

INTRODUCTION TO RESTORATION LESSON

Summer Presentation #2

Summary

Students are introduced to the concepts of ecological disruptors such as pollution and invasive plants. They also learn how local ecosystems change for the better - through restoration and other actions they can take both at home and in the community. This lesson includes an interactive PowerPoint presentation, a short skit about weed invasion, and a practice activity at monitoring weeds.

Objectives

Students will:

- name at least two materials that pollute the wetlands
- name at least two ways people can help keep wetlands clean
- name at least one way invasive plants established in the wetlands
- know how to estimate fractional parts
- understand the concept of restoration

California Content Standards Addressed:

Grade Five - *Science 3.d*: "Students know the amount of freshwater located in rivers, lakes, underground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing water use."

Grade Five - *History and Social Sciences 5.2-4*: "Locate on maps of North and South America land claimed by Spain, France, England, Portugal, the Netherlands, Sweden, and Russia."

Grade Five - *English Language Arts 1.2*: "Use word origins to determine the meaning of unknown words."

Grade Five - *Mathematics; Mathematical Reasoning 2.1*: "Use estimation to verify the reasonableness of calculated results."

Grade Six- *English Language Arts 1.2*: "Identify and interpret figurative language and words with multiple meanings."

Grade Six- *Mathematics; Mathematical Reasoning 2.1*: "Use estimation to verify the reasonableness of calculated results."

The Basics:

Grade Level:

6 - 8

Subject areas:

life sciences

Duration

90 minutes

Number of Docents Needed: 2

(with docent training prior to presentation)

Outline

There are four pieces to this lesson, total of 90 minutes:

- 1) Introduction/warm-up (5 minutes)
- 2) Power-point presentation (40 minutes)
- 3) Weed invasion story with M&M's (20 minutes)
- 4) Fraction Estimation: Introduction to Quadrat math in Field trip #2 (25 minutes)

Materials and Handouts

All handouts referred to in this section can be found in the Summer Program Presentation #2 folder at the WERC. Or, you may print out the .pdf files from the website.

1. Laptop computer with the "Intro to Restoration.ppt" loaded. The power-point can be found at
2. Projector
3. Extension cords for the laptop and projector for use in a classroom.
4. Several laminated vocabulary sheets. These can be found in the Summer Program Classroom Presentation #2 box at the WERC. Or, print and laminate the sheet at the end of this lesson.

for the weed invasion story:

1. Large glass jar
2. M&M's
3. Large lemon candies
4. One set of animal, plant, and weed role-playing cards necklaces. These can be found in the Summer Program Classroom Presentation #2 box at the WERC. Or, print, cut, and laminate the animal and plant pictures at the end of this lesson. Then punch holes in them and create necklaces by tying equal lengths of string to each picture.
5. Clear, plastic cups for each color of M&Ms and lemon candies.
6. Clean M&Ms that students get to eat

for fraction estimation:

1. Overhead projector
2. Overhead markers
3. Blank transparency

4. Fraction estimation transparency. This can be found in the Summer Program Classroom Presentation #2 box at the WERC. Or, open a new blank word document, make a LARGE square text box in the middle of the sheet, write FRACTION ESTIMATION over it, and print on a transparency.
5. Construction paper cutouts representing bristly ox-tongue. This can be found in the Summer Program Classroom Presentation #2 box at the WERC. Or, you may cut different-sized, oblong shapes out of any color construction paper. You will need many of these cutouts but never make any more than three inches across.
6. 6 quadrats. Quadrats are essentially large squares made out of PVC piping. They should be 3 ft. by 3 ft. (or a meter by a meter) with string tied across each width, which divides the square into four smaller squares.
7. 6 posters decorated with pictures of native plants and large Bristly Ox Tongue (B.O.T.) pictures (Note: each poster must have a different fraction amount of B.O.T. written on the back of the poster. This fraction represents the fraction of B.O.T. pictures on the front of the poster when compared to the rest of the space in the poster. The fractions represented on the posters should be 0, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$ Preferably, these posters should be the same size as your quadrats.)
8. 6 sets of laminated sheets with the above fractions written on them (Note: fractions on these sheets must match the fractions of B.O.T. on the posters.)

Procedure

1) Introduction – Review (5 minutes)

- Re-introduce yourself and any docents that are with you.
- Ask the students where they went to last week on their field trip. What was the name of the wetland/slough they visited?
- Were we on a preserve last week? What is a preserve? Why are they needed?

2) Power-point presentation: Introduction to Restoration (40 minutes)

- Vocabulary words: **native**, **non-native**, **invasive**, **compete**, **restoration**, **monitoring**, and **sprouting**. Make several laminated sheets with the definition for each word on them. Pass them out to student tables before the presentation as a cheat sheet.

****Teacher's Guide to Power-point:****

Slides 1 and 2: Introduction and Today's Agenda (2 minutes)

Part One: Disappearing Wetlands and Habitat Loss (Slides 3 and 4) (5 minutes)

slide 3- The blue parts on these maps represent wetlands. Ask the student if they can notice a difference in the amount of wetlands. How and why have so many wetlands disappeared over the last 150 years? Collect ideas from the students.

slide 4- When a wetland is destroyed the habitat is lost. What is a habitat? When an animal's home is destroyed, where does the animal go? Can wetland animals live in the places in the pictures?

Part Two: Impacts on the Wetland (each slide shows a different threat to wetlands) (Slides 5-9) (8 minutes)

For each of these slides, ask the students if they can guess what the threat is from the picture. Have they seen this in real life? How are the wetlands affected by each threat?

slide 5- Air pollution.

slide 6- Littering and street drains that lead to the wetlands and ocean.

slide 7- Chemical fertilizers and pesticides used on farms.

slide 8- Oil leaks.

slide 9- Invasive, non-native plants. When you get to this slide, ask the students if they saw this plant (poison hemlock) on their field trip last week. Why might it be bad for the wetlands and animals. You may introduce the idea of native and non-native at this point.

Part Three: Plants and Plant Diversity (Slides 10 and 11) (5 minutes)

slide 10- Why are plants important? Ask the students this question before revealing the answers on the slide. Get them to think about the role of plants in their lives.

slide 11- Wetlands need a variety of plants. Why is this? Will lots of different plants sustain lots of different animals?

Part Four: Native vs. Non-native (Slides 12-15) (8 minutes)

slide 12- What is a native plant? How does this relate to native people? Here are some examples of native plants? Did any of you see some of these plants on your field trip last week?

slide 13- Native plants and native animals have developed relationships over time. Here are two examples of those relationships. What do you think would happen to these native animals if these native plants died out?

slide 14- What is an invasive, non-native plant? Here are some examples. Did anyone see these plants on their field trip last week?

slide 15- Why are non-native plants bad for the wetlands? Have students come up with some ideas before showing the answers on the slide.

Part Five: Restoration and Other Ways to Help the Wetlands (Slides 16-21) (10 minutes)

slide 16- What is restoration? Kids and adults can participate in restoration. Have students repeat the word back to you after you have explained what it is.

slide 17- Removing bristly ox-tongue. Explain that we want to remove non-native plants.

slide 18- Collecting native seed. Why are we collecting seeds from plant in the wetlands instead of buying seed at the store?

slide 19- Cleaning seed before planting. What is sprouting? Explain why this helps the seed to sprout.

slide 20- Planting native plants. In this picture we are creating a garden of native plants.

slide 21- What can you do at home to help the wetlands? Have students come up with some ideas before showing the answers on the slide. At this point, pass out flyers for monthly restoration community days at the WERC.

Slide 22: Agenda for our next field trip. (2 minutes)

Slide 23: Pictures of Bristly Ox-Tongue. Leave this slide up as you go through the weed invasion story.

3) Weed Invasion Story: Skit with students, pictures and M&Ms

Dialogue and Instructions:

A thousand years ago, there were hundreds of native plants that lived near the wetlands.

I need six volunteers to be six different native plants. (Give each student a card and cup of M&Ms.) Each M&M color represents the seeds from each native plant. (Pour the M&Ms into a glass jar.)

This jar represents the diversity of seeds in the Wetlands.

Now I need three volunteers to be animals. (Give each student a card.)

Now the Song Sparrow eats seeds. He/she is going to come up and grab a handful. Did you get a diversity of seeds? *Dump M&Ms in a discard cup.*

Rabbit eats grass seeds. He/she is going to come up and grab a handful. Did you get a diversity of seeds? *Dump M&Ms in a discard cup.*

Ground squirrel comes up and eats some seeds. Repeat process.

Even though each of these animals took some seeds, the plants continue to grow with a diversity of seeds germinating each year, keeping balance of mm seeds.

Can anyone tell me what I mean when I say there is a great diversity of seeds?

200 years ago, farmers from Spain came to this area.

Can anyone show me where Spain is on this globe?

These people brought their cows with them and they grazed near the Watsonville wetlands. However, the cow hoofs had Bristly Ox Tongue (B.O.T) seeds on them.

(Pass around real B.O.T. seeds.)

The seeds were dropped from the cows hooves.

I need two volunteers to be cows. (Two cows come up. Drop 100 ugly candy seeds in jar.)

Well, this plant the ox tongue did very well. The next year there were over 1,000 seeds and 44 new plants of the ox tongue.

Does anyone have an idea how this affected the native plants?

Yes, there were less M&Ms.

I need the animals to come up and try to eat the seeds again. (Have each animal grab a handful.) Each animal has some B.O.T. seed. But the animals don't want the B.O.T. seed.

Why do you think the animals don't want the B.O.T. seed?

The Ox tongue is taking over more and more each year.

What will happen to the native plants?

(Add more ugly seeds to the jar to represent more seeds each year.)

Unless we do some restoration, this balance will only get worse!

Quick Quiz

How did Bristly Ox-Tongue get to California?

What happened to the native animals when B.O.T. arrived?

What happened to the native plants when B.O.T. arrived?

Now pass out a handful of clean M&Ms to each student since they had to endure playing with M&Ms while not eating them!

4) Introduction to Fraction Estimation- How to use Quadrats (25 minutes)

This is to serve as an introduction to one of the math exercises that the students will complete on their last field trip. To fully understand this activity it is necessary to also read the write-up for Field Trip #2 in the Summer Program.

- Discuss the agenda for their last field trip again. Tell the students that you are going to introduce some concepts to them now, in the classroom, so that the field trip is easier.

Overhead Discussion and Transparencies

- While at an overhead, introduce the concept of monitoring as a part of restoration. You may choose to use this word or not depending on the maturity of the group. Most importantly, help the students understand that when we remove non-natives and plant native plants, we want to go back to the same areas to make sure our restoration is working. Otherwise we wouldn't be very effective at restoring the wetlands. When they go on the last field trip, they are going to monitor two areas of the wetlands to see if the restoration is effective at getting rid of B.O.T.
- Explain the setup for the transect activity using a blank overhead sheet and marker. Draw the transects and explain that the class will be broken up into four or five groups and stationed at specific spots along each transect. Show the students a quadrat and explain that each group will get one to lay on the ground. Once the quadrats are on the ground, each group will have to estimate the fraction of B.O.T. within the square.
- Now put the fraction estimation transparency on the overhead and get out your bristly ox-tongue construction paper cut outs. Arrange some of the cut outs within the square on the transparency and explain that the cutouts represent B.O.T. Have the kids estimate what fraction of the square is taken up by B.O.T. Write down the options with a marker and then push all the cut outs to the side of the square so the fraction becomes clear. Circle the correct guess or write it down if no one was right. Try again with a different number of cut outs in the square. Repeat again until it seems that most of the students are confident at estimating the fractions.

Small Group Estimation

- If you have five more minutes, break the students up into small groups and give each group one B.O.T. poster, a quadrat, a stack of laminated sheets with different fractions written on them. Instruct them to put the quadrats over the posters and as a group

decide how much of the B.O.T. on the poster is taking up the quadrat. Once they agree, they must put the laminated sheet with the correct fraction beside the quadrat, then walk around the classroom to look at what the other groups have come up with. Match docents and teachers up with small groups for this activity.

Vocabulary: Good Words to Know

Native: a plant or animal that belongs to, or comes from a specific place

Non-native: plants or animals that come from a part of the world other than where they are growing

Invasive: spreads aggressively into an area and takes over

Compete: to try to beat others in a fight or contest

Restoration: returning to an original, normal, or unpolluted condition

Monitoring: to check the quality or health of an area or object by collecting information

Sprouting: a baby plant beginning to grow from a seed

California Poppy



SunCups



Bee Plant



Creeping Wild Rye



Blue Eyed Grass



Rabbit



Song sparrow



California Oat Grass



Cows



Ground Squirrel



Bristly ox tongue

