TheCornellLab of Ornithology

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Instructor Guide: Birds in Human Landscapes

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Level: University undergraduate
Adaptable for online-only or distance learning

Purpose

To investigate the interplay between a species' natural behavior and habitat needs, and to analyze how land use change may impact species abundance.

Overview

This investigation focuses on examining the impacts that humans may be having on a select group of bird species. The ultimate goal is to evaluate the connections between bird behavior, habitat needs, and factors involved in shifting population trends. Students will take the perspective of U.S. Fish and Wildlife Service biologists investigating bird species found on a site slated for development. Students will use a variety of resources to assess the natural history of the selected species and the impact of development on populations. Resources include online databases and other websites and scientific literature.

Essential Questions

- How are human impacts on the environment impacting wildlife?
- How do changes in species abundance (positive or negative) impact a particular ecosystem?
- Why does biodiversity loss matter? (or, Why is species conservation important?)
- How do we decide what species to protect?
- How do the costs and benefits of species protection impact conservation decisions? In other words, do conflicts arise between the various stakeholders (i.e., biologists vs. developers vs. policy makers)

Learning Objectives

Students will be able to:

- Establish habitat requirements and population trends of a target species
- Relate bird behaviors to their habitat needs, shifting population trends, and other factors
- Describe procedures for biodiversity monitoring in general terms
- Use online scientific databases to access up-to-date population information
- Examine the complexities associated with species conservation

Extension:

- Describe the purpose and contents of environmental impact statements

Materials

- Computers with Microsoft Office (PowerPoint)
- Internet access (see Online Resources below)
- Access to online library resources (e.g., peer-reviewed journals, the Birds of North America Online)

Preparation

To prepare students, instructors should:

- introduce students to basic concepts associated with population trends
- introduce students to the online population databases they will be using (e.g., see PowerPoint introducing the Breeding Bird Atlas of New York State)
- review how to access peer-reviewed journals from online library resources
- provide students with a basic outline of how to use PowerPoint (if necessary)

Time

This lesson will likely take a minimum of 2-3 weeks to complete.

Online Resources (New York)

Maps

New York State habitats and ecoregions:
http://www.dec.ny.gov/animals/9402.html
New York State Breeding Bird Atlas survey blocks:
http://www.dec.ny.gov/imsmaps/bbatlas/viewer.htm
New York State BBA species distribution maps:
http://www.dec.ny.gov/animals/51030.html

- Click on "BBA Database"
- Scroll down the page to the heading "Breeding Bird Atlas - Maps By Species."
- Click on either 1980-1985 or 2000-2005 under the Alphabetic Order heading. (Or, use the Taxonomic Order if you prefer to search by genus and species, as opposed to common name).

Data

Downloadable BBA data for Google Earth:
http://www.dec.ny.gov/pubs/42978.html
Viewing NYS DEC Data in Google Earth (pdf):
http://www.dec.ny.gov/docs/administration_pdf/geinstructions.pdf

Natural history information

New York bird species fact sheets: http://www.dec.ny.gov/animals/54755.html

Print resources

McGowan, K.J. & Corwin, K. (2008). *The Second Atlas of Breeding Birds in New York State.* Ithaca, NY: Cornell University Press.
See: http://www.dec.ny.gov/animals/7312.html

Online Resources (U.S. and Western Hemisphere)

Maps and data

USGS North American Breeding Bird Atlas Explorer:
http://www.pwrc.usgs.gov/bba/
North American Breeding Bird Survey: http://www.mbr-pwrc.usgs.gov/bbs/bbs.html

Partners in Flight Species Assessment Database: http://www.rmbo.org/pif/pifdb.html
BirdNET: http://www.nmnh.si.edu/BIRDNET/
Great Backyard Bird Count: http://www.birdsource.org/gbbc/
Christmas Bird Count: http://www.audubon.org/bird/cbc/
Project FeederWatch: http://watch.birds.cornell.edu/PFW/ExploreData
Google Earth: http://earth.google.com/

Natural history information

All About Birds: http://www.allaboutbirds.org/guide/search
The Birds of North America Online (by subscription): http://birds.cornell.edu/bna

Reports on bird population trends and habitat conservation priorities

State of the Birds: http://www.stateofthebirds.org/
Saving Our Shared Birds: http://www.savingoursharedbirds.org/
Environmental Protection Agency's 2008 Report on the Environment (See especially "Land Cover", "Land Use", and "Ecological Condition > Biological Diversity > Bird Populations"): http://www.epa.gov/ncea/roe/

Conservation-oriented journals for researching the primary literature

The Auk
Biological Conservation
Bird Conservation International
Conservation Biology
The Ibis
Journal of Avian Biology
Journal of Field Ornithology
Journal of Wildlife Management
Living Bird
Proceedings of the National Academy of Sciences
Science
Studies in Avian Biology
The Wilson Journal of Ornithology

Lesson Procedures

Engagement

1. Begin a discussion with the students about a general or specific scenario when human development and wildlife needs have come into conflict. Ask the students questions like:
    - How do we decide if a species is at risk?
    - What types of evidence do biologists use to monitor an area for evidence of a species' presence?
    - How can you find out about the habitat requirements of a certain species?

Exploration and Explanation

2. Give a brief introduction of the goals, methods, and status of the Breeding Bird Atlas project in New York State (or another project whose data you want to have students explore). You may wish to have the students explore how to access data from the resource now, or you may wait until you have introduced the case study that follows.

3. The instructor will determine the area that will be impacted by development. Instructors may select one example of land change for the entire class, or assign a unique impact area to each student group. Group size should not exceed 4 students to maximize involvement. It may also be interesting to take advantage of other university resources by acquiring information from an urban development department for decision-making details in the development process.

   Examples of the types of land changes/human impacts that can occur:
   - a percentage of forest cover will be converted to housing
   - a percentage of wetland will be drained/cleared
   - an abandoned farm that had been converted to secondary forest will be converted into a business park but a certain percentage will remain as secondary forest
   - a cleared farmland will be heavily planted with native trees and converted into "eco-housing" property

4. Any number of species can be used for the exercise. Suggested species are listed below although the instructor should be careful to choose a species that is appropriate for the land area chosen. The instructor may also choose to select species that are either declining or increasing in number since some species may actually benefit from certain land use changes.

   A useful guide for selecting northeastern U.S. species is *The Second Atlas of Breeding Birds in New York State* (page numbers below are from the printed version of this reference).

   Decreasing populations:
   Blue-winged Teal (p. 106)
   Ruffed Grouse (p. 138)
   American Bittern (p. 156)
   American Woodcock (p. 246)
   Eastern Towhee (p. 544)
   Henslow's Sparrow (p. 558)

   Marginal decrease:
   Marsh Wren (p. 428)
   Black-throated Green Warbler (p. 492)

Increasing populations:
Common Loon (p. 148)
Carolina Wren (p. 420)
Eastern Bluebird (p. 438)
Magnolia Warbler (p. 484)

5. Students should initiate their research by answering a series of questions. Depending on the instructor goals, students could be involved in a discussion to co-create this list of questions, either as a large class or in their small groups. Or, you may choose to provide a list of questions you want students to answer.

   Example Questions
   a. What are the habitat requirements for the target species? How do they forage? Where do they nest? Is this a migratory species? Is the species native or introduced?
   b. How has habitat changed in the targeted region over the years?
   c. Has the population declined in response to habitat changes?
   d. Has the target species declined in other parts of New York or elsewhere as a response to habitat change? Has the species increased in parts of New York or elsewhere as a response to habitat change? Are there other factors that may have contributed to changes in abundance?
   e. Are there any laws that may protect these species? (i.e., Migratory Bird Act, Endangered Species Act, etc.)

6. Students will produce a final product that will consist of a presentation to their peers, preferably in PowerPoint. The tone of the presentation should be that of scientists presenting to other scientists. Students should identify the basic biological needs of their species, identify population trends based on population databases, and identify the likely responses to habitat change. Evidence must be supported with scientific references. The length of the presentation will depend on how many groups there are – this is up to the instructor's discretion. However, 15 minutes is a suggested minimum.

Closure/Assessment
You might choose to have the students peer review one another's presentations, either by handing out a grading rubric you have selected, or by involving the class in a discussion about peer review and inviting them to select the criteria by which presentations should be judged. If possible, have this discussion or provide these criteria before students have embarked upon creation of their PowerPoint presentations.

Extension
Depending on your learning objectives and available time, you may wish to combine this activity with a unit about Environmental Impact Statements. Helpful resources and information are available from: http://www.epa.gov/compliance/basics/nepa.html.