Population Explosion

Subject: Math, Science, Reading
Duration: 3-4 Class Periods
Location: Classroom / Indoors
Vocabulary: native, exotic, wetland
Related Activities: Fishy Business, Everglades "Most Wanted," Unwanted Guest, Go Back Home, Going…Going…Gone,! Break the Chain
Florida Sunshine State Standards: SC.H.1.2, SC.H.1.3, SC.G.2.3 LA.B.1.2, LA.B. 2.2,MA.A.4.2

Objectives. Students will be able to 1.) Recognize melaleuca and tell how the seeds are dispersed, 2.) Describe that meleleuca produces over 1 million seeds per year and have a concept of how much that really is, and 3.) Determine the population of melaleuca seeds for their wetland ecosystem through sampling.

Materials
- String
- Poster board
- Art Supplies
- Copies of Dot Worksheet
- Copies of Answer Worksheet
- Cotton Balls

Method. Through a simulation, sampling and estimation activity, students learn about the impact of melaleuca on a wetland due to its exponential growth. They learn about melaleuca's way of life and appreciate how scientists determine population size in an ecosystem.

Background. Melaleuca is an aggressive non-indigenous plant that rapidly disperses throughout wetland areas. It is an unwelcome intruder because it interferes with the growth of native species and occupies spaces where natives would normally grow. Melaleuca creates many problems through its competitive advantage that causes an imbalance in the wetland ecosystem.

Florida holds the title of having the second worst invasive exotic plant problem in the United States only after Hawaii. Over 25,000 exotic plants have been introduced to Florida since the New World was discovered. Invasive exotic plants, such as Brazilian pepper, melaleuca, and Old World climbing fern, pose a serious threat to the South Florida ecosystem, native plant communities, along with threatened and endangered species. Generally, exotic plants in South Florida tend to establish in disturbed areas. Melaleuca is one of the introduced plant species that is not restricted to disturbed areas.

Melaleuca is a native of Australia and was introduced in southwest and southeast Florida in 1906 as an ornamental tree and for timber. Soon after, the trees began invading wet prairies and marshes of the Everglades. In the 1930s and 1940s melaleuca was planted along the rim of Lake Okeechobee and in an area that is now part of Big Cypress National Preserve.

Melaleuca is an extremely hardy tree that thrives in wet, flooded habitats. Its thick bark acts as an insulator protecting it from damage. It is both cold and fire resistant. When melaleuca trees reach four or five years years of age, they begin flowering. In South Florida, a tree will flower up to 6 times per year. There can be as many as 40 flowers on a stem and 400 seeds per flower.

In one year a melaleuca can produce up to 1 million seeds and can store up to 20 million. The seeds are very small and have “wings” which enable them to travel long distances on wind.

Any disturbance to the tree, including fire, drought, lightning, mechanical disturbance or cold causes the seed pods to open and release the seeds. Herbicide treatment will also cause the tree to release its millions of seeds. Becuase of this, it was estimated the melaleuca trees advanced across the Everglades at a rate of 50 acres per day. By the early 1990s, melaleuca trees had invaded 488,000 acres in South Florida.

Strands of melaleuca can become so dense that animals and people are unable to travel through them. Dense areas can impede water flow and cause higher water loss. Many people are allergic to melaleuca pollen and it also takes away wildlife habitat. Melaleuca strands are only occassionally used for nesting and roosting birds. Today melaleuca has become a threat to the character of the irreplacable Everglades ecosystem.

Suggested Procedure

1. For one or two class periods, have the students, in groups, draw a wetland ecosystem that is found in South Florida on the posterboard. (Hint: have each group draw a different type of habitat)

2. Distribute the information sheet on melaleuca and discuss this with the students. Also discuss methods that scientists use to study ecosystems, as the students will be doing an example of this with their posterboard.

3. Have the students work through the activity sheet “How Much Is One Million Seeds?” to realize the enormity of this number. If possible, bring in one ream of paper (500 sheets). One ream of paper with 2000 dots on each page would make 1 million dots!

4. Have students work within the same groups they were in for step 1. Students make a grid on the wetland poster by drawing lines or stretching string to make equal-sized sections. For example, posterboard that is 22x28 inches (56x70 centimeters) could be divided into sections of 14 square centimeters. Students could mark off every 14 centimeters down (4 marks) and every 14 centimeters across (5 marks). The total number or sections would be 20. Then have students draw lines in or stretch strings across at these marks and tape them down. Stretching string across the posterboard would be a simulation of what is actually done in the field. Last, have the students number the posterboard sections.

5. Each group lines up their wetland ecosystem side by side leaving no spaces. The teacher spreads out a bag of cotton balls on cardboard. This will represent the “parent” melaleuca strand. With a fan or hair dryer, the teacher simulates the wind and spreads the seeds to every ecosystem. Students should take their ecosystems back to their desks to count the seeds. They must guess how many “melaleuca seeds” are in one section.

6. Then they should guess how many seeds are dispersed througout the whole ecosystem. Students should look at their wetland and determine what section will be used to to count the melaleuca seeds. All the seeds in this section are to be counted, and each group can devise their own way of doing it. To find the estimate, students should know that the size of the population equals the number in the section that was counted multiplied by the number of

sections. **Population=Number In One Section x Number of Sections** If there is time, have students estimate and then count another section. Compare the results.

7. Compile the data from each of the groups. The ecosystem closer to the parent plant (fan) will receive more of the seeds. Notice how the seeds can be spread by the wind. Draw the ecosystems on the chalkboard and duplicate the path of the spreading seeds.

8. Discuss the following questions (with sample answers):

Melaleuca seeds can also travel by water and on things that move from place to place. How would this affect our findings? *The different ways they are transported would affect how far and how fast the seeds could be dispersed.*

Did each section of your ecosystem have the same number of seeds? Which ecosystems had the most seeds? The least seeds? What factors determined which ecosystems got the most? *Each section counted should yield a different number of seeds. Ecosystems closer to the fan should receive the most seeds if the wind is not very strong. Students need to realize that a scientist cannot possibly count every organism. If they could, that organism would only be found in low numbers, meaning that the organism is probably endangered or almost extinct*

Evaluation

1. Have students describe how to count the number of insects in a square meter area of the playground, using the sampling method.
2. By making calculations, have students compute how many sheets of paper with dots are needed to make 3 million.

Extension

Have students research the difficulty of getting rid of melaleuca and its impact on a wetland. How does it upset the balance of a wetland ecosystem?

How Much Is One Million Seeds?

Objective: To realize the magnitude of large numbers and to see how many dots will make 1 million.

Directions: Please read all questions and show any work necessary to calculate your answers. All questions refer to the number of dots on the worksheet.

1. How many dots are there on the worksheet? _____

2. How many total dots would there be on 5 sheets of paper? _____

3. How many total dots would there be on 50 sheets of paper? _____

4. How many sheets of paper would it take to make 1 million (1,000,000)? _____

5. How many sheets of paper would it take to make 20 million (20,000,000)? _____

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5. How many sheets of paper would it take to make 20 million (20,000,000)? _____

How Much Is One Million Seeds? (Answer Key)

Objective: To realize the magnitude of large numbers and to see how many dots will make 1 million.

Directions: Please read all questions and show any work necessary to calculate your answers. All questions refer to the number of dots on the worksheet.

1. How many dots are there on the worksheet? _____
[40 x 50 = 2,000]

2. How many total dots would there be on 5 sheets of paper? _____
[2,000 x 5 = 10,000]

3. How many total dots would there be on 50 sheets of paper? _____
[2,000 x 50 = 100,000]

4. How many sheets of paper would it take to make 1 million (1,000,000)? _____
[1 million would be 10 x the number above = 10 x 50 = 500]

5. How many sheets of paper would it take to make 20 million (20,000,000)? _____
[20 million would be 20 x the number above = 20 x 500 = 10,000]

Dot Worksheet