



Preserving Unimpaired Earth's Natural Environments: Bird Migration Lesson

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Created by Candela Cerpa

Overview

Preserving unimpaired Earth's natural environments is key to the survival of species, both local and visiting. In a progressively urbanizing world, National Parks are becoming increasingly crucial havens for bird species, both migratory and non-migratory. MONO is of importance due to its preservation of grasslands. This lesson covers the importance of birds, the species found in MONO, migratory patterns, and the impacts of park management on birds.

Learning Objectives

- Students will know about the bird species that stop at MONO on their migratory path
- Students will have a general understanding of how park management impacts birds
- Students will be able to distinguish between best and worst conditions for birds

Materials Needed

- Bird Factsheet (provided)
- Bird Cutouts (provided)
- Simplified Map of MONO (provided)
- Paper and pens or pencils

General Outline

1. Birds

- a. Are birds important?*
- b. Monitoring*
- c. What birds reside in MONO?*

2. Migration Patterns

- a. Why do birds migrate?*
- b. How do birds migrate?*
- c. Why don't birds migrate?*

3. The Impact of Park Management on Birds

- a. Grasslands*
- b. Agricultural land*
- c. Invasive Plant Removals*
- d. Parks as havens*

4. Activity



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Background (for park employee benefit)

There are over 100 species of birds that visit MONO. This lesson covers the very basics of birds in ecosystems, their migration, how NPS monitors them, and how park management impacts their habitat. The activity includes both male and female birds. You can make a brief comment about how songbirds and ducks have very distinct plumage differences between the genders, to the point where they may look like different species. This is because the male individual must be as attractive (literally) as possible for the female to choose him.

Procedure

5. Birds

a. Are birds important?

- i. Birds are invaluable parts of Park ecosystems! They can tell us a lot about the conditions of our forest.
- ii. Ever heard of “a canary in a coal mine”? Miners would carry canaries down into mine tunnels with them. If dangerous gases (like carbon monoxide) collected in the mine, the gases would kill the canary before the miners. This acted as a warning for miners to leave the tunnels.
- iii. Birds can be used as “indicator species”, a less dramatic version of the above example. The presence, absence, or abundance of indicator species reflects a specific environmental condition¹. When local conditions of habitat quality, pollution, biodiversity, diseases, and temperatures worsen, birds are often the first to display a noticeable response by taking flight.²
 1. 1 in 5 American and Canadian species are so particular about the temperatures they can tolerate that they may soon disappear entirely from some parts of their range.³

b. Monitoring

- i. The National Capital Region Network (NCRN) has been monitoring and calculating long-term trends in bird density and abundance since 2007 at many forest sites, including 15 in MONO. Our park is one of 4 in the region that also track birds in grasslands. Monitoring is done twice a year for forest species and thrice a year for grassland species.⁴
- ii. NCRN uses a hybrid monitoring design: point-count data is recorded in near (under 50 meters) and far (50-100 meters) distances.⁵

¹ Hill, J. (2015) “Birds as Environmental Indicators.”

² Goldman, J.G. (2018) “More Birds Expected for Majority of National Parks – Here’s Why.”

³ Wu J.X., et al. (2018) “Projected avifaunal responses to climate change across the U.S. National Park System.”

⁴ NPS. “National Capital Inventory & Monitoring at Monocacy National Battlefield: Birds Species List.”

⁵ Dawson, D.K., & Efford, M.G. (2014) “Protocol for monitoring forest-nesting birds in NPS parks”.

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- iii. eBird, the world's largest biodiversity-related citizen science project, allows NPS to better understand the species present in parks. It allows users to document bird distribution, abundance, habitat use, and trends through checklist data collected with a simple, scientific framework. eBird is managed by the Cornell University Laboratory of Ornithology.
- iv. This approach simplifies the task of measuring distances: it only requires determining if detected birds are within or beyond a specified distance.
- c. *What birds reside in MONO?*
 - i. Thanks to the monitoring NCRN does, we know that over 100 species of birds are found at MONO every year!⁶ Some include:
 - ii. Nonmigratory
 - 1. Hawks (Red-tailed, Rough-legged, Red-shouldered, Broad-winged)
 - 2. Wild Turkeys
 - 3. Woodpeckers (Red-bellied, Pileated, Downy, Hairy)
 - 4. Owls (Barred, Great Horned)
 - iii. Migratory
 - 1. American Goldfinches
 - 2. Swallows (Barn, Northern Rough-winged, Tree)
 - 3. Red-winged Blackbirds
 - 4. Orioles (Baltimore, Orchard)
 - 5. Herons (Great Blue, Green)
 - 6. Hummingbirds (Ruby-throated)

6. Migration Patterns

- a. *Why do birds migrate?*
 - i. Migration: periodic, large-scale movements of populations of animals that evolved and is an inherent, instinctive behavior.⁷
 - ii. Some birds evolved to travel from areas of low resources to areas of high resources, specifically for plants, bugs, and nesting locations, as well as weather, geography, and day length. As winter nears and food sources decrease, the birds travel the opposite way.
 - 1. Escaping the cold is not as big a factor as expected, as many species can withstand freezing temperatures if there are adequate supplies of food.

⁶ NPS. "National Capital Inventory & Monitoring at Monocacy National Battlefield: Birds Species List."

⁷ The Cornell Lab. (2007) "The Basics of Bird Migration: How, Why, and Where"

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- b. *How do birds migrate?*⁸
 - i. Short distance: higher to lower elevations on a mountainside
 - ii. Medium distance: one or several states away
 - iii. Long distance: across the continent
 - iv. Video: "Where Do Birds Go in Winter?" [Link](#)
- c. *Why don't birds migrate?*
 - i. As mentioned, migration is an inherent, instinctive behavior. While some birds evolved the ability to precisely navigate their way across the world, others evolved to make the most of not migrating by switching their diets, burrowing together to find warmth, or slowing their metabolisms.
 - ii. Benefits of not migrating:⁹
 - 1. Saving energy: instead of doubling their body weight to have enough energy to travel, they spend their energy foraging, watching for predators, and other tasks beneficial to their survival
 - 2. Defending territory: prime feeding and nesting areas are highly competitive, and those that don't migrate don't need to compete
 - 3. Nurturing young: beyond giving extra care to young birds, non-migratory birds may raise additional chicks later in the season

7. The Impact of Park Management on Birds

- a. *Grasslands*
 - i. Forests are traditionally thought of as the main habitat for birds, but grasslands house many important species!
 - 1. Surveyors have found species in grasslands that they don't encounter in forests, such as Grasshopper Sparrow, Field Sparrow, Vesper Sparrow, Blue Grosbeak, Eastern Meadowlark, Yellow-breasted Chat, and American Kestrel¹⁰
 - ii. Grassland habitats across the eastern U.S. are declining due to natural succession to forest, fire suppression, and reduction in open agricultural fields, causing severe habitat loss for birds
 - iii. Through regular disturbance regimes, managers mow grasslands to prevent saplings and shrubs from establishing into a grassland and reverting it back to forest

⁸ The Cornell Lab. (2007) "The Basics of Bird Migration: How, Why, and Where"

⁹ Mayntz, M. (2019) "Do All Birds Migrate? No!"

¹⁰ Higgins, C. (2015) "Civil War Battlefields: A Haven for Grassland Birds."

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1. At MONO, mowing is mainly done to maintain a Civil War era landscape, with clear views and sightlines so visitors can easily imagine troop movements on the rolling hills
 - a. Many trees near the Worthington House are scheduled to be cut to return the landscape to its Civil War era appearance.
2. Mowing in the middle of summer, before the breeding season has ended, can destroy nests, cause direct mortality of fledglings, and possibly affect the foraging resources and behavior of many grassland species.
 - b. *Agricultural land*
 - i. Agriculture supports the number of Horned Larks and Vesper Sparrows than any other habitat type by providing a source of water and food (berries, mice, bugs)¹¹
 - ii. However, pesticides, poisoned rats, contaminated bodies of water, and dead fish pose serious health risks to birds. Windows in buildings are also cause for concern; window collisions are dangerous!
 - c. *Invasive Plant Removals*
 - i. By removing the plants that native and migrating birds do not use, we can increase the resources birds can use to mate, nest, feed, and thrive¹²
 - d. *Parks as havens*
 - i. 60% of U.S. National Parks could become more hospitable to birds by the middle of the century if conditions continue to change. The number of settling species would exceed the number of extinctions, making National Parks an even more vital sanctuary for birds in future winters.¹³
 - ii. Outside of parks, the degradation, destruction, and fragmentation of forests by development and suburbanization has led to regional and local declines in some populations of forest-nesting bird species and an increase in the use of more stable park forest habitat.¹⁴
 - iii. Park forests are, however, not without their own challenges. Deer browse, tree diseases, insect pests, and invasive exotic plants have reduced nesting sites, food sources, and other parts of a valuable habitat.
 - iv. As the areas around National Parks continue to develop and green spaces are reduced, birds are losing the historic spaces where they once nested

¹¹ Higgins, C. (2015) "Civil War Battlefields: A Haven for Grassland Birds."

¹² Wu J.X., et al. (2018) "Projected avifaunal responses to climate change across the U.S. National Park System."

¹³ Wu J.X., et al. (2018) "Projected avifaunal responses to climate change across the U.S. National Park System."

¹⁴ NPS. "National Capital Inventory & Monitoring Network: Birds."

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- v. Commercial hunting is prohibited in all National Parks, meaning that birds are safe.

- 1. Video: "Bird Migration, A Perilous Journey" [Link](#)

8. Activity

- a. Divide students into pairs. Give each pair a Bird Factsheet, which will give details of a species found in MONO, and a Bird Cutout.
 - i. Give the students 3-5 minutes to get comfortable with their factsheet and cut their birds out.
- b. In the center of the table, lay down the simplified landcover map of MONO.
- c. Describe the scene to students and have them place their birds in the correct habitat according to the time of year. Ask them to explain their choices and how the habitat could be improved for the birds.
 - i. "It is August at MONO! So, where are your birds? What do their nests look like? Place your cutout where you think they would be, then we can go around the table and explain why."
 - 1. Baltimore Oriole: at MONO. High up in large, leafy deciduous tree near water. Nest: intricate woven nests high up in a tree.
 - 2. Red-Bellied Woodpecker: at MONO. Forested area with dead and trees. Nest: dig the nesting cavities themselves.
 - 3. Black Vulture: at MONO. Forested or open grassland, near water. Nest: they don't.
 - 4. Green Heron: at MONO. Wetlands. Nest: near water with trees/shrubs for privacy.
 - 5. Barred Owl: at MONO. Mature forests of both deciduous trees and evergreens, often near water. Nest: natural tree cavities.
 - 6. Wood Duck: at MONO. Staying near the water and trees, not grassland. Nest: tree cavities.
 - ii. "It is December at MONO! Where are your birds now? What are they eating? Move your cutouts where you think they would be, then we can go around the table and explain why."
 - 1. Baltimore Oriole: Flew down to Mexico, Central, or South America. Food: insects, fruit, nectar.
 - 2. Red-Bellied Woodpecker: Stayed at MONO. Food: fruit, hard mast, seeds, nuts, insects, small vertebrates.
 - 3. Black Vulture: Stayed at MONO. Food: carrions.
 - 4. Green Heron: Flew down to southern coastal swamps. Food: fish and invertebrates. May eat frogs, snakes, and amphibians.



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5. Barred Owl: Stayed at MONO. Food: small animals, amphibians, reptiles, fish, and invertebrates.
6. Wood Duck: Stayed at MONO. Food: seeds, fruits, insects, nuts, grains, berries, and snails.

d. Discussion

- i. Did your birds have a lot of their preferred habitat landcover at MONO?
 1. There is not much wetland or grasslands/shrubs. There's not much evergreen forest cover.
- ii. What factors do you think may be impacting their habitat extent?
 1. A lot of the area around MONO has impervious surfaces. Agricultural land takes up most of the landcover.
- iii. Which bird species we just talked about is the most adaptable? Which one is the least?
 1. Adaptable
 - a. Red-bellied Woodpecker- they use birdfeeders, have very general requirements, survive the cold.
 - b. Baltimore Oriole- they can breed in secondary habitats and are found in urban spaces.
 - c. Black Vulture- all they need is dead organic matter.
 2. Vulnerable
 - a. Green Heron- they depend on the health of wetlands and bodies of water.
 - b. Barred Owl- they need large, dead trees, which young forests may not have and logging impacts it.
 - c. Wood Duck- sensitive to mature and dead trees loss.



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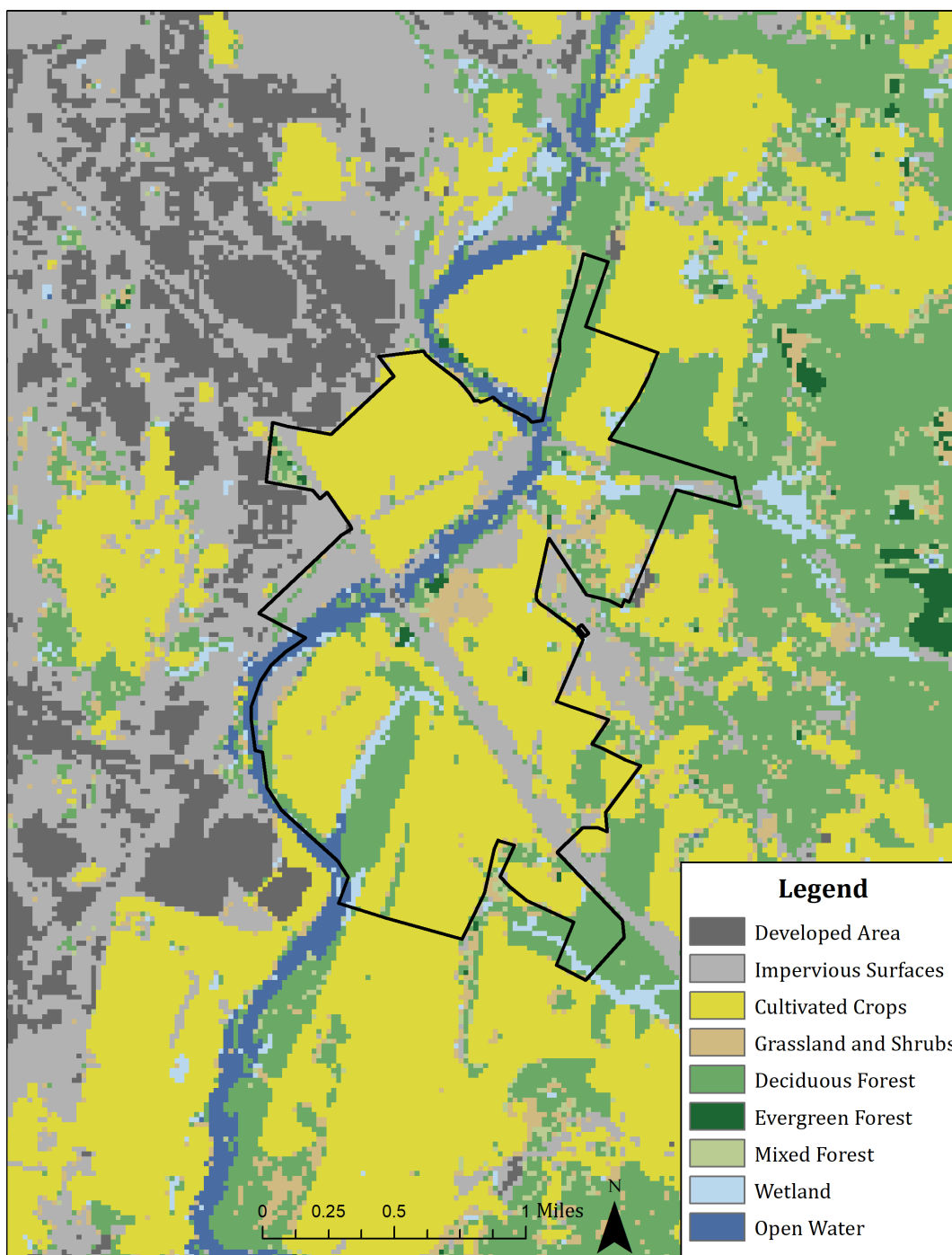
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Baltimore Orioles¹⁵

Species name: *Icterus galbula*

Length: 6.7-7.5 in

Weight: 1.1-1.4 oz

Wingspan: 9.1-11.8 in

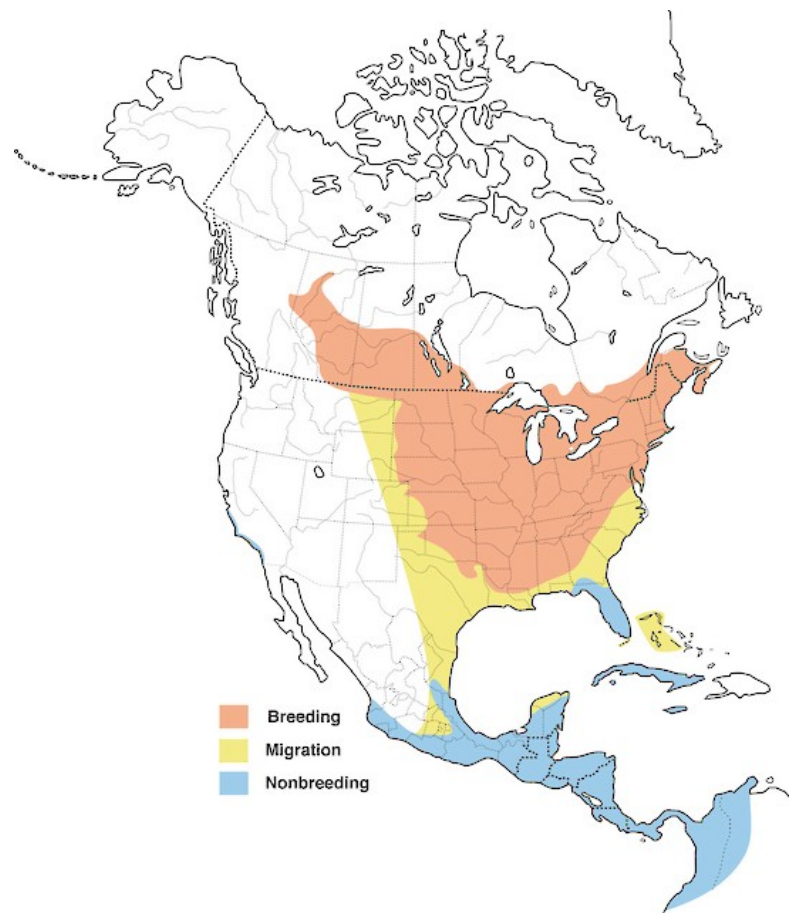
Migration: they breed in their home state and fly to Mexico, Central or South America for the winter months, where they like flowering canopy trees, often over shade coffee plantations.

Food: insects, fruit, nectar.

Habitat: high up in large, leafy deciduous tree in woodland edge and open riparian woods (trees on the edge of bodies of water). They create intricate, woven, thin nests high up in trees.

Adaptability: they can breed in a variety of secondary habitats. They can be found in urban parks and suburban landscapes.

Fun fact: they are the state bird of Maryland. They got the name "Baltimore Bird" in 1731 because black and orange were the colors of the Baltimores, the colonial proprietors of the Maryland colony.



¹⁵ The Cornell Lab. "Baltimore Oriole."

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Red-Bellied Woodpecker¹⁶

Species name: *Melanerpes carolinus*

Length: 9.4 in

Weight: 2-3.2 oz

Wingspan: 13-16.5 in

Migration: most stay in their home state year-round.

Food: fruit (particularly oranges), hard mast, seeds, nuts, insects, small vertebrates.

Habitat: decayed cavities of dead trees, old stumps, or in live trees with soft wood (elms, maples, willows). They dig the nesting cavities themselves.

Adaptability: they have very general habitat requirements, use bird feeders, and are commonly found in both undisturbed and human-modified landscapes.

Fun fact: the cavities they excavate in dead or dying wood provide shelter and nest site for other vertebrate species.



¹⁶The Cornell Lab. "Red-bellied Woodpecker."

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Black Vultures¹⁷

Species name: *Coragyps atratus*

Length: 22-29 in

Weight: 3.5-6.6 lb

Wingspan: 52-66 in

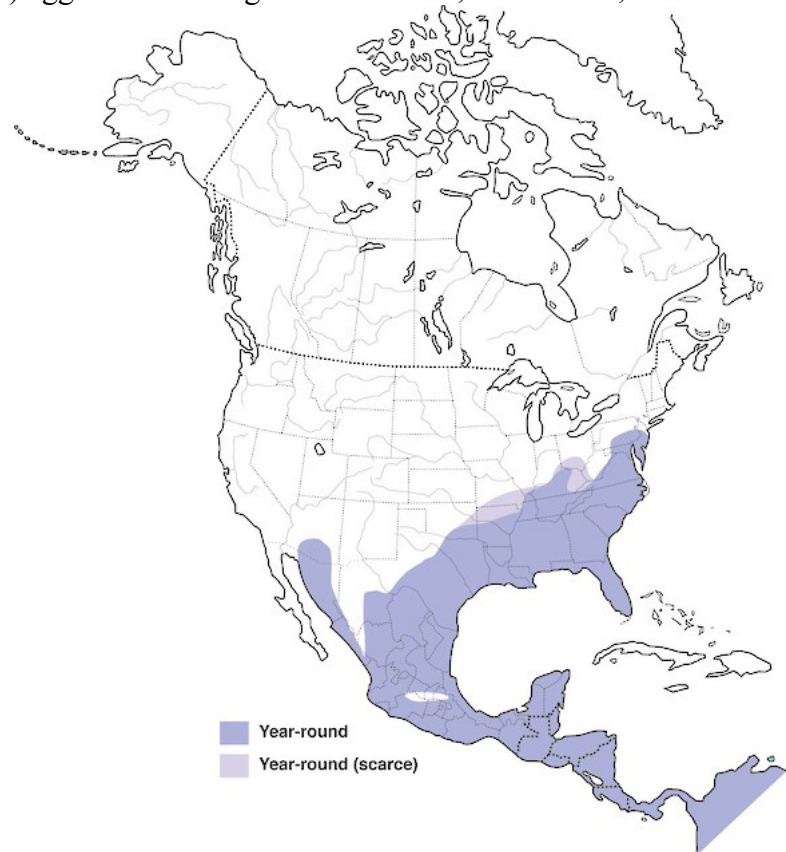
Migration: most stay in their home state year-round.

Food: mostly carrion, carcasses of dead animals of all sizes. They may eat the eggs of other birds, turtles, lizards, and may kill and eat young of some birds and sea turtles.

Habitat: forested and open areas. They roost in undisturbed stands of tall trees, near water. They do not nest. They lay their (usually 2) eggs on the bare ground in a cave, hollow tree, abandoned building, or other dark recess.

Adaptability: They eat some plant materials, like coconuts and rotting vegetables, and will scavenge scraps of refuse from garbage dumps.

Fun fact: they lack a highly developed sense of smell, unlike Turkey Vultures, so they can't find carrion by scent alone. They often follow Turkey Vultures and displace them from the food they found!



¹⁷ The Cornell Lab. "Black Vulture."

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Green Heron¹⁸

Species name: *Butorides virescens*

Length: 18 in

Weight: 6.2 oz

Wingspan: 26 in

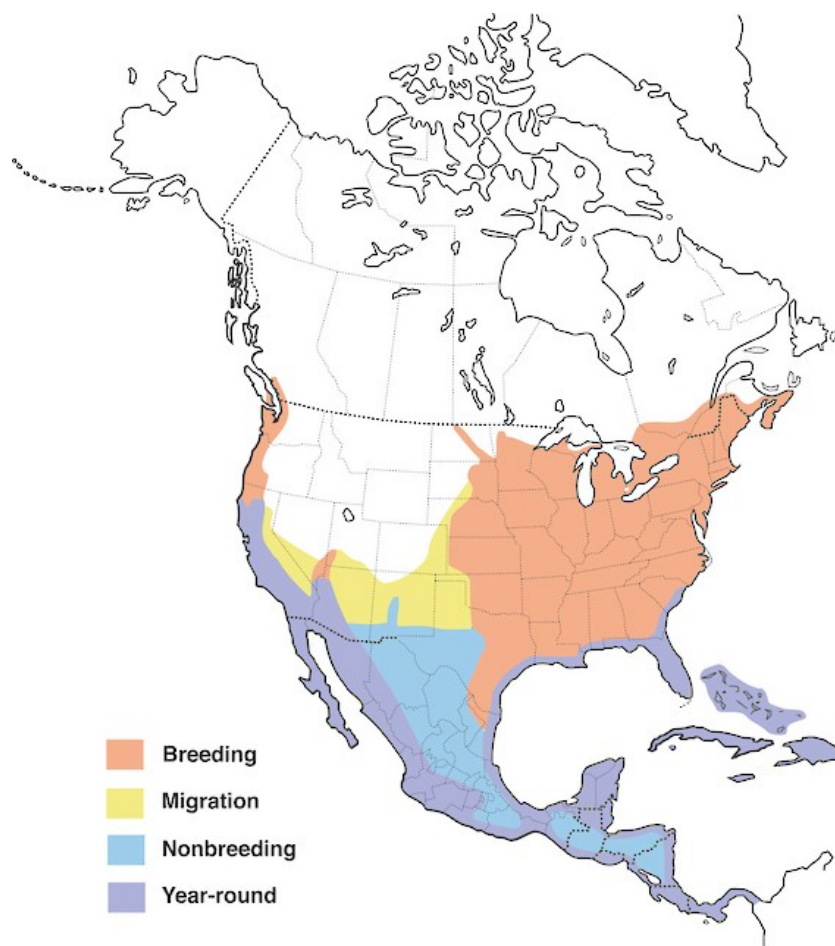
Migration: they mate in the wetlands in their home state then migrate to southern coastal swamps during the winter months.

Food: fish and invertebrates. May eat frogs, snakes, and amphibians

Habitat: they live in coastal and inland wetlands. They nest along swamps, marshes, lakes, ponds, impoundments, and other wet habitats with trees and shrubs to provide secluded nest sites. If there is water, they may nest in dry woods and orchards.

Adaptability: They are sensitive to habitat loss through the draining or development of wetlands.

Fun fact: they are one of the few birds that use tools! They often drop twigs, bread, or insects onto the water to lure fish to the surface.



¹⁸ The Cornell Lab. "Green Heron."

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Barred Owl¹⁹

Species name: *Strix varia*

Length: 16.8-19.7 in

Weight: 16.6-37 oz

Wingspan: 39-43.3 in

Migration: most stay in their home state year-round.

Food: Small animals, amphibians, reptiles, fish, and invertebrates.

Habitat: large, mature forests made up of both deciduous trees and evergreens, often near water. They live and nest in natural tree cavities.

Adaptability: Human fire suppression allowed them to expand their range, but they need large, dead trees for nest site, which makes them sensitive to expansion of logging.

Fun fact: young Barred Owls can climb trees by grasping the bark with their bill and talons, flapping their wings, and walking their way up the trunk.



¹⁹ The Cornell Lab. "Barred Owl."

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Wood Ducks²⁰

Species name: *Aix sponsa*

Length: 18.5-21.3 in

Weight: 16-30.4 oz

Wingspan: 26-28.7 in

Migration: some move south in the winter, but many are year-round residents.

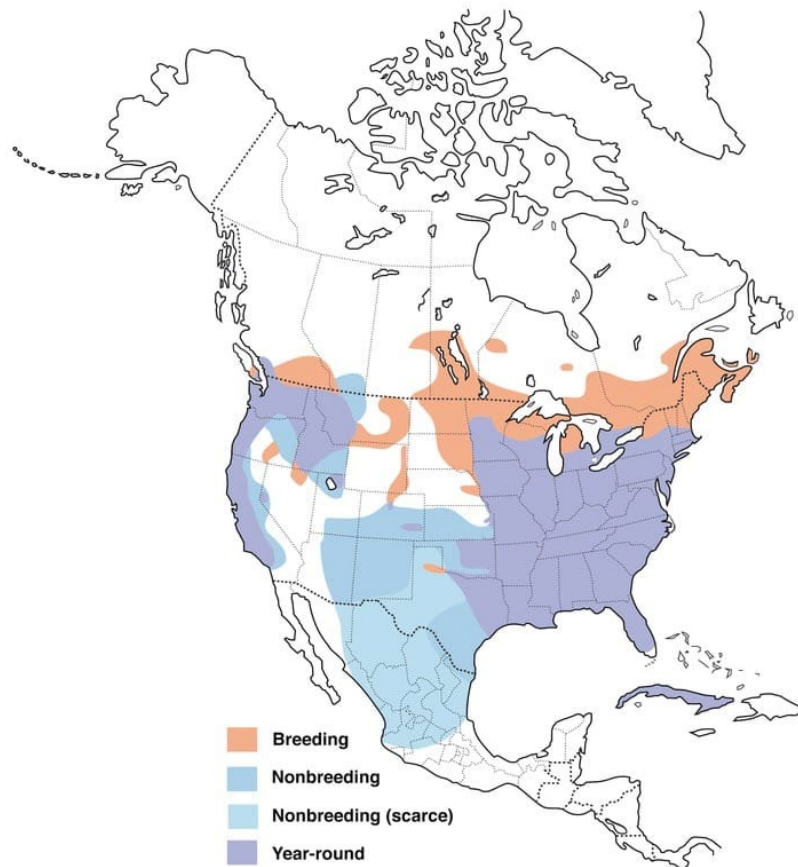
Food: seeds, fruits, insects, nuts, grains, berries, and snails.

Habitat: wooded swamps, marshes, streams, beaver ponds, and small lakes. They like wet areas with trees or extensive cattails.

They nest in cavities in trees.

Adaptability: if there is a loss of mature and dying trees with nesting hollows, the species is impacted.

Fun fact: they perch and nest in trees and are comfortable flying through woods, unlike most waterfowl.



²⁰ The Cornell Lab. "Wood Duck."

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