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# K-12 Partnership Lesson Plan

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# *Michigan’s Most Unwanted*

# *How to identify Michigan’s invasive species and why we should worry*

## Overview

How do we identify invasive species, and why do we care? In this lesson, students learn to make and use dichotomous keys to identify common invasive species. Students will gain an appreciation for why invasive species are important through a series of discussions, videos, and keying activities. A graphing activity will allow students to make graphs, interpret data from graphs, and draw conclusions based on data.

**Objectives**

At the conclusion of the lesson, students will be able to:

* Make and use simple dichotomous keys to identify species
* Discuss why species identification skills are important to understanding and preventing invasions
* Convert a data table into a figure and draw conclusions
* Interpret a figure and discuss ecological explanations for the data shown

**Length of Lesson**

Presentation: 15 minutes

News article discussion: 10 minutes

Jelly bean key: 20 minutes

Plant key: 15 minutes

Sea Lamprey activity: 20 minutes

**Grade Levels**

This lesson is designed for middle and high school students, but could easily be tailored for elementary classes.

**Standards covered (NGSS)**

Cross Cutting Concepts

* Patterns
* Cause and effect

Science and Engineering Practices

* Analyzing and interpreting data
* Engaging in argument from evidence
* Obtaining, evaluating, and communicating information

***Previous Michigan Standards Met:***

* **S.IA.06.11**: analyze information from data tables and graphs to answer scientific questions
* **S.IP.06.15**: construct charts and graphs from data and observations
* **S.IP.06.16**: identify patterns in data
* **S.I.A.03.11**: summarize information from charts and graphs to answer scientific questions
* **S**.**I.A.03.12**: share ideas about science through purposeful conversation in collaborative groups

**Materials**

* PowerPoint introduction
* Copies of two new articles: “Invasive species could be transmitted by school teachers releasing critters into the wild” and “Not giant hogweed or Angelica” (1 for each student)
* Two pieces of poster paper and two markers
* 1 bag Jelly Belly “Kids Mix” jelly beans
* small paper cups (1 per 2 students)
* Jelly bean dichotomous key handouts
* Plant material (5 distinct species per 3-4 students)
* Lamprey eel handout

**Background**

Invasive species are species of any taxa (plants, vertebrates, invertebrates, etc.) that have been transported out of their native range and have established and spread in new areas. Few areas on Earth are untouched by invasive species. We know that invaders can have negative impacts in several ways. Invaders often negatively affect native species, either through competition, predation, or herbivory. This can lead to declines of native species in invaded areas and loss of biodiversity. In addition to directly affecting other species, invaders can also indirectly affect other species by altering the habitats they invade. For example, invasive saltcedar (*Tamarix sp.*) in the southwest United States can increase soil salinity in the areas it invades, making it harder for native plants to grow. Invasive species can also have devastating economic impacts—the US spends millions of dollars every year to control and eradicate invaders that threaten native ecosystems, agricultural areas, and fisheries.

Dichotomous keys are reference tools used by biologists that allows the user to identify an organism by answering many questions that only have two possible answers. With basic knowledge of the anatomy of an organism, anyone can use a key to correctly identify a species. Being able to use a key is an important skill to have when dealing with invasive species, as some invaders look similar to native species.

### Activities of the session

1. PowerPoint Introduction
   1. Ask the students if they can name some invasive species. Talk about how even though we sometimes know their names, invasive species can sometimes be hard to identify, especially when they look similar to native species.
   2. Can you identify the invaders? Show students the slides with similar-looking invasive and native species. Ask them to guess which are the invaders. Make the point that it is important to be able to distinguish between native and invasive species, in order to track existing invaders and spot invaders that are new to an area.
   3. Why should we care about invaders? Discuss the ways that invaders can affect other species, the environment, and the economy.
2. Discussion of recent news articles about invasive species
   1. Give half the students the article “Invasive species could be transmitted by school teachers releasing critters into the wild” and the other half “Not giant hogweed or Angelica.” Have them read the articles to themselves, then get together with the other students who read the same article. On a piece of poster paper attached to the wall, have each group of students write down answers to the following questions:
      1. What was the main point of the article?
      2. Based on what you learned from the article, why should we care about invasive species?

Have a representative from each group briefly explain their article and answers to the questions to the class.

1. Jelly bean key
   1. Explain that a dichotomous key is a reference tool that allows the user to identify an organism by answering many questions that only have two possible answers. Go through the basic instructions in the PowerPoint presentation about how to make a key.
   2. Have the students split into pairs, and give each pair a small paper cup filled with 10-15 jelly beans and the Jelly Belly “Kids Mix” key. Have the students use the key to identify their jelly beans. Students can eat the jelly beans to see if they identified them correctly.
2. Making a dichotomous key
   1. Have the students split into groups of three or four. Give each group 5 or more distinct plant species (can be parts of plants collected from around the school, houseplants, or cut flowers), and a blank sheet of paper. Have the students write their own dichotomous key based on the characteristics of the plants they observe. Once they have finished, have each group trade keys and plants with another group and attempt to use the keys.
3. Sea lamprey video and graphing activity
   1. Show students the short video “MSU Today: Love-sick lampreys.” Discuss the basic biology of lampreys, as talked about in the video, and why they are a threat to the Great Lakes.
   2. Have students complete the “Sea Lamprey: A Great Lakes Menace” graphing activity. Discuss answers to the questions posed on the handout as a class.

**Resources**

MSU Today: Love-sick lampreys.

<https://www.youtube.com/watch?v=NMutVGTgWC0>

**Extensions and Modifications**

This lesson can be modified to suit elementary classes by putting less emphasis on the news article discussion and more emphasis on practicing making and using dichotomous keys.

**Assessment**

Teachers can use the Sea Lamprey handout for assessment. Students should graph the data given in the table, interpret the meaning of the second graph, and answer all questions on the handout.