Weed Lotto: How Brazen is the Invasion?

Activity Overview
Students will learn how to measure the percentage of their restoration site that is made up of non-native plants.

Objectives

Students will:
- Be able to calculate the percent frequency
- Learn about the visual characteristics of their non-native plants

Subjects Covered
Math and Science

Grades
K through 12

Activity Time
1 hour

Season
Spring, Summer, Fall

Materials
Weed Lotto worksheet, pen/pencil, clipboard

State Standards
Math:

Use reasoning abilities (A.4.1, A.8.1, A.12.1)

Communicate mathematical ideas (A.4.2), logical arguments (A.8.2, A.12.2)

Connect mathematical learning with other subjects (A.4.3)

Use vocabulary, symbols, notation (A.4.4)

Explain solutions to problems (A.4.5)

Analyze non-routine problems (A.8.3)

Develop effective oral & written presentations (A.8.4)

Explain mathematical concepts, procedures, & ideas (A.8.5)

Recognize & describe measurable attributes & units (D.4.1)

Demonstrate understanding of measurement (D.4.2)

Background

The proliferation of non-native, invasive species in a restoration site can lead to native species not having enough space, food, water or sun to flourish. It's useful to determine the frequency of occurrence of non-natives in order to decide upon control measures.

Simple Sampling Tools
A quadrat is a simple scientific tool that allows students to take a sample representative of the whole site. Here are two types of sampling devices:

Quadrats: Four dowel rods of equal length form a square. Students then take a sampling (i.e. count) of the numbers of individuals of the species inside the square.

Hoops: Hula hoops of the same size can be randomly (and gently) tossed over the students' shoulders. Students then take a sampling inside the circle.

Create a "Weed Lotto" sheet of pictures and/or descriptions of each of the non-native plants in the site. Make sure the pictures and descriptions fit the current stage of the plant (i.e. early spring- leafy part of plant, late fall- plant going to seed).

Activity Description

1. Form students into groups and demonstrate how to construct quadrats or use hoops. Then assign them two different areas for sampling.
2. Provide worksheets. The left column of the worksheet under "Species Name" should have all of the common, non-native species found in the restoration.
3. Students set up their quadrats (or hoops) in their areas. They identify non-natives by using the "Weed Lotto" sheet as a guide and then marking them on their worksheets.
4. Older students can collect the data from all the groups and their quadrats. Then under the right hand column titled "# Quads" list the number of quadrats in which that species was found. Students should have a completely filled in sheet by the end of the activity. A classroom copy could be displayed on a bulletin board for everyone to see.
5. Individually or as a class, students calculate the frequency at which each species occurs in their site. For each species, divide the number of quadrats in which that species was found by the total number of quadrats sampled and multiply one hundred.

For example: If white clover is found in six of the twelve quadrats, the percent frequency would be: 6/12 x 100 = 50%

Read & interpret measuring instruments (D.4.3)

Determine measurements by using standard tools (D.4.4)

Determine measurements by using basic relationships or estimations (D.4.5)

Identify & describe attributes in situations not directly or easily measurable (D.8.1)

Demonstrate understanding of measurement facts, principles, techniques (D.8.2)

Determine measurement directly by using standard units (D.8.3)

Determine measurement indirectly (D.8.4)

Science:

Discover how organisms meet their needs (F.4.1)

Investigate how organisms respond to internal/external cues (F.4.2)

Investigate structure & function of organisms (F.8.1)

Show organism's adaptations (F.8.2)

Extensions

- Younger students can figure out percent frequency by listing in order which plant species occurs most frequently.
- Students can translate the percent frequency into a pie chart to give further visual representation of how much of the restoration site is occupied by non-native plants.
- See Earth Partnership for Schools Activity "Young Prairie Check-Up" 8-5 to decide which non-native plants are causing the most problems based on quantity, growing and seeding characteristics.
- Make weed cards for each non-native species. See Earth Partnership for Schools Activity "Weed Cards" 8-3 Press sample plants or parts on cards with laminating film or wax paper.

Additional Resources

- Check your state Department of Natural Resources for images of non-native plants.
- Boyer, France, Dickinson, Richard (1999). *Weeds of the Northern U.S. and Canada,* A guide for identification. Edmonton; University of Alberta Press and Renton; Lone Pine Publishing.
- Czarapata, Elizabeth J. (2005). *Invasive Plants of the Upper Midwest:* An illustrated guide to their identification and control. MadisonUniversity of Wisconsin Press.
- *"Weeds of the North Central States."* (1981). University of Illinois at Urbana-Champaign, IL., (Available at County Extension Offices.)
- Shirley, Shirley. (1994). Restoring the tallgrass prairie: An illustrated manual for Iowa and the upper Midwest. Iowa City: University of Iowa Press.
- Solecki, Mary Kay (1997). "Controlling Invasive Plants," in Packard, S., Mutel, C.F. eds. *The Tallgrass Restoration Handbook*, Washington, D.C.: Island Press.

Assessments

- Students can write a brief paragraph about which non-native plants might be the most troublesome and the least troublesome, and why.

Weed Lotto Field Sheet: Quadrat Data

Researchers _____

Date _____

Location _____

Quadrat Number
(place an X if species is present)

Quadrat Number / Species Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	# Quad	% Freq