Counting Birds for Science
6-8 grade

Themes: Community science, birdwatching

Location:
The lesson can be taught in the classroom or a hybrid of in the classroom and on WDFW public lands. If your group size is over 30 people, you must apply for a group permit. To do this, please e-mail or call your WDFW regional lands permitting agent. Check out other WDFW public lands rules and parking information.

Data can also be gathered from your school yard, local park, or nearby green space.

Remote learning modification: Lesson can be taught over Zoom or Google Classrooms. Students can gather data from their porches, backyards, balconies, local parks, green spaces, etc.

Standards:
NGSS

MS-LS2-1
Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2
Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

CCSS

Math.6.SP.B.4
Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Math.6.SP.B.5.A
Summarize numerical data set in relation to their context such as by reporting the number of observations.

Math.HSS.ID.C.9
Distinguish between correlation and causation.

Modifications, Adaptations:
For COVID-19 distance learning, or other remote learning modification, look for **Remote learning modifications** throughout the lesson plan.

Vocabulary:
Abundance: Number of individuals per species in a given ecosystem or habitat.
Causation: The relationship between cause and effect.
Community/citizen science: The collection and analysis of data by members of the general public, typically as part of a collaborative project with professional scientists.
Correlation: A measure of the extent to which two variables are related
Invasive species: Any kind of living organism that is not native to an ecosystem and causes harm to the ecosystem and/or species who live there.

Materials:
Clipboards, notebooks, pencils, Bird ID guides Bird ID activity, Bird Count PDF
Optional: Tablet, smartphone, binoculars

Objectives:
Students will....

1. Describe what community science is and how community scientists contribute to scientific knowledge.
2. Analyze data from a community scientist and hypothesize why bird populations change.
3. Observe and identify birds for at least 30 minutes.
4. Compile data on birds in their area and create (a) graph(s) that measure(s) the data accurately.
5. Infer relationships between habitat and the abundance of birds they saw in their project.

Procedure:
Introduction to community science
Ask students if they have heard of community or citizen science before. If so, what do they know about community science?

Write their answers on a whiteboard/virtual whiteboard. After discussion, have students read this short National Geographic encyclopedia article about community science.

Community science is when members of the general public participate in collecting and analyzing data. Data collected are typically things people can observe. For example, how many species of mushroom are found in a state park? How has the weather varied over the last five years in the same location? Community scientists and programs usually work with professional scientists. This collaboration allows scientists to gather or sift through more data than they could on their own. Ask students if they can think of any examples of community science programs.

Some examples include:

- Stardust at Home: Help NASA find interstellar star dust using a virtual microscope.
- Monarch Watch: Grow milkweed, raise monarchs, and report monarch observations to help dwindling butterfly populations.
- EarthEcho Water Challenge: Test a water sample near your home and submit the results to help support clean water efforts.
- Finally, the Christmas Bird Count (CBC): The Christmas Bird Count is the longest running community science project. It began in 1900 as an alternative to shooting birds. Let's learn more. This link takes you to a four-minute video explaining the history of the CBC and its importance today.

After watching the video, ask students why they think counting birds is important. What are examples of how these

data can be used to inform scientists? You can write these answers on a physical or virtual whiteboard.

- Track changes over time.
  - o What does it indicate if there are changes in wintering areas, food sources, populations, etc.?
- Monitor bird habitat (food, water, shelter, space).
  - o What changes might people notice in habitat over time? Would this change where the birds choose where to overwinter/migrate?
- Obtain information about the presence/absence of bird species.
  - o What might a decline or increase in species tell scientists?
- Develop ways to protect and conserve bird species.
  - o How could this data be used to help make local, regional, national, or international decisions that help protect birds and their habitat?

Looking at Christmas Bird Count (CBC) data
In this activity, students will look at four years of data collected from Audubon volunteer, Jordan. Jordan compiled the five most commonly seen birds in their CBC and graphed the abundance of the species over four years. This activity can be completed and turned in though Google Slides, or you can print the slides and hand them out to the class. If you have the class complete the assignment via Google Slides, make sure you "Save as a Copy" otherwise students will all be editing the same copy.

Watch this video as a class (or students can watch individually). Region 4 district biologist Chris Anderson will walk students though how to see the percent a species' population has changed using Christmas Bird Count Data. Students will choose a bird in Washington, then use the below formula to answer.

> *"To convert an annual percent change to percent change over a longer time interval, try the following. Divide the annual percent by 100, and then add 1. Then raise that value to the number of years in the new time interval, say 52 years, from 1966-2017. Then take that value and subtract 1. Finally, multiply that value by 100 to return it to a percentage."*

Gathering data
Explain to students they will be community scientists and will conduct a bird count. Students will count all the birds they see. They will document their findings in a notebook or on a piece of paper and then will input data into an online database called eBird.

Familiarize yourself with eBird, where thousands of people enter bird sightings into an online database. Cornell Lab of Ornithology, who runs eBird, has put together eBird Essentials for Educators. This document explains eBird and Merlin, the bird identification app (Merlin is optional to this lesson).
You will want to create a group account (see page five of the eBird Essentials for Educators) for your class. Have students practice Bird ID Basics pages 6-9. In order to identify birds, it is important students look at the bird's size and shape, color patterns, behaviors, and the surrounding habitat. You can use this series of videos and this webpage to help students learn how to ID birds. You can also use the Merlin app.
The following birds are commonly seen throughout Washington:

- American Robin,
- American Crow,
- House Finch,
- Dark-eyed Junco,
- Golden-crowned Sparrow,
- European Starling,
- Spotted Towhee,
- White-crowned Sparrow,
- Ruby-crowned Kinglet,
- House Sparrow.
- You can also choose species that are commonly seen in your locale.

After students have practiced their bird ID with a couple of different species, pair students up into groups of two or three. Pass out clipboards and binoculars if you have them. They can learn how to use and focus binoculars with this video. If students have smartphones or tablets, they can use these to zoom in on birds. This way they can even take pictures of the birds they see! If you can, take a field trip to your local public lands. Otherwise, utilize your closest greenspace: schoolyard, nearby park, pathway along river, etc.

When you first start, you may want to find and identify a handful of birds as a class. This way, students learn in the field and you can assess their abilities. Have the students wander for a specified amount of time. Make sure that students take turns with the binoculars and that each student fills out their own data set. This is important because they will be required to graph their data later. You should set some safety ground rules such as:

- When looking through binoculars, make sure you're standing (not walking)
- Always carry binoculars around neck to prevent them from dropping
- Stay within eyesight of an adult at all times
- Don't swing, throw, toss, or otherwise abuse binoculars
- Respect any wildlife you see. Don't chase, torment, yell at, throw objects at, or otherwise harass birds or other wildlife
- The more peaceful and quiet you are, the more wildlife and unique behaviors you are likely to see.
- Do not feed, touch, or attempt to lure any animal.

Read more from The American Birding Association Birding Code of Ethics.

Remote learning modification: Birding at home. Have students watch this introduction video to and birding tips for attracting birds to their home. Counting birds can be done individually. Have students choose a nearby area where they are likely to see birds. This could be their backyard or a local park. Have them confirm with you the spot is appropriate. Students may need adult guidance/supervision depending on their chosen spot. Students should be outside for a minimum of 30 minutes counting birds.

You can still create a group eBird account and show students how to use over Google Classroom/Zoom. Binoculars are not necessary, but are a helpful tool. Public libraries are offering a "Check Out Washington" backpack complete with bird guides,

Discover Pass, and binoculars. Please make students aware of this exciting, and free resource. Participating libraries can be found here. Safety and ethic rules still apply and should be made clear to students and adults.

Analyzing data
After students have collected their data, they will analyze it. You can give students graphing paper, a graph outline, or have them use this online graph maker. Have students review their data. Introduce correlation vs. causation. Just because data sets may correlate, doesn't mean one causes the other. Remind them it is important to be aware of this while making hypotheses and when reading articles on the internet or in journals.

Students will make a line or bar graph that shows their observation of birds. They will need to determine how they display their information so that it is accurate and tells the story of the birds they observed. If students took data over multiple days/events, they may want to display it on the same graph to show potential changes.

After summarizing the data in a graph, students should answer the following questions:

1. Why are some bird species abundant and others less abundant?
2. What effects might an increase in an invasive plant species have on bird habitat?
3. What are some reasons a bird population might decline in this area?
4. What are some reasons a bird population might increase in this area?
5. How would you measure/test these hypothesis?
6. Why is it important to count individual birds? What about population of birds?
7. What role does community science play in today's world?
8. How might community science further our knowledge of the natural world?
9. What has been the most interesting thing you learned in this project and why?

Have students compare graphing sheets. At the end of the project, you can input data into eBird together—just like community scientists do at the end of the CBC. We encourage you to make it a fun event with snacks and beverages. Call out species and then students who have recorded that species will say how many. You can put this final tally into eBird.

Remote learning modification: Have students come together in Google Classroom/Zoom to share their data as you input into eBird.

Idea: Show off your students' work! Share student projects from this lesson with WDFW.
Facebook:@WashingtonFishWildlife
Instagram:@TheWDFW
Twitter:@WDFW
#WildWashington #WildWa

Did you teach this lesson? Give us your feedback.

Additional Resources :

You can use the following resources to build onto this lesson, or share these resources with students for their research project.

Supplemental Activities and extensions:
Instead of having students count birds in one session, have them count birds:

- Once a week for a month
- Twice a week for a month
- Once a month for the school year
- Every other week for three months

At the end of the time you've set for them/time they are interested in gathering data for this project, have them complete the analyzation section the same way. They will have more data to analyze, so their graph and written analysis will be richer.

Create bird habitat in your school yard. This is a great way to get students involved in hands-on service-learning projects. Check out this resource on how to get started.

Have students compare data on the species they collected with data from their local Audubon chapter's most recent CBC count. Have students compare and contrast differences in the data sets and identify why differences and similarities in data occur.

- Bird educational lessons-Klamath Bird Observatory
- Bird ID experts sheets- Klamath Bird Observatory
- Winter bird bingo-Washington Trails Association
- Birding and community science- WDFW

Other resources:
Supplies:
If you do not have access to binoculars, check with your local Audubon chapter. Some chapters like Vashon, Seattle, and Eastside offer a rental service on their website.

More information:

- Bird web- Seattle Audubon (an index of birds in Washington).
- Christmas Bird Count-Audubon
- Washington Birds Map-Washington Birds

eBird training

- K-12 eBird resources-Cornell Lab of Ornithology
- eBird advice for educators-Cornell Lab of Ornithology

Other community science bird projects:

- Washington State CBC information-Washington Ornithological Society
- Great Backyard Bird Count-Audubon
- Olympia Youth Audubon Society-Black Hills Audubon
- Project FeederWatch
- Urban Bird Project
- NestWatch