Objective: A simulation which will illustrate how owl populations are influenced by the population of their prey.

Materials:
Beans - 100 each of 4 colours (lima, white, pinto, etc.)
NOTE: you could use M & M's or Smarties if you can afford them
Paper cups - 1 per student
Plastic forks - 1 per "adult owl"

Do the activity on a lawn area or on a multicoloured tablecloth.

Overview:
There are two types of owls in our story: parents and fledglings. The parents (selected students) prey upon rodents (beans or M&M's). They feed their "rodent" catch to their offspring (other students) who hold them in their "stomach". Different rodent species are represented by different coloured beans or M&M's.

The green M&M's or one of the bean colours represent a rodent which has ingested a significant amount of pesticide. Don't tell the students about this until after the investigation.

In Action:
1. Set up between 4 and 5 "owl families". Most should have 2 parents however at least one should have a single parent (owls do die sometimes). Vary the family size from as low as 4 to at least one with 8 individuals.

Example (class of 35):
- 2 adults with 7 fledglings
- 2 adults with 7 fledglings
  (break off part of the fork for one adult - this represents a broken claw)
- 2 adults with 5 fledglings
- 1 adult with 5 fledglings
- 2 adults with 2 fledglings

2. Each participant receives a "stomach" (a cup) and the adults receive their "claws" (the forks).

3. Choose a table in the classroom (or a lawn area outside) to be the field. Cover the table with a multicoloured tablecloth which provides some camouflage for the rodents. If you are using the beans, you may wish to spread the "rodents" in a 5 x 5m grass area. Spread the 400 "rodents" beans or M&M's in the field.
4. Move the owl families to their "nest" (about 10 metres from the "field").

5. The parent birds must only use their "claws" (forks) and not their hands. They can only carry one "rodent" at a time. The parents must feed themselves one rodent first and one after every 3 feedings. Any "rodent" which falls on the floor is lost and cannot be recovered.

6. Each offspring must make an appropriate "hoot" to get fed. The "rodent meal" is placed in their cup and will be counted later.

7. The game should be timed. About 5 to 6 minutes seems to be appropriate length - this represents one week in the life of an owl.
   *The length of time is not the critical factor. Make sure they have "eaten" at least 50% of the "rodents" so you will have some owls surviving.
   HINT: make a visual count of the faster adults to see if they have at least seven or eight "rodents".

8. At this time, each group needs to count the types and numbers of "rodents" eaten and complete the chart (Appendix 1). Compile each group's data on a class chart (Appendix 2).

9. After completing step 8 you may now inform the class that each owl needed 7 rodents to survive. Any owl failing to eat the 7 is now considered to be a mortality. Discuss with the students how this number may fluctuate depending on environmental factors.

   Any owl that "ate" two or more of the pesticide contaminated rodents (green M&M's or beans) also dies.
   (A tough step - but it happens in real life.)

10. Each group now completes the information on the chart (Appendix 3). Deaths from pesticide count only if they ate at least 7 rodents (2 of which were contaminated). eg. If the "owl" ate only 3 rodents, 2 of which had pesticide. They really died of starvation. This data must now be shared with the whole class. The questions can now be considered.
Family # _______ adultes ______ fledglings

## Rodents Eaten

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>Offspring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>colour 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>colour 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>colour 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>colour 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The total number of rodents eaten by the family is _____.

The average number of rodents eaten per owl is ______.

The average number of colour 1 rodents eaten per owl is ______.

The average number of colour 2 rodents eaten per owl is ______.

The average number of colour 3 rodents eaten per owl is ______.

The average number of colour 4 rodents eaten per owl is ______.
## Class Data

### Owl Mortalities and Survivors

<table>
<thead>
<tr>
<th>Family Number</th>
<th>Number of Parents</th>
<th>Number of Fledglings</th>
<th>Death from Pesticide</th>
<th>Death from Starvation</th>
<th>Survivors</th>
<th>Total Survivors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>PAR.</td>
<td>FLED.</td>
<td>PAR.</td>
<td>FLED.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Totals**
OWLS

Name_____________________

You will be using class data from your charts to answer the following.

1. How many rodents were eaten by the owls?  
   How many rodents survived predation?  

2. How large was the initial owl population?  
   How many owls were killed by starvation?  
   How many owls were killed by the pesticide?  
   How many owls survived?  

3. Did the number of adults in the family influence the number of fledglings that survived? How do you know?

4. Did the owl with the broken claw provide for its family as well as the owls without this condition? Explain.

5. Did the number of fledglings in each family influence the survival rate in the family? Give reasons.
6. If we had played this game with only 100 rodents would this have influenced the outcome? Why or why not?

7. In the natural environment the number of rodents and owls in a given area stays relatively the same from generation to generation instead of "dying out". Explain why this happens.

9. A beetle enters the forest where the owls are nesting. The beetle carries a fungus which destroys the trees where owls build their nests. Predict how this event may influence the populations of the owls and the rodents in this area.
PLEASE FEEL FREE TO PHOTOCOPY.
### Bone Sorting Chart

<table>
<thead>
<tr>
<th></th>
<th>Rodents</th>
<th>Shrews</th>
<th>Moles</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skulls</td>
<td><img src="image1" alt="Skull" /></td>
<td><img src="image2" alt="Skull" /></td>
<td><img src="image3" alt="Skull" /></td>
<td><img src="image4" alt="Skull" /></td>
</tr>
<tr>
<td>Jaws</td>
<td><img src="image5" alt="Jaw" /></td>
<td><img src="image6" alt="Jaw" /></td>
<td><img src="image7" alt="Jaw" /></td>
<td><img src="image8" alt="Jaw" /></td>
</tr>
<tr>
<td>Loose Teeth</td>
<td><img src="image9" alt="Loose Teeth" /></td>
<td><img src="image10" alt="Loose Teeth" /></td>
<td><img src="image11" alt="Loose Teeth" /></td>
<td><img src="image12" alt="Loose Teeth" /></td>
</tr>
<tr>
<td>Shoulder Blades</td>
<td><img src="image13" alt="Shoulder Blades" /></td>
<td><img src="image14" alt="Shoulder Blades" /></td>
<td><img src="image15" alt="Shoulder Blades" /></td>
<td><img src="image16" alt="Shoulder Blades" /></td>
</tr>
<tr>
<td>Front legs</td>
<td><img src="image17" alt="Front Legs" /></td>
<td><img src="image18" alt="Front Legs" /></td>
<td><img src="image19" alt="Front Legs" /></td>
<td><img src="image20" alt="Front Legs" /></td>
</tr>
<tr>
<td>Hips</td>
<td><img src="image21" alt="Hips" /></td>
<td><img src="image22" alt="Hips" /></td>
<td><img src="image23" alt="Hips" /></td>
<td><img src="image24" alt="Hips" /></td>
</tr>
<tr>
<td>Hind legs</td>
<td><img src="image25" alt="Hind Legs" /></td>
<td><img src="image26" alt="Hind Legs" /></td>
<td><img src="image27" alt="Hind Legs" /></td>
<td><img src="image28" alt="Hind Legs" /></td>
</tr>
<tr>
<td>Assorted ribs</td>
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<td><img src="image30" alt="Assorted ribs" /></td>
<td><img src="image31" alt="Assorted ribs" /></td>
<td><img src="image32" alt="Assorted ribs" /></td>
</tr>
<tr>
<td>Assorted vertebrae</td>
<td><img src="image33" alt="Assorted vertebrae" /></td>
<td><img src="image34" alt="Assorted vertebrae" /></td>
<td><img src="image35" alt="Assorted vertebrae" /></td>
<td><img src="image36" alt="Assorted vertebrae" /></td>
</tr>
</tbody>
</table>

**Caterpillar Larvae and Cocoons**

**Caterpillar Droppings**
OWL PELLETS: AN EXPERIENCE IN ECOLOGY
SOURCEs AND RESOURCES


Carolina Biological
Burlington, NC 27215
1-800-334-5551
pellets

Connecticut Valley Biological
82 Valley Road, Box 326
Southampton, MA 01073
1-800-628-7748
books, kit, display, pellets

Creative Dimensions
Box 1393
Bellingham, WA 98227
pellets, posters, teachers guide, student kit


Fisher-EMD
4901 West LeMoyne St
Chicago, IL 60651
1-800-621-4769
Lab-Aids kit


Genesis
Box 2242
Mount Vernon, WA 98273
206-428-6764
pellets, worksheets, transparency, teachers guide

Lab-Aids
249 Trade Zone Drive
Ronkonkoma, New York 11779
pellets, student kit, worksheets
NASCO
901 Janesville Ave, Box 901
Fort Atkinson, WI 53538-0901
414-563-2446 or 1-800-558-9595
Lab-Aids kit, pellets

National Science Teachers Association
1742 Connecticut Avenue, NW
Washington D.C. 20009
poster

Pellets
3004 Pinewood
Bellingham, WA 98225
206-733-3012
pellets, transparencies, teachers guide

Sargent-Welch
7300 North Linder Ave, Box 1026
Skokie, IL 60077
1-800-SARGENT
Lab-Aids kit, book


Senger, Clyde M. Key to the Mammal Skulls Found in Owl Pellets Collected in Western Washington. Western Washington University, October, 1980.
