

PREPARATION: Make craft dough (or paper territories for Modification).

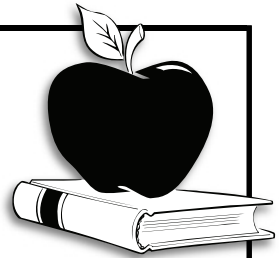
CLASS TIME: one class period

VOCABULARY: territory, forest interior species, fragmentation

MATERIALS: craft dough—enough for one lump of dough per student (or paper and compasses for Modification); round cookie cutters or similar items, such as jar lids—one for each student; rolling pins or other similar items; waxed paper; a table knife

NEXT GENERATION SCIENCE STANDARDS: MS-ESS3-4, MS-LS2-4, MS-LS2-5

TEACHER'S GUIDE



ACTIVITY

Territory Tango

OVERVIEW

Students make craft dough models of bird territories to learn about habitat requirements of interior forest species compared to edge species.

CONCEPTS

- People and some birds depend on forests for their needs.
- Bird populations are affected by human impact on their habitat.
- Each forest management option may limit other forest uses.
- Human use and management of forests affects bird populations.

OBJECTIVES

Students will be able to: 1) demonstrate how forest fragmentation reduces habitat for some migratory birds; and 2) explain that some birds require interior forest habitat, while others thrive on the edge.

KEY POINTS

- Bird species have different habitat requirements.
- Some bird species require interior forest habitat to succeed.
- Some bird species require forest edge habitat, grassland, wetland or other habitat types.
- Dividing a forest into smaller sections alters the habitat, even if the total area forested remains the same.

TEACHER BACKGROUND

When the European explorers and settlers came to Illinois, portions of the state were covered with extensive, mature forests that were broken by the open sweeps of marshes, savanna and prairie. In some places where the forest met the open prairie, there were savannas, with scattered trees and a grassland understory. The part of

the state not covered by prairie was covered by forests of oak and hickory, maple and basswood, as well as mixed broadleaved trees and conifers, and other forest types. In these great forest tracts lived many kinds of mammals and birds.

Some wildlife species need large forest stands to find food and shelter to successfully rear their young. Among them are many species of birds, called interior forest species, because they live in the interior of large forested areas. The ovenbird and scarlet tanager are examples of interior forest birds.

As Illinois was being settled, trees were cut for lumber and to clear the land for farming, much as people are doing for new settlements in the tropics today. Wood was used to build homes, factories and other artifacts of modern living. Wetlands were drained, and prairies were plowed. Since reaching a low point in the 1920s, the forest cover has slowly grown back. However, we have divided the land into smaller areas and compartments for the variety of uses we demand for our lives, thus we have fewer extensive forests and more smaller woodlots. We call this division of forest land into smaller sections "fragmentation."

Some forest interior bird populations are limited by this land conversion. Other species, such as the indigo bunting, prefer a more open setting and can thrive on the edge of forests. The indigo bunting is a Neotropical migratory bird that breeds in Illinois.

Several small woodlots hold fewer interior wildlife species than one large forest, since conditions in small woodlots are different than in a large forest. In a large forest, the distance to the nearest edge or opening may be miles away, while in a 40-acre woodlot it can be no more than about 200 yards. Winds from the surrounding land keep a moist micro-climate from developing and discourage certain plants from living there. Also, brown-headed cowbirds (*Molothrus ater*) venture into these small areas to lay their

eggs in the nests of other birds. Forest interior bird species, not having lived with cowbirds before, produce fewer young, and may actually now only raise cowbirds. In other words, the area has been upset to a point where it no longer functions as an interior forest ecosystem for certain plant and animal species.

The smaller woodlots can be beneficial to those species that thrive on the forest edge, such as the indigo bunting. The abundance of indigo buntings has increased since the turn of the century with the creation of favorable habitat following logging operations and abandonment of pastures. While indigo buntings are frequent cowbird hosts, they have a strategy to defend against this parasitism (the laying of eggs by another species in the host's nest). Indigo buntings occasionally bury cowbird eggs by building a new floor in the nest.

As we fragment the forest community into smaller segments, it becomes harder for those species that depend most on forest interior habitat to survive and reproduce successfully. A forest rich in biological diversity may be home to dozens of bird species. When we fragment the forest, we reduce the size of their habitat. We also open the area to invasion from competitors like brown-headed cowbirds, the introduced European starling (*Sturnus vulgaris*), or predators such as raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*) and cats (*Felis catus*). With the destruction of habitat, some forest birds no longer use the area because of the lack of space, while others cannot successfully raise their young. Over time, these populations decline.

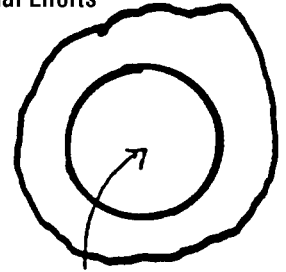
As we turn our attention to the loss of tropical habitat, we need to keep in mind that many birds come to Illinois to raise their young. The way we manage our forests is just as important to migratory bird survival as land management in the tropics.

PROCEDURE

1. Tell the class they will carve bird territories out of dough. Have the students assist with the mixing of the craft dough or bring it pre-mixed from your home (simple recipes follow). You may also purchase the craft dough if you do not want to make it.
2. Divide the class into cooperative groups: in each group, half the students are "ovenbirds" (an interior forest species) and half are "indigo buntings" (edge specialists).
3. Give each class member a lump of dough that would be **just** big enough for one cut-out. Pass out lids to use as cookie cutters, waxed paper to work on and rolling pins (or similar cylindrical items).
4. Explain that the dough represents the forest habitat, and the cut-outs represent breeding territories. Explain

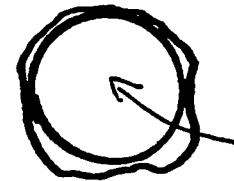
that only whole cut-outs (territories) are allowed and that they cannot put scraps together to role out more cut-outs because birds can't create more habitat this way. Tell students that a thin, stretched cut-out will represent poor quality habitat.

Individual Efforts



Ovenbirds define their territories in the forest interior, with a buffer zone between the territory and the edge.

5. Explain to the "ovenbirds" that they prefer interior forest territories and that their cut-outs must be made with



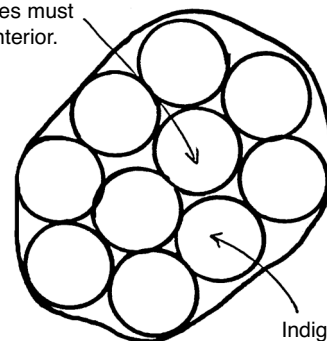
Indigo bunting territories can go up to the edge of the forest.

a border of one inch of dough all around. This arrangement is not because ovenbirds have bigger territories, but to simulate interior forest territory with a buffer zone. The indigo buntings can make their cut-outs right up to the edge. (See illustrations.)

6. After they've tried this procedure, discuss how it worked. The ovenbirds were probably not able to create a territory with their lump of dough. If they were, it was probably too thin to be good quality habitat.
7. Redefine the group's goal: to make as many complete territories as possible, with just one round of cutting (i.e., without putting all the scraps together, rolling them out and cutting out more). All the bird territories must be whole (no partial cut-outs), and ovenbirds must have at least a one-inch border from the edge of the dough. Ovenbird territories may be next to indigo bunting territories, but not next to the edge. Explain that ovenbird territories normally don't overlap. Ideally, the group members will combine dough into one big sheet to get more territories, placing ovenbirds in the interior and indigo buntings around the edge. If the students do not adopt this

Cooperative Efforts

Ovenbird territories must be in the forest interior.



Indigo bunting territories may be in the buffer zone around the forest edge.

strategy after a while, suggest it to them. They should be able to get more territories than by working individually.

8. See how many interior and edge territories each group is able to cut from the dough and record class totals. Is there any way that more territories could be cut without making them thinner? Re-lump the dough. Merge several groups, then the whole class, and see how many territories can be carved out of the larger roll of dough. This number of interior territories should be higher than their previous totals.
9. Once all the territories have been counted, cut a thin, straight line through the center of the dough. Tell the students the people living on one side of the forest need to get to town on the other side, so they made a road, as represented by the knife line. Now see how many whole territories are left. Ovenbird territories must be one inch from this line, since the road has created a new edge.
10. Discuss how the dough represents the forest and the cut-outs represent the minimum space requirements for one pair of breeding ovenbirds or indigo buntings. Relate the dough activity to key points. Different birds require different habitats and dividing the forest, even by a slender road, fragments the forest and alters it as habitat for some species. Relate what students have learned to forest management. How would they manage a forest differently for edge or interior species?

DISCUSSION

1. Ask students why the ovenbirds had to have territories at least one inch from the forest edge. Why were the students able to get so many thick cut-outs from the larger sheet of dough when it was so difficult with the small individual portions? If you were managing a forest for indigo bunting habitat, what would you do? How about for ovenbird habitat? Why is it important for ovenbirds to have access to large blocks of forest, rather than just many small woodlots? Did cutting the sheet of dough with the knife reduce the number of whole territories that were able to be cut from the dough? What would be a parallel disturbance in a real forest? Point out that when we use forest land for one purpose, it may limit other uses.

MODIFICATION

Substitute four-inch squares of green construction paper for the craft dough and have students draw circular territories 3.5 inches in diameter with a compass. When students would re-lump the dough, have them turn over their paper squares so when they combine them with several groups together, the new compass-drawn circles will not be confused with the earlier ones. Create larger tracts of forest by putting paper squares together (like

pieces of a puzzle) instead of combining dough. In the final combination of green squares for the whole class, you can change marker color to help avoid confusion. Draw the road with a different colored marker as well.

EXTENSION

Use the remaining dough to make a model of your sister country or a model of the Westerly forest in the "Town Meeting" activity.

ASSESSMENT

1. Have students write about how forest fragmentation affects interior forest birds and edge species.
2. Assess participation in cooperative groups.

BAKER'S DOUGH

This recipe is simple to make but should be mixed just before class to avoid over-stickiness.

Materials:

2 cups flour ½ to 1 cup water
1 cup salt food coloring (green)

1. Combine flour and salt together in mixing bowl.
2. Gradually add water.
3. Mix dough with your hands until it is pliable and not sticky.
4. For color, add food coloring to the water.

This recipe makes enough dough for approximately 18 students.

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CRAFT DOUGH

This recipe is more complex, but the dough is easier to work with.

Materials:

2 cups baking soda 1 1/4 cups cold water
1 cup corn starch food coloring (green)

1. Combine all ingredients, except food coloring, in sauce pan.
2. Cook over medium heat, stirring constantly, for 10 minutes until mixture is consistency of mashed potatoes.
3. Remove from heat, turn out onto a plate, and cover with a damp cloth.
4. When cool knead into a smooth ball, adding food coloring.
5. Store in tightly sealed plastic bag and refrigerate.

This recipe makes enough dough for approximately 20 students.