

INVASIVE SPECIES LESSON PLAN

For Instructor Use Only



**PRICKLY PEAR
LAND TRUST**

Invasive Species

Location: Ten Mile Creek Park

Aim: Why are invasive species so damaging and what can we do to prevent spreading them? How do we combat already established invasive species?

Time: 2-2.5 hours

Common Core State Standards: LS2.C, LS1.A

Next Generation Science Standards:

HS-LS2-6, HS-LS4-5, HS-LS4-6, HS-ESS3-4

Guiding Questions:

What is an invasive species?

What makes an invasive species invasive and why are they so successful where they are established?

How do we distinguish plants? What do we look for when we are doing plant identification?

Learning Objectives:

Accurately define an invasive species

Understand the role humans play in invasive species and ways to prevent invasive species from spreading

Identify some common Montana invasive weeds

Lesson Timeline

Note: A good portion of this lesson will be spent pulling weeds, so the teaching portion will not be too long

Students arrive, greet them and introduce yourself

**10
MIN**

Try to be as engaging as possible. The introduction with the students is what sets the tone for the rest of the lesson. This does not require you to have any special skills, just be friendly and be yourself. It would be great if you included some information about what you do, or did, for work. It is a good opportunity to introduce the students to different careers and does not need to be related to the lesson you are leading.

Ask the students to introduce themselves. Up to you how you want to do this.

A good portion of this will be spent showing the students invasive weeds around the property:

**40-50
MIN**

Give the students an introduction to invasive species.

The differences between native, introduced, and invasive species

Ask the students why they think invasive species do so well. Discuss the reasons.

Ask the students to come up with ways to combat invasive weeds. Discuss the options.

Discuss how biological controls can go wrong and the current research standards that need to be met before releasing them

Touch on what a priority 1 weed is and show the students what garlic mustard looks like

Briefly go over some of the weeds we find at Tenmile Creek Park and show them to the students

Preventative measures to prevent spreading invasive weeds

**30-40
MIN**

Play the invasive species game, using the instructions outlined in this document. Engage the students in a conversation about what they learned from the game and about some things they could do to stop the spread of invasive species.

**40-50
MIN**

After the game, we will give the kids trashbags and gloves to pull weeds. Consider splitting them into groups and turning it into a competition of who can collect the most weeds.

Background Info

Introduction

Invasive species have devastating consequences for native species found in the same ecosystem or area. Invasive species are introduced both accidentally and purposefully, sometimes to combat pests or other invasive species, and sometimes because they are pretty or valuable. This lesson will cover the difference between native, introduced, and invasive species, as well as ways we as individuals can help prevent spreading invasive species and help combat them. Because the students will be spending part of the lesson pulling weeds at Tenmile, there will also be a short section on how to identify a few common invasive weeds of Montana. This lesson will focus on plant species, but will also touch on other life forms.

Definition

When the term invasive species is used, many of us automatically think of a species that is not native to the area. However, not all non-native species are invasive. Species that have been introduced to a new area, either purposefully or not, but do not cause harm to the native species or to human health, are called introduced species. Native flora and fauna are species that are part of a balanced ecosystem that has developed over hundreds or thousands of years in a particular area. Native species are only native to a particular area. If they are introduced elsewhere, they become introduced or invasive in that area. Invasive species are non-native and able to establish on many sites, grow quickly, and spread to the point of disrupting communities or ecosystems. While native species have biological controls that limit their growth and distribution, invasive species often have few or no biological controls that can limit their populations. In a balanced ecosystem, each species has something that controls the population, whether it's a predator, an herbivore, a disease, or a parasite, the population can be maintained. An invasive species will often not be affected by local diseases or infections, and will often have characteristics that protect them from predators, herbivores, or parasites. These factors, combined with the ability to spread and propagate quickly are what make introduced species invasive.

Control Methods

There are a few methods we can use to control invasive weeds, and different methods are used to control different species depending on the weed's specific adaptations. The easiest method that any person can do is to pull or mow invasive weeds. Pulling is one of the most effective methods of getting rid of invasive weeds. However, there are limitations. It is a very slow method and requires a lot of man power and hours. It also does not work on plants that have deep root systems. If the entire plant is not pulled out, the roots will grow new shoots. Mowing can be an effective method but requires diligent mowing at the right time. The best time to mow invasive weeds is after they have produced flowers but before they produce seeds. Plants use a lot of energy to grow flowers and cutting the plant at that time can reduce the plant's ability to produce flowers and seeds. Even when not done diligently, mowing can help to control and contain invasive weeds.

A method similar to mowing is grazing. This requires access to herds of grazing animals. There are other limitations, however. Many invasive weeds have evolved chemical deterrents that can make animals sick or even kill them. Ranchers often use their livestock to help control invasive weeds after they receive training on what weeds their livestock can eat and at what time of the year.

One of the most effective controls is the use of herbicides. Herbicides are designed to kill the plant through various methods depending on the herbicide. The challenge with herbicides is that they can often kill native plants as well. The best method to picking an herbicide is to consult an expert and discuss types of herbicides and the best application. Terrestrial herbicides cannot be sprayed in water, and a buffer zone should be created around nearby water sources. Protective equipment should always be worn when applying herbicides.

In some cases, there are native plants that have the ability to outcompete an invasive weed. In these cases, the native plants are planted in the area with invasive weeds and encouraged to spread. Sometimes invasive weeds become established because the growing conditions are not good enough for native plants. In this situation, if the soil conditions are improved, the native plants may be able to repopulate the area on their own.

The last control method is through the use of biological controls. Sometimes this can be the most effective method as well as the easiest. Biological controls for weeds can include insects, bacteria, or fungi. When a biological control is released into an area, it attacks the weed and requires little to no ongoing maintenance. Biological controls can take longer to establish and the results may take years to be noticeable. Once the control is established, though, it can almost completely eradicate the invasive weeds.

Often more than one method will be used. Depending on the weed, a combination of methods will often have the best outcome.

Cautionary Tales of Biological Controls

Biological controls can be an incredibly effective control for invasive species. However, when used incorrectly they can cause more harm to native species. In Australia, Cane Toads were introduced to get rid of beetles that were damaging cane crops. However, Cane Toads reproduce rapidly, produce a deadly poison that they excrete on their skin, and will eat pretty much anything they can catch and fit in their mouths. They have become such a problem in Australia that government officials ask their citizens to kill any cane toad on sight with whatever they have on hand. Cane toads produce a poison that is lethal to most wildlife when ingested and is wreaking havoc on many native species. In the cane toad's native habitat, predators have evolved to not be susceptible to the poison, which enables them to help control the cane toad populations. This is an ongoing problem, with no indication that the cane toad populations will be controlled in the near future.

Today we recognize that biological controls can have long-term consequences for native habitats. In order to release biological controls, case studies must be completed that take place over 10-15 years. This allows researchers to show that the biological agent will not have adverse consequences for native species. At the end of the study, researchers must show that the biological control will only affect the targeted species and will never move to a new species in the area.

Common Weeds of Montana

Montana invasive weeds are classified into priority 1, 2, or 3. Recently, the state changed their criteria for classification. In the past, priority 1 weeds were the most widespread weeds. Now, priority 1 weeds are newly introduced invasive weeds that have the greatest chance of causing widespread and lasting harm. One of the most widespread and devastating invasive weeds in North America is garlic mustard. The plants are so successful because they can grow under tree canopies with little light and they outcompete native plants. Until 2018, there were no reported cases of garlic mustard in the state of Montana. Currently, the only county reported to have garlic mustard is Lewis and Clark County, and state officials are desperately attempting to eradicate the plants before they can spread to the rest of the state. The easiest way to identify garlic mustard is to crush the leaves and smell them (a picture will be included to show to the students). They have a distinct pungent odor that is reminiscent of garlic. Any sightings of these plants should be immediately reported to your county weeds district or the Montana Department of Agriculture.

Weeds of Montana Continued

Note: a field guide will be given to each student, volunteers and teachers

One of the most widespread invasive weeds in Montana is cheatgrass. It is easily identifiable by the reddish tinge at the top or base of the plant. While this weed can be pulled by hand, it is too widespread to be managed through hand pulling. The best methods to control cheatgrass are herbicides and prescribed grazing.

There are quite a few invasive weeds that can be found on the Tenmile Creek property and it is an ongoing project for PPLT. We will cover a few weeds that can be hand pulled as well as a couple that are fun to talk about with students.

Hoary Alyssum is spread across most of the property. It stands 1-3 feet, appears slightly silver due to hairs covering the entire plant and has a sandpaper-like leaf texture. When flowering, it has white 4-petal flowers. This plant can be managed with herbicides and prescribed burns, in addition to hand pulling.

Dalmatian toadflax has a green stem with rubbery feeling heart shaped leaves that are attached directly to the stem. When flowering, they have yellow flowers that look like snapdragons. This weed can be biologically controlled by releasing weevils to the area. Sometimes weevils can be found inside the stems of the plants (fun to show students).

Spotted and Russian knapweed look similar but can be distinguished by the differences in their bracts (the part directly below the flower). Spotted knapweed have bracts with spotted ends, while Russian knapweed has bracts that look feathery. New growth knapweed leaves look similar to dandelion leaves. Both can be removed through hand pulling as well as herbicides. Spotted knapweed can also be controlled with a weevil that attacks the roots.

Houndstongue looks like a clump of green velvety leaves with smooth edges. They resemble a hound's tongue. Their flowers are reddish-purple and they produce burr-like seeds. These seeds stick so well they may have been the inspiration for Velcro. These can be hand pulled.

Leafy Spurge's new growth looks like a narrow long stem with alternating slender leaves. If you break the stem off it leaks a milky white sap that can cause skin irritation in people allergic to latex. These cannot be hand pulled because they grow root systems that can reach 20-30 feet. When they flower, the flowers look like lime green/yellow plates with a bead sitting in the center. When the plant is ready, the bead bursts and can shoot seeds up to 15 feet away from the plant. This weed can be controlled through grazing, herbicide, and biological controls.



Invaders! Activity

Materials:

Paper Squares with the words "Native" on one side and "Invasive" on the other (One per Student)
Two-Sided Name Tags with the words "Native" on one side and "Invasive" on the other
Dry Erase Board
Two Different Colored Markers

Gameplay:

Place the paper squares in a circle on the ground. Flip all the squares to read "Native". Flip two squares to say "Invasive"

Give each student a name tag and tell them to flip the name tag to "Native"

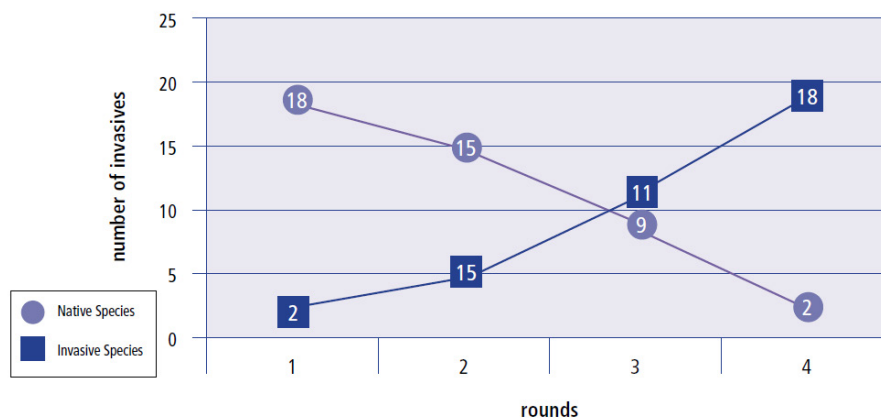
Tell the students that they are a native wildflower species (You can pick a favorite, Silky Lupine is a good option) and that there is an invader in their native habitat.

Have the students name some of the invasive species we discussed and pick one to represent the invader in our ecosystem. Ask the students what advantages invasive species have over native species and about the dangers of invasive species.

Have all the students stand in the middle of the circle. On the count of three, have the students run to a paper square on the ground.

Tell the students standing on the invasive habitats to switch their name tags to say "Invasive". Explain that the invasive species within the habitat outcompeted them for resources and they have been replaced by an invasive species.

One instructor should note on the whiteboard that there are two invasive species and X number of Native species to start the first round. Graph the round as shown below, with different colors for native and invasive species.



Play music for 45 seconds and have students rotate through the squares like musical chairs.

Once the music stops have the students that are standing on an invasive habitat report out. If their nametag is currently "Native" they switch it to "Invasive". If it is "Invasive" they remain "Invasive"

Then ask the students with "Invasive" name tags to flip over the paper square so it reads invasive. Explain that the migrating invasive species have taken over the previously native habitat.

Play the game in rounds until every student is "Invasive"

Continually record the graph of population change on the white board.

Once the game is over, show the students the white board and have them make observations from the data. Tell the students that this population data is similar to that connected by scientists trying to control invasive weed problems.

Have the students brainstorm potential solutions to invasive species. Ask them ways they could have slowed the spread of invasives in the game. Examples include removing the invasives, improving native habitat etc. Ask the students to brainstorm weed management practices.

i.e Weed management: Pulling, Grazing, Burning, Mowing, Chemicals.

Non-Classroom Activities

PBS Invasive Species Online Game

<https://montana.pbslearningmedia.org/resource/plum14.sci.life.invaders/invaders/#.XnJDQXOSnb0>

Montana Weeds Guide

<https://www.mtweed.org/weeds/weed-id/>

Other Fun Activities for Kids (Canada based but still very relevant)

https://bcinvasives.ca/documents/Education_Teacher_Resources_FINAL_06-02-2014.pdf

HAPPY.

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TRAILS.

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