

CLASS TIME: one to one and one-half class periods

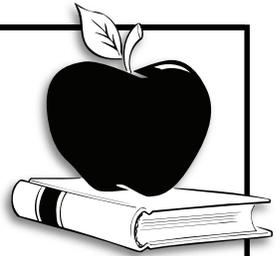
VOCABULARY: flyways, habitat

MATERIALS: construction paper bases; buttons, bottle caps, pasta or similar items; copies of population data sheet; paper for population graph

COMMON CORE STANDARDS: mathematics 5.MD

NEXT GENERATION SCIENCE STANDARDS: MS-LS2-1

TEACHER'S GUIDE



ACTIVITY

Migration Migraines

OVERVIEW

By simulating migration on a playing field, students see increases in human populations correlated with decreases in bird habitats and populations.

CONCEPTS

- Bird populations are affected by human impact on their habitats.
- Some birds migrate to meet their habitat needs.
- Migratory birds depend on habitat in Latin America, the Midwest and along flyways. Human actions that impact the forest environment have a global effect.

OBJECTIVES

Students will be able to: 1) describe natural and human-induced factors affecting bird populations; and 2) explain how increasing human populations can have a negative effect on some bird populations.

KEY POINTS

- When humans alter forests on the wintering ground, the breeding ground or at stopover points, migratory bird populations are affected.
- As human populations increase, suitable bird habitat decreases.

TEACHER BACKGROUND

Migratory birds require suitable habitat and environmental conditions in breeding grounds, wintering grounds and along migratory flyways. A reduction in quantity or quality of habitat in any one of these areas may lead to population declines in the birds dependent upon them. The birds that depend on forests for their northern nesting ground may live in scrub or some habitat other than interior forests in the wintering ground. The ovenbird is one species that requires forest habitat in both places.

People and some migratory birds depend on forests for their needs. In addition to forests, people need farms, cities, highways and housing. To meet these needs, we

have often deforested land. However, this land conversion can conflict with the needs of those birds that depend on forests. In Latin America, forests were highly disrupted by the Maya civilization. However, that was a thousand years ago and reforestation has occurred. In North America, forests were most severely disrupted in the late 1800s and early 1900s. They are now slowly recovering. While the stories of Paul Bunyan were pure exaggeration, the logging industry had a profound effect upon the land at the time. As human populations continue to increase, changes in land use, road construction and expansion of cities and farmlands continue to affect our forests. In Latin America, where the human population is increasing at a rapid rate, deforestation is occurring at an incredible speed. Forest ecosystems are always in a state of change, and bird populations are always in a state of flux. But just as it takes many years for forests to regenerate, so it takes many generations for a species to adapt to habitat changes. When so many changes happen so fast, the birds and other wildlife cannot adjust. Sustainable, wise use of forest land is required to conserve these birds and their forest homes. Conservation becomes more challenging as human populations increase.

There are many factors, natural and human-induced, that contribute to making habitat more or less suitable for migratory birds. Some natural factors are short-term. A year of low rainfall causing short-term drought or a temporary decline in insect populations that provide food for birds may cause a temporary strain on migratory bird populations. A year of plentiful rainfall or an insect outbreak may be beneficial to birds. Other natural factors may be long term, such as habitat destruction from large storms or fires or reduction in the quality of a food source through disease. Favorable climatic trends might affect bird populations positively over the long-term.

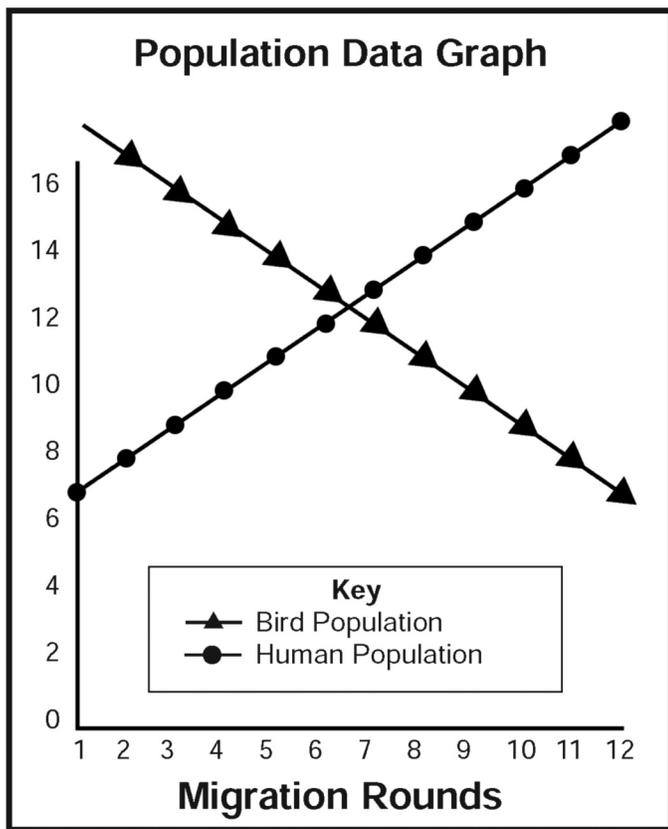
While natural factors are generally beyond our control, there are many human-related factors affecting migratory bird populations. Negative factors might be short-term, such as illegal hunting pressure, or long-term,

such as contamination of a water supply through pollution or land conversion and deforestation. People also can have beneficial effects on migratory birds through habitat protection, management and restoration. Research about migratory bird habitat needs can provide valuable information to implement conservation strategies in all the Americas.

While migratory birds comprise a large portion of the birds in North America, they only comprise a small percentage of the birds in Latin America. The migratory birds that winter in Central America may have to compete with large numbers of resident birds both for habitat and human acknowledgment of importance. The perspective on the fate of Neotropical migrants may also be different in Latin America because deforestation there frequently occurs for human subsistence needs—for agriculture, cattle grazing or firewood—or for export of timber for national income. In a war-torn nation, such as Nicaragua, people are likely to focus more on rebuilding their own lives than in worrying about the demise of a few seldom-seen birds. Yet research indicates that disruptions in habitat both in North and Latin America are affecting many of the Neotropical migrants adversely.

PROCEDURE

1. Discuss the need for breeding, wintering and flyway habitats for migratory birds. Brainstorm factors affecting habitat, including those that are positive and negative, natural and human-related and short- and long-term.
2. Have students count off by fours. Groups 1, 2 and 3 will be "ovenbirds." Group 4 will be "people." Divide the "people" into two groups: North American and Latin American. Each group of "people" should appoint an individual responsible for recording the number of birds that survive the migration (successfully find a base) as well as the number of "people" in the group at each round of the activity. Give each of these recorders a copy of the "Population Data Sheet" found at the end of this activity.
3. Create a playing field for the students with exactly one green paper base for each bird at each end. Explain that each base represents forest habitat for one bird. Designate one end the North American breeding ground and one the Latin American wintering ground. Place the bases closer together on the wintering ground to represent the smaller land area available for migratory birds. In between, place several bases to represent stopover points during migration. At the beginning of each round deposit buttons, bottle caps, pasta or similar items by the stopover points to represent food. At first, make sure there are enough "food" pieces for each "bird" to retrieve one.
4. Start the activity with "ovenbirds" in the wintering ground in Latin America. Each bird must have one foot on a base to indicate that it has found adequate habitat. No more than one "bird" may have its foot on a base at a time.
5. At your signal, the birds must "fly" by running and flapping their arms to the breeding ground. As ovenbirds, they should say "teacher, teacher, teacher" as they fly. They must land at one stopover point and say "teacher, teacher, teacher" before continuing on. Only one bird may be at a stopover base at one time. Each bird must pick up a button (or whichever item you used) at a stopover point. At the breeding end in North America, each bird must put a foot on a base.
6. While birds stop at the stopover base en route north, the "people" in North America must confer to name a human-related cause of deforestation (such as to build houses or furniture, to make paper products, to build highways and roads, to create farmland, to build factories, to build shopping malls). Their land-use decision reduces the forest habitat in the breeding ground, according to the number of "people" in the group. Remove one base for three people, two bases for four to six people, three bases for seven to nine people or four bases for 10 to 12 people in that continent. Have birds migrate to North America. Those that do not find a base are dead and become people, to represent the human population growth as the benefit from use of the forest land.
7. To even the number of bases in Latin America, announce that a hurricane has destroyed some forest in Latin America: remove one base. Anytime it's necessary to remove an extra base to limit the habitat more so some birds will "die," the teacher can inject a natural disaster into the game and remove a base or two while the "ovenbirds" are at the other end of the playing field.
8. Then tell the "people" in the wintering grounds to confer to name a human-related cause of deforestation (such as farming, cutting firewood, raising cattle, building houses and villages, selling timber for furniture and other products) and remove the number of bases corresponding to their population. Have the "ovenbirds" migrate again. The birds that cannot find a base when they migrate die and become people.
9. When the forests are being rapidly reduced, add the option of making land-use decisions that increase or protect forests. When students choose one of these options, add a base, and the corresponding number of students may return as birds; however, if there is not adequate habitat at the other end of the migration, the bird population will decrease again rapidly.



- Continue the migrations until it becomes evident that the human population is growing at a rapid rate, and the birds are threatened by lack of habitat. Point out that the land-use decisions we make as humans can significantly affect bird populations, even though natural factors cannot be controlled.
- Have the students who recorded the human and bird populations consolidate their data and fill in the last column on the Population Data Sheet. They should then plot the numbers on a graph. The graph should show that, as the people increased in numbers, the birds decreased in numbers.

DISCUSSION

- How did changes in the forest affect the birds? Which affected the birds first: changes in nesting, wintering or stopover areas? Can people always control habitat changes?
- How did growth of human populations affect the availability of forest habitat and therefore bird populations?
- Who generally makes land-use decisions? Who looks out for the interests of birds? Why do people

sometimes make land-use decisions that adversely affect bird populations? What effect does human population growth have on these decisions? Compare reasons for deforestation between North and Latin America. Are they similar?

MODIFICATION

After the correlation between increasing human populations and decreasing bird populations has been demonstrated, add another obstacle to migration: place less food on stopover points to represent degradation of fly-way stopover habitat. Or, stop the migration in mid-flight to remove a stopover base (and the bird resting there), either by human or natural cause. Any bird that cannot obtain food from a stopover cannot migrate successfully and must wait on the sidelines.

If bird populations decline quickly, start over, this time reducing only one habitat area (North America, Latin America or stopovers) and point out that the end result is basically the same to migratory birds because they depend on habitats in more than one place, thus the title of the unit: *One Bird—Two Habitats*.

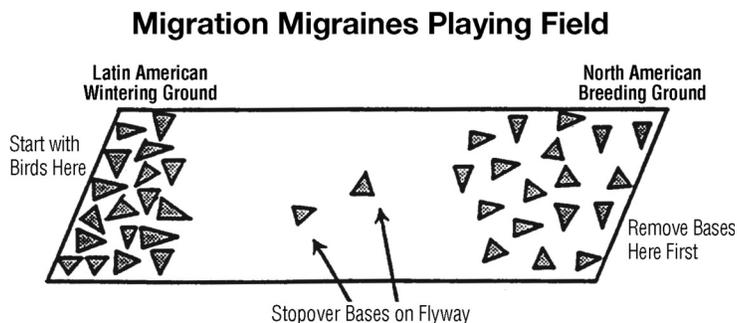
EXTENSION

- Have students list some reasons why humans alter habitats in ways that may hurt migratory bird populations. Have them do research and then graph human population growth in the United States and Latin America over the last 200 years. Which of the reasons for changing bird habitat that the students listed can be directly related to human population growth?

ASSESSMENT

- Students should be able to analyze the graphed data and explain what it means.

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POPULATION DATA SHEET

POPULATION DATA SHEET			
ROUND	LATIN AMERICA	NORTH AMERICA	TOTAL NUMBERS
Start	# people _____ # birds _____ +	# people _____ # birds <u> 0 </u> =	# people _____ # birds _____
Round # _____	# people _____ # birds _____ +	# people _____ # birds _____ = Reason for habitat loss _____	# people _____ # birds _____
Round # _____	# people _____ # birds _____ +	# people _____ # birds _____ = Reason for habitat loss _____	# people _____ # birds _____
Round # _____	# people _____ # birds _____ +	# people _____ # birds _____ = Reason for habitat loss _____	# people _____ # birds _____
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Round # _____	# people _____ # birds _____ +	# people _____ # birds _____ = Reason for habitat loss _____	# people _____ # birds _____

Photocopy enough sheets to complete the activity.