.

Michigan Science Standards Addressed

MIDDLE SCHOOL:

L.EC.06.21-23 (CLCE's 6th Gr.) **Food Webs/ Food Chains/ Competitions/ Beneficial Relationships**

LS2.A: MS-LS2-1 & 2 (NGSS): **Interdependent Relationships in Ecosystems (Extension:**

MS-LS2-5: "Evaluate competing design solutions for maintaining biodiversity and ecosystem services") **HIGH**

SCHOOL:

HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

List Materials & Quantities Needed

Computer/ Internet access - can be shared in partners

Great Lakes Ecosystems Posters from MI DNR (Optional)

New Vocabulary

Ecosystem: A community of species interacting with each other and their physical environment.

Native Species: A species with historical occurrence (endemic/ indigenous) in an environment, serving an established role within the food chain

Non- Native/ Introduced Species: Species that are accidentally or intentionally introduced to an environment, but do not disrupt the natural ecosystem or economy.

Invasive Species: Species that are accidentally or intentionally introduced to an environment that displaces native species and/or negatively impacts that economy/ecosystems.

Biodiversity: The variety of species (plant, fungi, insect, mammals, etc..) that are found in an environment. The more "biodiverse" an ecosystem, the more stable it is to disturbances, like invasive species.

Naturalized: An organism that has become "*established*" in an environment that it is not indigenous to.

Focus Questions

1. What is a *Native* species? What is an *Ecosystem*? Can something become native to an ecosystem, or is it stuck with its past?

2. Prejudice or Science: Why are salmon welcomed, but carp banished?

3. Should *naturalized* species, such as Salmon, Pheasants and Earthworms, be considered “native” to our ecosystem?

Classroom Activities

1. Students will begin by *listing* as many species as they can that are found in Michigan in a “round-robin” style with their group. Students will take this list and *research* whether these are **Native species** of Michigan (make sure both plant, animal, terrestrial and aquatic species are mentioned). Discuss the importance of “Biodiversity” in ecosystems and the reliance of species on one another, as in a food web. [This can be done from the DNR Ecosystems Posters (preferred, so that students become familiar with our local ecosystems) or from an online database, like that featured on the DNR web-page.] Have students record at least 10 species, and describe the environment in which they are found.
2. **Discuss** the idea: “What is an **Ecosystem**?” Give examples of several types of ecosystems found in Michigan--- Rivers, Dunes, Wetlands, Forests, etc. Group species Identified by class into which Ecosystem they would most likely be found. Are species only found in one ecosystem, or can they be found in more than one ecosystem?
3. Ask students if they are familiar with the term “**Invasive species**”? Record their thoughts on a whiteboard for all to see. Give examples of species and what they do in an **environment**. Add these to the species chart.
4. Have students explore the article: “**Invasive or just non-native? Why Michigan loves Pacific salmon and fears sea lamprey**” and compare the designations of “Native”, “Non-Native” and “Invasive”. Give examples of each. (Add to the chart below)
5. For the “species list,” follow up with partners/groups to check that specific species are named (not broad categories like “fish” or “bird”). If they are using the DNR posters, have them take their categories and find a few types of native “fish” for example by species name. See sample list below.

Sample responses

Species Name:	Physical Description	Environment/Ecosystem:	Native	Non-native	Invasive
Brook Trout	Small (7-9in), brightly colored fish with brown on top, orange stomach and speckles (yellow and pink)	found in streams, creeks, rivers and along shorelines (“coasters”)	X		
Brown Trout	Large silvery fish (can reach 40 lbs) with black speckles along body.	Found in streams a rivers in the fall to spawn, larger lakes rest of the year. Can tolerate warmer waters than other trout.		X (Introduced in 1880’s for sport fishing)	
Butterfly -ex. Karner Blue Butterfly	A small (about the size of a nickel) silvery blue butterfly, yellow and black spots on wings	Habitat is limited to small prairies where host plant “blue-lupine” grows	X threatened in Michigan		
Ring Necked Pheasant	Large (18in.) bird with long tail. Males have an iridescent blue-green head, red face, copper body. Females are brown (blend in)	Found on ground in open grasslands, agricultural lands or bushy areas. Game bird (used for hunting)		X (Native to China, introduced in 1895)	
European Earthworm	Made of many small segments, covered in a slimy mucus. Can range in size but generally no larger than 10 inches. Color is generally reddish, pink, and iridescent.	Found in gardens, forests, and moist soils. Migrate “vertically” in winter. Introduced in 1800’s by European settlers		X (in gardens) Introduced by Europeans	X - can be considered invasive in hardwood forests for compacting soil too quickly

6. Have groups research one of the Michigan Ecosystems, describing its features and characteristic species [can attach Google template if desired:

<https://docs.google.com/presentation/d/1ODChrepHPINHrqDr3NylUTcRFaaONChOE4FwaIJ4qFg/edit?usp=sharing>]

7. Have students work individually (HS) or in pairs (MS) to create a presentation on 5 Invasive species found in Michigan and their impact on the environment. Discuss examples with whole class, add to species list. Provide a presentation rubric, so student knows what to include.

Sample document here:

https://docs.google.com/document/d/1pB8e1Hh48b6L5UrCaeqU_nKW17fh3LOMDzX3OZ9QL7A/edit?usp=sharing

8. Have students discuss the term “**Naturalized**” after reading the Invasive vs. Non-native article, and determine whether a species like salmon, earthworms, and brown trout should be considered “Naturalized” in the Great Lakes ecosystems? What about species such as lamprey, round goby or zebra mussels? Students can do a “5 minute write” expressing their opinion, or an essay (in HS) or a class debate. Need rubric to describe what is expected for each of these assignments.

Formative Assessment: Students should understand that the term “Naturalized” refers to a person, or organism, that is not from/born in that particular region, but over time has become incorporated into that location (either legally, as in humans or biologically as in brown trout). The teacher can give examples of “naturalized citizens” and ask students to share stories of relatives that they know were “naturalized” Give examples of species, like brown trout, sea lamprey or earthworms, and discuss how the species got into the Great Lakes. Have students debate as a class, or write a quick (“5 minute write”) opinion piece including their views on why each species should, or should not be “Naturalized” into the Great Lakes. Have students share their reasoning with the class and see if the class can come to consensus.

Assessment of Student Learning

Have students write a response to one of the following focus questions:

1. Can a species *become* native to an ecosystem, or is it stuck with its past?
2. Prejudice or Science: Why are salmon welcomed, but carp banished?
3. Should *naturalized* species, such as Salmon, Pheasants and Earthworms, be considered “native” to our ecosystem?

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