

## Introduction

This activity is a simulation designed to show that habitat destruction can contribute to species extinction. The activity is best done outdoors on a lawn, but it can be easily adapted to be a classroom activity.

## Grade Level

Grades 5 – 8

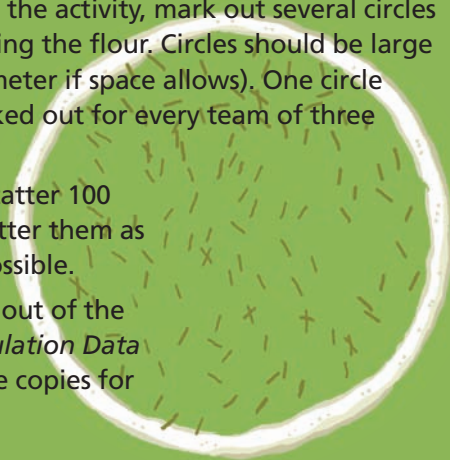
## Materials Needed

- Several boxes of wooden toothpicks
- Stopwatch or wristwatch
- Pencil and paper
- Flour to mark areas on the lawn



## Teacher Prep

1. The day before the activity, mark out several circles on the lawn using the flour. Circles should be large (20 feet in diameter if space allows). One circle should be marked out for every team of three students.
2. In each circle scatter 100 toothpicks. Scatter them as randomly as possible.
3. Prepare a handout of the *Extinction Simulation Data Table* and make copies for your students.



Extinction Simulation Data Table

Round	# At Start of Round	# Collected During Round	# Remaining at End of Round	Additional Scatter
1	100			
2				
3				N/A

## ACTIVITY

- 1 Divide the class into teams of three and assign each team to one of the areas marked out on the lawn. Designate one student as the “**hunter**,” one student as the “**timer**,” and the third student as the “**counter**.”
- 2 Tell the students that there are 100 “**toothpick grasshoppers**” in their circle. Tell them that the hunter will have two minutes to “catch” as many toothpick grasshoppers as she or he can.
- 3 Have the timer for each group say, “**Ready. Set. Go.**” and then time two minutes for the hunter to collect toothpick grasshoppers.
- 4 At the end of the two minutes, have the counter determine how many toothpick grasshoppers have been caught and then calculate the number of toothpick grasshoppers remaining in the circle. The counter then records this information on the **Extinction Simulation Data Table** handout.
- 5 Have the team scatter one additional toothpick grasshopper into the circle for every pair of toothpick grasshoppers remaining. This simulates **reproduction**.
- 6 Have the group rotate roles and **repeat the activity a second time**, recording the information on the handout when done.
- 7 After the second round is finished, have the group rotate roles once again and **repeat the activity for a third time**, recording the information on the handout when done.
- 8 Have the students draw a line graph of the number of toothpick grasshoppers in the grass at the end of each round as a function of time.
- 9 Discuss with the students the implications of the graphs. Some focus questions might include:
  - a. *What has happened to the population of toothpick grasshoppers over time? Answers might include “The numbers dropped,” or “The numbers became steady.”*

(continued)



b. What environmental factors might account for differences in the graphs and/or total numbers of toothpick grasshoppers from group to group? Answers might include, "There were different kinds of grass in each circle," or "The backgrounds were different," or "The 'hunters' were different."

c. Have the class discuss what effect habitat reduction might have on the toothpick grasshoppers' population. Have them suggest a method for testing their hypothesis. Suggestions should include reducing the circle size and repeating the activity.

10 Using the suggestion of circle size reduction, repeat this activity on a second day and compare the resulting graphs with the first day's results. Do this by reducing the diameter of each circle by one third. Or one half, depending on how quickly you'd like extinction to occur. If you have time, perhaps you could reduce the diameter of each circle by one third, and repeat the process reducing the diameter by one half.

11 If no "extinction" has occurred, discuss why not with the class. If extinction has occurred, discuss why with the class.

## CULMINATING ACTIVITY

Have the class watch *Nature: The Loneliest Animals*. Have them discuss what human factors might have contributed to the population reduction of the species featured in this episode.

## EXTENSIONS

1 If it is not possible to do this simulation outdoors, it can be done indoors using **colorfully patterned cloth squares** as the background and **paper punch-outs** using some sort of **colored construction paper**. Choose a variety of different cloths for the backgrounds. The more mottled the cloth, the better. The larger the cloth square, the better as well. If your classroom is carpeted, you may be able to use the carpet itself as the background. It is not necessary for the cloth samples to be a specific shape, but to compare results, each cloth sample should be of similar size.

Use a paper punch to create identically sized circles of color.

The first time you try this activity, use one color of construction paper for the circles. Try to match the construction paper color to the background so the paper circles blend in, making them harder to find.

Depending on the starting size of the cloth background, you may be limited in the number of times you can reduce the **hunting area**. Don't worry. The smaller the hunting area, the more dramatic the **extinction** will become.

2 How can animal populations avoid extinction?

This simulation can be easily changed to show how variations within a species can enhance that species' ability to survive.

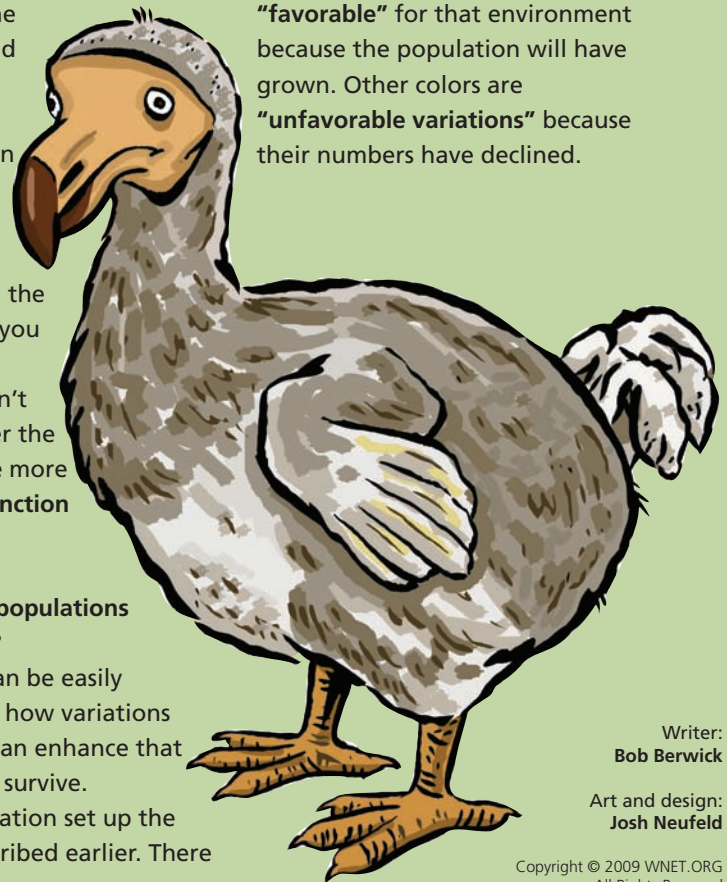
Set the simulation set up the same way as described earlier. There

are two exceptions:

(1) Rather than scattering 100 toothpicks of the same color, use four different colors of toothpicks (**red, green, blue, and yellow**, perhaps). Scatter 25 toothpicks of each color in the circles, and record the number of each color "**surviving**" at the end of each round. **Pairs of "survivors"** reproduce one additional toothpick of that color to be scattered before the start of the next round.

(2) Keep the circles the same size for the various rounds. This will vary only one condition for each trial of this simulation.

Once the data on each color has been collected, line graphs of the number of "**survivors**" of each color can be drawn. Students will easily see that some colors are "**favorable**" for that environment because the population will have grown. Other colors are "**unfavorable variations**" because their numbers have declined.



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