

PREPARATION: Make songbird and cowbird "beaks."

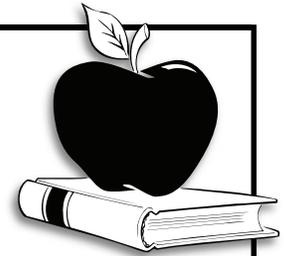
CLASS TIME: 20 to 30 minutes

VOCABULARY: cowbird, brood parasitism, fragmentation, edge effect

MATERIALS: 1 blindfold; 4 small (4- to 6-ounce) paper or plastic cups; 1 large unbreakable mixing bowl or plastic container (e.g., the bottom half of a plastic milk jug); 5, three-foot pieces of string; popped popcorn

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

TEACHER'S GUIDE



ACTIVITY

Cowbird Capers

OVERVIEW

Students participate in a simulation of brown-headed cowbird (*Molothrus ater*) parasitism.

CONCEPTS

- Bird populations are affected by human impact on their habitat.
- Human use and management of forests affect bird populations.

OBJECTIVES

Students will be able to: 1) recognize that forest fragmentation increases "edge effects" including brood parasitism; 2) recognize that brood parasitism affects the reproductive success of forest songbirds; and 3) describe how nests of breeding songbirds are parasitized by brown-headed cowbirds.

KEY POINTS

- Forest fragmentation increases edge effects.
- Those edge effects impact negatively on interior forest bird populations.

TEACHER BACKGROUND

In "Territory Tango," forest fragmentation was discussed as one reason for the decline of songbird populations. Breaking a forest into fragments reduces the total number of suitable territories, and hence nesting sites, for those birds that depend on interior forest.

Fragmentation contributes to the decline of migratory bird populations in another way too, by giving parasitic birds access to their hosts, a phenomenon referred to as brood parasitism.

Brood parasites are birds that lay their eggs in the nests of other birds (host species). The parasite's eggs hatch and are raised by the host species. Some parasites never rear their own young and are, therefore, totally dependent on host species. The brown-headed cowbird

is the most common nest parasite in North America. Because the host parent birds are attending to the parasite young, often few or none of the host's own young survive. Young cowbirds tend to hatch and develop more quickly than most songbirds' young. Often they are bigger too, and they may push others out of the nest. Many of the host species that co-evolved with the brood parasites have reduced the success of parasites through a variety of strategies, such as building a new nest or pushing the parasite eggs out of the nest. However, if a host species has not co-evolved with a parasitic species, the host may lack the strategies necessary to cope with parasitism. This situation is true in North America, where the brown-headed cowbird can now reach populations of forest songbirds.

The brown-headed cowbird, prior to European settlement, was found in the western part of our country. Its habitat was open grassland. It followed American bison (*Bison bison*) herds, eating insects from their dung and from the prairie disturbed by their great hooves. Because it followed the herd to find food, it could not warm and hatch its own eggs and raise its young, so cowbirds adapted by using the nests and parenting abilities of other birds. With settlement and the subsequent deforestation of large areas of eastern North America, the range of the cowbird has expanded. Along with deforestation has come significant forest fragmentation. The fragments contain more area that is adjacent to the forest edge, and cowbirds have increased access to forest bird nests.

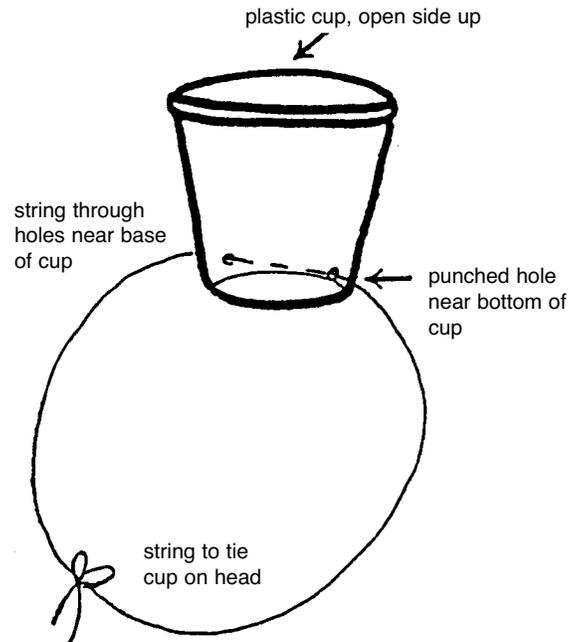
Forest fragmentation and increased edge effect were not the only influences on cowbird parasitism. The cowbird population has also increased sharply, due in part to an increase in rice cultivation in the south. Rice provides a winter food source, which was previously lacking. Now, increased cowbird populations, in combination with increased forest fragmentation and edge effects, have led to increased brood parasitism.

Many forest-breeding Neotropical migratory birds have not developed defenses to parasitism. The susceptible

host birds include warblers, vireos, flycatchers, tanagers and thrushes. If cowbird populations continue to rise, the populations of our forest-dwelling Neotropical migratory birds are likely to continue to decline.

PROCEDURE

1. Thread each of the small paper or plastic cups onto a three-foot piece of string by punching two small holes on opposite sides of the container within one-half inch of the bottom.
2. Ahead of time, secretly select a student with a loud voice to play the role of the baby cowbird. Tell the cowbird to join the others in the circle when you give the signal. Explain the activity to the selected student, but keep the cowbird's role secret from the rest of the class.
3. Introduce the activity with a question about why songbird populations are declining or what effect cutting large tracts of forest into small fragments surrounded by nonforested areas has on forest birds. Say, "Let's simulate a songbird nest to find out."
4. Select four students to be baby songbirds. Have them sit facing outward in a tight circle on the ground or on chairs. Tie the plastic cups onto the heads of the four baby songbirds like hats but with the open end pointed up. Explain that the cups represent the open mouth of the hungry baby birds. When the parent bird returns to the nest, the baby birds call loudly ("Tweet tweet tweet...") to signal the parent bird that they are hungry. The parent bird responds by distributing food to the hungry babies. Typically, the loudest bird attracts the most attention and thus gets the most food.
5. Select one student to be the parent bird. Give that student a blindfold and a bowl of popped popcorn. The parent bird distributes food (popcorn) to the hungry baby birds by standing at the edge of their circle and dropping or tossing pieces of popcorn in the direction of the tweeting birds. Blindfold the parent bird to ensure that s/he is distributing the food only in response to whomever is tweeting the loudest. Each baby bird must catch at least ten pieces of popcorn in the cup in order to survive. Caution students against trying to actively position themselves to catch the popcorn as this could result in banging heads with another student. Rather, they should simply tweet louder to get the attention of the parent bird.
6. After the directions are given and the parent bird is blindfolded, the baby cowbird is signaled to quietly enter the circle and sit in the center of the other baby birds. Don't let the parent bird know that this is happening. The baby cowbird competes for food and is aided by the larger container, such as a mixing bowl, which s/he holds on his/her head to represent the



bird's open mouth. The baby cowbird should join the other baby birds in tweeting loudly for food. The cowbird's larger "mouth," louder voice and central location in the nest should give it a clear advantage over the baby songbirds and allow it to catch a significant portion of the distributed popcorn. To simulate the real-life situation of limited resources, limit the amount of popcorn given to the parent bird to throw.

7. Continue the activity until the parent songbird has used the popcorn, then have the baby birds count their pieces of popcorn.
8. Discuss how many songbirds survived. Why did so few survive? How much popcorn did the cowbird catch?
9. Define cowbird parasitism. Explain that cowbirds parasitize songbird nests and that brood parasitism from cowbirds is one factor in the population decline of songbirds. Point out that humans have altered the forest, creating more of an edge. This change in landscape has put forest birds in close proximity to the cowbird.
10. Ask whether the people of Puerto Rico should be concerned about what cowbirds are doing in the Midwest? Why or why not?

DISCUSSION

1. If all the popcorn kernels caught by the cowbird were distributed to the other baby birds in the nest, how many of them would have survived? What impact do cowbirds have on the nesting success of songbirds? What will eventually happen to songbirds if brood parasitism continues year after year?

2. Is there anything that humans can do to protect songbirds from cowbird parasitism? (Short-term responses could include trapping cowbirds, removing cowbird eggs from songbird nests or in some other way discouraging them from parasitizing songbird nests. Long-term solutions include restricting the geographic range of cowbirds by reducing the amount of forest edge and restoring the presence of large unbroken tracts of forest.) Is this something that people should do? Is the current situation "natural?" Does it preserve the balance of nature? Why do cowbirds parasitize other nests? How have changes in the rural landscape affected cowbird populations? Why is it that cowbirds are more of a threat to songbirds now than they were in the past? What changes have occurred in the landscape of the Midwest? This change in landscape has put forest birds in close proximity to the cowbird. Who is responsible for the current cowbird situation? Who is responsible for protecting the songbirds?
3. Tell students about the endangered Kirtland's warbler and the recovery effort to reduce cowbird parasitism on the warbler's nest (as explained in "Intelligent Tinkering").

MODIFICATIONS

Not all species of songbirds are successfully parasitized by cowbirds. Those that have co-evolved with cowbirds for long periods of time (hundreds or thousands of years) are able to distinguish cowbird eggs from their own eggs and may either throw out the cowbird eggs, build a new nest floor over the cowbird eggs or simply abandon the nest completely and start over elsewhere. To represent such adaptations, the activity could be repeated with the modification that if the blindfolded par-

ent is able to distinguish the "tweet" of the cowbird from the "tweets" of the songbirds, then the cowbird can be evicted from the nest and the baby songbirds will have a better chance of surviving.

This activity can also be done with the entire class participating in small groups, rather than with only one group of five or six students actively participating while the other students observe the outcome.

EXTENSIONS

1. Students could prepare a report on cowbirds and find out how to recognize their eggs. How do state agencies and other wildlife managers recommend dealing with the cowbird situation?
2. Some students may want to conduct their own study of cowbird parasitism. They could look for nests of songbirds to see whether or not they are being parasitized by cowbirds. Cowbird eggs are most common in songbird nests during May and June. During these months, students with supervision could check to see if there are any cowbird eggs in them. (Cowbird eggs are usually white profusely speckled with brown. They should look different than the eggs of the host bird.) Caution students against disrupting the parent birds tending the nest.
3. Have students speculate why brood parasitism evolved. Think about the feeding behavior of cowbirds. They evolved to forage along with nomadic bison and had no time to build nests and raise young hence, host species.

ASSESSMENT

1. Have students describe cowbird parasitism and explain how it affects songbirds.