Getting to Know Bald Eagles Through eBird

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Overview: Students examine Bald Eagle distribution using data submitted by Citizen Scientists on eBird.

Objectives:
Students will be able to:

- use eBird maps to answer questions about Bald Eagle distribution and abundance.
- make inferences about Bald Eagle habitat preferences by analyazing patterns of Bald Eagle reports
- name a benefit and a drawback to data collected from citizen scientists.

PA Standards Addressed

- 4.1.5-7F
    - Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
    - Describe relationships using inference and prediction.
    - Use appropriate tools and technologies to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.

Grade Level: Grade 4-8, but can be adapted to other grade levels.

Timeframe: 1- 2 class periods

Materials: Internet access, eBird.org website

Background

Birdwatchers observe birds and keep records of their observations. They aren't necessarily scientists, but their data, if it is collected in a systematic way, can be used by researchers to help answer questions about bird populations. The **Christmas Bird Count** (CBC) is an example of this. Every year since 1900, groups of volunteers count the birds that they find in a specific area on a set date in late December, or early January. Those records are collected by the National Audubon Society into a database that can be used by scientific researchers, land managers and conservationists, anyone who is trying to learn more about bird populations, or trying to make decisions that impact bird species.

eBird is an online checklist program that allows participants to submit their bird sightings throughout the year, rather than just during a specific time period. eBird is a joint project by the Cornell Lab of Ornithology and National Audubon Society, and was launched in 2002. eBird data is available to everyone and can be a tool used to investigate questions about bird populations. Individuals who participate in collecting data for the CBC, eBird or similar projects are taking part in what is known as Citizen Science. Participants follow protocols that dictate how data is to be collected and recorded so that it is consistent for analysis. During this activity, students will investigate Bald Eagle distribution using Citizen Science data from eBird.

Bald Eagles generally prefer forested areas that have tall trees for perching and nesting, and are located near large bodies of water. Fish are a large component of their diet, but they are also opportunists who will go after other types of animals, including birds, reptiles, amphibians and mammals. They will feed on carrion, as well. Some Bald Eagles migrate, especially in areas where they must move to find open water during winter. Immature birds searching for territory tend to travel around more than mature adults.

Activity: Getting to Know Bald Eagles Through eBird
This exploration can be done as a large group, or older students may work more independently in smaller teams.

Getting started:

Ask the students to brainstorm a list of questions about Bald Eagles. Divide the questions into 3 categories based on how you would go about getting the answers:

1. **Make observations and record data**. These can be true experiments, where you control variables, or they may be descriptive studies, where you don't have strict control over all variables
2. **Look it up.** This involves going to a reference source for the answer.
3. **Data exploration or investigation.** You interpret data that has been collected by others and is housed in a database.

In this activity, we will explore Bald Eagle distribution using the eBird database.

Intro to eBird

- Go to **eBird.org**. Click on the *About* tab and review this information just to familiarize everyone with what eBird is.
- Click on the *Explore Data* tab.
- In the *Explore Data* window, go to *Species Maps.* Before you type in the species box, zoom in to Pennsylvania. Use the tools on the right hand side of the screen to switch the map view between *Terrain, Street, Satellite* and *Hybrid*. It may be helpful to uncheck the box labeled *Survey Locations* for this part of the exploration. It will give you a clearer image.

- Discuss with the students why each of the map views might be useful when looking at bird distribution. For instance,
    - *Terrain* shows changes in elevation and can show features such as mountain ranges.
    - *Street* view can make it easier to discern landmarks such as roads and water bodies.
    - *Satellite* view shows land cover, such as wooded areas, or areas that have been developed.

<u>What can eBird tell us about Bald Eagles in North America?</u>

For now, use the *Terrain* view. Zoom out all of the way. In the Species search box, type in *Bald Eagle*. Select *Year-Round*, and *Past 10 years* for the Date range. The *Frequency* key in the lower right hand corner shows the percentage of checklists that had Bald Eagles as one of the birds reported. It will show up as a shade of purple. If a checklist is submitted but doesn't have Bald Eagles on it, it will show up as a gray box.

    - Which areas of North America seem to have more checklists with Bald Eagles?
    - Are you able to find areas on the map that did submit bird reports, but that had no Bald Eagles on their reports? These areas will have a transparent gray over them.
    - Are there areas that do not show any Bald Eagles because they haven't submitted any bird checklists at all?
- Now, go back to the *Date* selection box above the map. Select *March – May*. Does the map change? Continue to select different month ranges (keep the years at *Past 10 Years*). Are there areas where the frequency of eagles reported changes as the time of year changes? Can you brainstorm reasons why or why not? Are there areas on the map where it does not change through the year? Remember that this data comes from observations submitted by the general public. Could that affect the data in any way?

<u>What about Bald Eagles in Pennsylvania?</u>

- On the right hand side, make sure that *Show Points Sooner* is checked. Use the slider on the left hand side of the map to zoom in on Pennsylvania. Set the date range back to *Year-Round*. Use the following questions to guide the discussion, or alternately, provide the discussion questions below to small groups of students to work on independently.
    - What is the frequency of Bald Eagles reported for Pennsylvania? Are there any areas that appear to have a higher frequency of sightings?
    - What is the range of frequency of reports around Pittsburgh?
    - Gradually move the slider so that you zoom closer, and the purple boxes are replaced by teardrop markers. Each marker is an actual checklist that has been submitted. Click on a marker to view the checklist and see what information it contains.
    - Zoom in so that the slider is about halfway between the **+** and **-**. Do you notice a pattern to where the sightings take place? Is there a feature on the map that is associated with reports of eagles?
    - Switch to *Satellite* or *Hybrid* view. Does there seem to be a particular land cover (such as woods, developed areas, golf courses, etc) that is found with eagle sightings?

- Based on the data provided by eBird observations, what can you infer about typical Bald Eagle habitat?
- Try to find a marker that does not fit the pattern and click on it to investigate further. How would you explain any sightings that do not fit this pattern?
- There are 3 separate pairs of Bald Eagles that have nested on each of the three rivers, not far from downtown Pittsburgh (the eagles in the video are on the Monongahela River). Can you guess the location of the nests using eBird?

Discussion

What kinds of questions about Bald Eagles can sites like eBird help us to answer? Can you use eBird to answer any of the questions from the introductory brainstorming session?

Could we use eBird to tell us if Bald Eagles in Ontario migrate to Pennsylvania? Why or why not?

How does using citizen scientists to collect data help scientists learn more about birds? Can you think of any drawbacks to using citizen scientists to collect data?

Taking it Further:

- Have students pick another Bird of Prey such as Red-tailed Hawk or Golden Eagle, and compare their distribution to the Bald Eagle.
- Explore other ways that eBird displays data about Bald Eagle populations by using the *Bar Charts* and *Line Graphs* features of *Explore Data.*
- Older students can research historical population trends using data from the Christmas Bird Count. First, they should familiarize themselves with the history of the CBC. Go to www.audubon.org/science/conservation/christmas-bird-count, and click on the *History of the CBC.* After that, return to the main page and click on *CBC Results*. This page contains instructions on how to access data from all of the CBC's over the years. You have control over the date range, species, and region. Data includes both the numbers and graphs and can be downloaded in several formats.
- Have students keep track of the birds around the school ground and submit their data to eBird. Contact Audubon Society of Western Pennsylvania at www.aswp.org to find out how.

Resources

Gross, Doug, and Dan Brauning. "Bald Eagle Species Account." *Pennsylvania Game Commission*. Commonwealth of Pennsylvania, 19 Aug. 2014. Web. 02 Feb. 2015. <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=978032&mode=2>

"Bald Eagle." *The Cornell Lab of Ornithology: All About Birds*. Cornell Lab of Ornithology, n.d. Web. 2 Feb. 2015. <http://www.allaboutbirds.org/guide/Bald_Eagle/id.aspx?spp=Bald_Eagle>

"Christmas Bird Count." *Christmas Bird Count*. National Audubon Society, Inc., 2014. Web. 2 Feb. 2015. <http://www.audubon.org/conservation/science/christmas-bird-count>.

eBird. An online database of bird distribution and abundance. Cornell Lab of Ornithology, Ithaca, NY. http://www.ebird.org.