

FeederWatch Classroom Guide

CLASSROOM CITIZEN SCIENCE

Kids and adults all over the world are making observations following simple scientific protocols and submitting their observations to databases that scientists use to answer real world questions. Citizen science projects are very diverse and include projects focused on plants, insects, birds, stars, streams, and many more. In these projects, students become scientists—making careful observations, following protocols, and collecting data, while supporting researchers across the world. Many projects get children outside, learning about and connecting to their local environment. Participating also helps teachers meet the Next Generation Science Standards' (NGSS) goal of having students experience the science process first-hand, developing science literacy through hands-on discovery, exploration, and real-world connections. To learn more about how citizen science and these activities meet NGSS standards, visit the resource website for this guide (birds.cornell.edu/k12/pfw-resources).

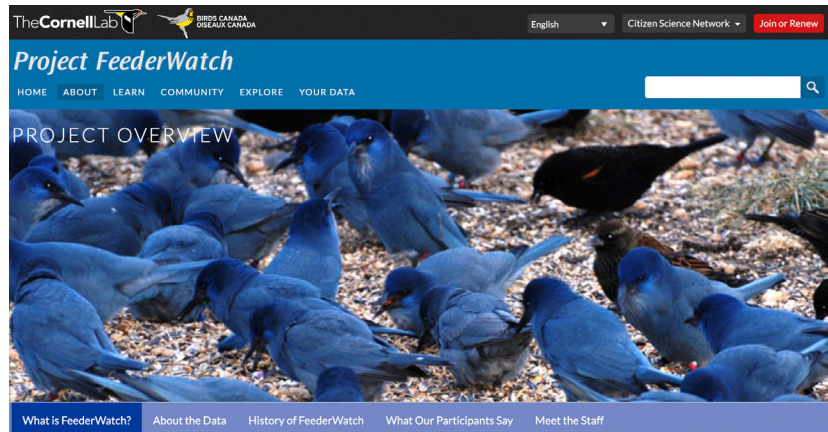
INTRODUCTION TO PROJECT FEEDERWATCH

Project FeederWatch (PFW) is a November-April survey of birds that visit schoolyards, backyards, nature centers, community areas, and other locales in North America. Citizen science projects like PFW can support classroom learning while providing your students with skills they need to thrive in the world. Being a FeederWatch citizen scientist involves carefully observing, identifying, and collecting data on feeder birds. Participating allows you to track what is happening to birds around your school and contribute important data to scientists who need to know more about where birds are and how they are doing. This guide gives educator-tested tips, tools, and activities that will help your class participate in and learn through the project.

Getting Started: PFW with Students

SIGNING UP FOR PFW

The first step is to enroll in the program on the PFW website at feederwatch.org/about/project-overview.



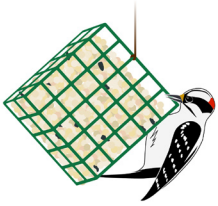
For a nominal program fee, you will receive all the tools your class will need to track your birds and instructional materials that will enliven your classroom.

When scheduling this unit, make sure to account for the time to receive your PFW kit. Once you have received your kit, make a PFW account to submit your class data. Use an email address and password that you feel comfortable sharing with students.

TEACHER TIP: CREATING A GROUP ACCOUNT

Ms. Smith uses the Cornell Lab website to take courses and participates in several Lab citizen science projects at home. This year, she plans to introduce PFW to her classroom. Because the Lab has a single sign in for all of its websites, she created a new account for her class to keep their data separate. She decided to register a new email address, SmithClassPFW@emails.service.com and use a password that she can share with students. This way her students can log into the account and share in the data-submitting responsibilities. Ms. Smith monitors that email account for any PFW updates that may help her students grow as birders.

GET YOUR TOOLBOX READY



FeederWatch Mobile App or Tally Sheet

Your class can keep track of their bird counts using either the FeederWatch mobile app or copies of the Tally Sheet included in this guide. They can also be downloaded from the website: feederwatch.org/about/detailed-instructions/#prepare-a-tally-sheet.



Common Feeder Birds Poster

Hang up the common feeder birds poster, included in the PFW kit, so students can see it while they observe your count site. You might also want to download and print mini-posters of common feeder birds, common backyard hawks and falcons, and hummingbirds: feederwatch.org/learn/identifying-birds/#download-feederwatch-posters.



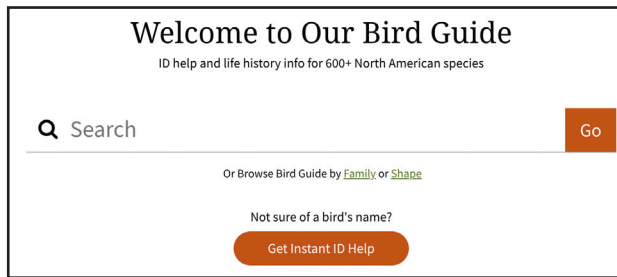
Merlin Bird ID Mobile app

If you have access to smartphones and tablets, we recommend installing and using the Merlin Bird ID mobile app. This user-friendly app can provide instant identification assistance when your class is unsure of a bird species. You might want to show this Merlin video tutorial (youtube.com/watch?v=J1C-Q-z_np0) and practice using the app with students by finding a bird that the whole class can observe (outside, through a classroom window, or video clip).



Field Guides and Bird Books

Field guides are a classic tool that have species drawings or photos, short descriptions, and range maps of birds. They can cover specific regions or an entire country. Gather field guides or other bird books if you can.



All About Birds

All About Birds is a free online field guide that has a wealth of life history information and fun facts. You can look at multiple photos and videos of a bird, compare similar species, and listen to songs and calls. Visit: allaboutbirds.org/guide/search.



Binoculars

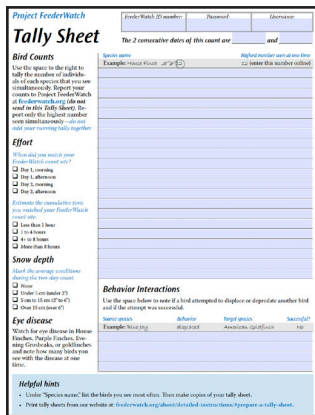
While binoculars are not necessary for PFW because the birds will be coming to you and your feeders, you might consider purchasing some to enhance your students' observations. Consider these tips before and after your purchase: birds.cornell.edu/k12/binoculars-for-kids.

TEACHER TIP: CITIZEN SCIENCE FROM THE COMFORT OF YOUR CLASSROOM

One of the benefits of participating in Project FeederWatch is the opportunity to engage students in outdoor-focused learning. If you are new to birding and to the project, it can be helpful to start with short 10 minute feeder counts. Students might also be more engaged if they help set up the feeder area or even design the feeders in it!

Activities

ACTIVITY 1: INTRODUCE CITIZEN SCIENCE AND PROJECT FEEDERWATCH



The image shows a 'Project FeederWatch Tally Sheet' form. It includes sections for 'Bird Counts', 'Effort', 'Snow depth', 'Eye disease', and 'Behavior Interactions'. The 'Bird Counts' section has a table with columns for 'Species name', 'Number seen at one time', and 'Enter this number below'. The 'Effort' section has checkboxes for 'Did you watch your feeder(s) every day?', 'On 1 morning', 'On 2 mornings', and 'On 5 mornings'. The 'Snow depth' section has checkboxes for 'How much snow was on the ground when you counted?', 'Less than 1 inch', '1 to 2 inches', '3 to 4 inches', and 'More than 4 inches'. The 'Behavior Interactions' section has a table with columns for 'Species name', 'Behavior', 'Feign species', and 'Season(s)'. The form also includes 'Helpful hints' at the bottom.

Resources Needed

- Project FeederWatch kit
- Project FeederWatch Detailed Instructions website (feederwatch.org/about/detailed-instructions)
- Project FeederWatch tally sheet (feederwatch.org/about/detailed-instructions/#prepare-a-tally-sheet)

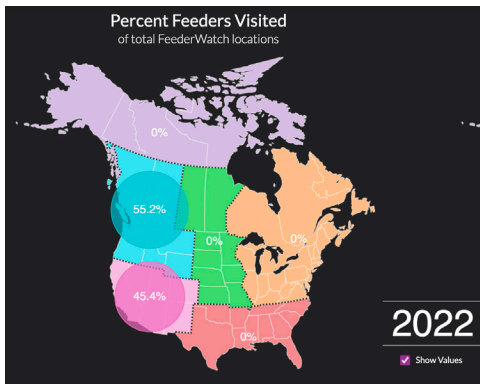
Getting Ready

- Familiarize yourself with the protocols for Project FeederWatch.
- Decide how and when your class will participate. Plan how your students will tally counts—use the Tally Sheet provided on the website or devise your own method, perhaps using a white board.”
- If you like, learn more about Anna’s Hummingbird at the All About Birds website: allaboutbirds.org/guide/Annas_Hummingbird.

Introduce PFW by explaining the basics to students: FeederWatch is a November-April survey of birds that visit backyards, nature centers, community areas, schoolyards, and other areas. People who participate in FeederWatch count the birds using the same method so that the data they collect are useful to scientists. In order to provide complete and correct data, students need to accurately identify and count birds. The data they collect will be used by professional scientists who work to understand bird abundance and distribution. One seventh grader put it best when she said, “Scientists can’t be everywhere, so students from all over can record data and send it in.” Project FeederWatch is one of many citizen science projects that invite people like us to share what they see with scientists. Explain when and how you plan to use the project this school year.

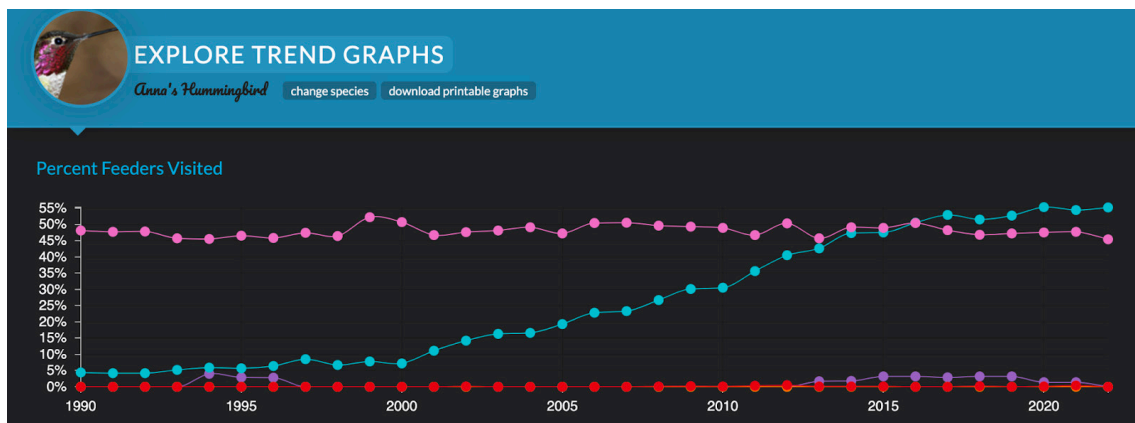
Give students a glimpse of how their data is used to understand birds. Go to feederwatch.org/explore/trend-graphs and show students one or more trend graphs that show how PFW data has helped scientists discover how bird populations have changed over time.

For example, you can select the Anna’s Hummingbird and show students the “Percent Feeders Visited Graph.” Explain that this graph represents the percentage of feeders in each geographic region of the US (Northwest, Southwest, Far North, Central, Northeast, and Southeast) that FeederWatchers observed Anna’s Hummingbirds at for each year starting in 1990.



2022	
Northwest	55.2%
Southwest	45.4%
Far North	0%
Central	0%
Northeast	0%
Southeast	0%

Make sure students know how to read the key, which will appear when you hover over a data point with the mouse. Hover over the data points for one year and verbalize what the data shows. For instance, in the year 2022, FeederWatchers observed Anna’s Hummingbirds at 55.2% of all the feeders in the Northwest and 45.4% of all the feeders in the Southwest of the US. For students who are less familiar with percentages, you may explain that this means that out of 100 feeder sites in each region, about 55 in the Northwest and 45 in the Southwest were observed to have Anna’s Hummingbirds come visit them. This means this species was relatively common in those two regions, but they are almost non-existent in the Far North, Central, Northeast, and Southeast.





Hardy Hummer © Maggie MacDonald

Ask:

- **What do you notice about how the geographic distribution of Anna’s Hummingbirds has changed over the past 30+ years?** (Anna’s Hummingbirds have been spotted at increasingly greater percentages of feeders in the Northwest since the 2000s. Explain that the data the students will collect will contribute to the data points for future years.)
- **Why do you think there might be more Anna’s Hummingbirds in the Northwest region now than in the past?** (Students might mention weather and people putting up more feeders. Research shows that the planting of exotic flowering trees provided nectar and nesting sites, and allowed the hummingbird to greatly expand its breeding range. Anna’s Hummingbird thrive alongside humans. One study found that Anna’s Hummingbirds tend to colonize new locations, even cold ones, based on housing density — that is, how many people live there — and the availability of flowery landscaping and nectar feeders.)
- **How do you think that citizen science projects like Project FeederWatch help scientists?** (Projects like PFW help scientists answer big questions because people all over send in data over time. We can help track changes to bird populations and help understand and document why these changes happen.)

ACTIVITY 2: GET TO KNOW YOUR FEEDER BIRDS



Resources Needed

- Project FeederWatch Poster (in the PFW kit)
- Project FeederWatch Identifying birds website (feederwatch.org/learn/identifying-birds)
- Optional: Hawk and Hummingbird posters (feederwatch.org/learn/identifying-birds/#download-feederwatch-posters)
- Inside Birding Video: (academy.allaboutbirds.org/inside-birding-size-shape)
- Bird ID Skills blog: (allaboutbirds.org/news/building-skills-the-4-keys-to-bird-identification)

Getting Ready

- Watch the Inside Birding videos or read the BirdID Skills blog posts on shape and shape and color patterns to help inform your lesson planning on bird identification. Consider introducing these resources to students as part of the lesson.
- Become familiar with the birds on the Common Feeder Birds poster and print the hawk and hummingbird posters if you choose to use them.
- You may wish to download the Merlin Bird ID mobile app, or visit the All About Birds website or the PFW website about tricky bird identification (feederwatch.org/learn/tricky-bird-ids) to help your students discover and differentiate different species of birds.
- Show students the Common Feeder Birds poster that is included in the PFW kit and the hawk and hummingbird posters if you choose to use them. Make sure to use the side that corresponds to your geographic location (Eastern or Western North America).

Ask:

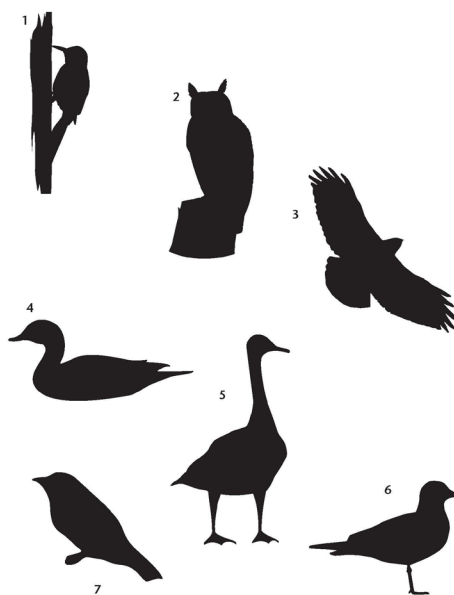
- **Have you seen any of these bird species before? If so, where and when did you see them?**
- **What differences do you observe between these species?** (Make sure that students mention size, shape, and color pattern. These are the key ways they will distinguish the various bird species that visit.)

Encourage students to take a close look at these key characteristics by comparing and contrasting the birds on the poster:

1. **Size and Shape:** It's tempting to start with color, but bird ID experts begin by observing the general size and shape of a bird. Is the bird bigger or smaller than a robin, for example? How long is its beak compared to its head? Invite students to describe the size and shape different parts of each bird (beaks, wings, tails, etc.) as well as compare them to each other.
2. **Color Pattern:** Encourage students to pay attention to the overall color pattern by taking a color inventory of a bird. What color is on the head? Body? Tail? Where is there spotting or streaking? Look for those patterns and features that really stand out for each bird on the Common Feeder Birds poster. Among birds that are similarly colored, the color patterns on the head and wings are often important for identification.

Play an "I Spy" guessing game for students by describing the characteristics of one of the birds on the poster using a variety of descriptors, for example, "I see a bird that is smaller than a robin, mostly black and white, with a small dark beak, and a medium-size tail." Invite student partners to each do an "I Spy" bird for their partner using size, shape, and color clues.

Keep the poster(s) visible for students throughout the unit, and play additional rounds of "Bird I Spy" in downtimes or on outdoor walks so students continue to get to know the birds they are likely to see and collect data about.



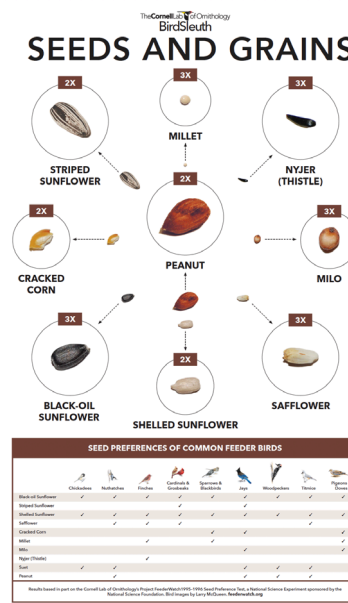
ACTIVITY 3: BIRD BEAKS AND SEED PREFERENCES

Resources Needed

- Project FeederWatch Poster (in your PFW kit)
- Common Feeder Birds Interactive: feederwatch.org/learn/common-feeder-birds
- Seeds and Grains Poster (download)
- Bowls or plates
- Mixed seed
- Construction paper
- Tape or glue
- Optional: Beaks! A book by Robin Brickman and related activities on our website: birds.cornell.edu/k12/beaks

Getting Ready

- Print the Seeds and Grains poster or plan to project it.
- Learn about beak differences at: allaboutbirds.org/news/a-birds-beak-is-shaped-by-more-than-what-it-eats.
- Prepare to project the Common Feeder Birds Interactive.



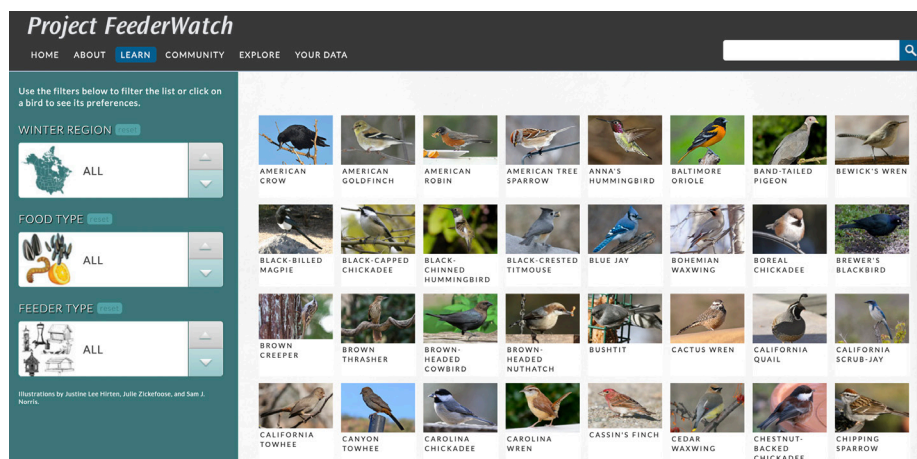
Draw students' attention to the differences in bird beaks on the Project FeederWatch poster.

Ask:

- **What are some seeds that people eat?**
- **What seeds do birds eat? How do these seeds differ?** (*Birds eat a variety of wild seeds. Bird seed mixes often contain seeds like sunflower, safflower, peanuts, and corn. Seeds differ in taste, hardness, and nutritional value.*)

Let students know that different seed and feeder combinations will attract different bird species, and birdbeaks are adapted for the type of food it eats and how they obtain their food. Birds in temperate climates must rely on foods such as berries, seeds, and grains to survive the winter. These birds often have beaks that can crack open nuts and seeds.

Introduce the Common Feeder Birds Interactive. Project FeederWatch has put together a list of nearly 100 common feeder birds and cross-referenced what they like to eat and where they like to eat it. Explore your region to see what you might be able to attract to feeders using this interactive: feederwatch.org/learn/common-feeder-birds.



TEACHER TIP: SEEDS AND ALLERGIES

In this activity you will be exposed to various seeds, grains, and nuts. Take note of any participants that have allergies to such foods, and consider easy substitutions such as dried fruit for nuts, and vegetable shortening instead of peanut butter if needed.

TEACHER TIP: SEEDS BIRDS DON'T REALLY LIKE

Golden Millet, Red Millet, and Flax seeds are often used as fillers in packaged bird seed mixes, but most birds shun them. Waste seed becomes a breeding ground for bacteria and fungus, which makes a mess and also contaminates fresh seed. Make sure to read the ingredients list on bird seed mixtures, avoiding those with these seeds. In particular, if a seed mix has a lot of small, red seeds, make sure they're milo or sorghum, not red millet.

Take a closer look at bird seeds by doing a seed sort. Distribute small bowls or plates containing a small quantity of mixed bird seed to each student or pair, and ask them to sort the seed by type. Invite them to glue or tape a sample of each seed type on a sheet of construction paper, using the Seeds and Grains Poster to identify and label each type of seed.

Notice that seeds (unless they have been shelled) have a tough outer coating that needs to be opened or cracked. Invite students to try to break open the shell of a sunflower seed.

Ask:

- **How are the seeds similar? How are they different? Do you think some seeds are harder or easier to eat?**
- **Why do birds seek out these seeds?** (*Seeds are generally oily and high in calories, which provides the energy birds need. In cold and wintery areas, there may be little else for birds to eat since there are few insects, worms, nectar-bearing flowers, etc.*)

Using the Common Feeder Birds Poster, discuss the differences students see in the beaks of birds. If you are using the hawk and/or hummingbird posters, this is a good time to emphasize even bigger differences in beaks and the connection between what a bird eats and the size and shape of its beak.

Ask questions such as: *Which species have similar beaks? Which species have different beaks? Why do you think these similarities and differences exist?* Invite small groups to study the Seed Preference Chart on the "Seeds and Grains" poster to determine which birds prefer which seeds, and add the names of the birds next to the seed samples on their seed collages.

ACTIVITY 4: FEEDER ENGINEERING



Resources Needed

- An assortment of recycled and natural materials
- Rulers
- Glue, tape or hot glue gun
- Scissors or box cutters
- Bag of mixed bird seed
- 8 oz measuring cup or bowl

Getting Ready

- Determine which kind of bird seed you wish to purchase and purchase it. To find out more about different types of bird feeders, what food to use, and what birds you can expect to see in your area, check the PFW Guide to Feeder Types website (feederwatch.org/learn/feeding-birds). As needed, discuss the tips and important notes provided on the website with your students.
- Collect an assortment of recycled and natural materials. Materials can include various plastic containers and cartons; pieces of wood, cardboard, plastic, and fabric; clothes hangers and clips; pine cones and branches; and yarn, string, twine, and rubber bands; and old hardware. The bigger the variety, the better!
- Select a location outdoors where you will hang all of the students' bird feeders. Ideally, this location should be easily viewable from a window in your classroom. Get permission to hang them if necessary.

Introduce the problem/challenge to students: To design a functional bird feeder that can hold one cup of birdseed and withstand your climate and local birds for at least one week. Show students the materials you have gathered.

Ask questions such as: *What are the constraints for the challenge?* (The materials we have been given, the time to build the bird feeder, and the rules for success--the feeder needs to hold at least a cup of seed and to withstand the elements for at least a week.)

Have student teams work together to brainstorm ideas for their bird feeder design based on the materials you have provided. Encourage students to generate and record as many ideas as possible. Have student teams discuss the advantages and disadvantages of their ideas to inform their final design (which can be a combination of ideas).

Using their final design, teams collect materials and construct their bird feeder. Once all the bird feeders are constructed, have students share their designs and logic. Fill the feeders with seed and hang them outdoors. You will use this location as your FeederWatch count site (covered in Activity 5).



Over the week, invite students to monitor the feeders and keep a running list of the species that visit. They can also note how the feeders are holding up, whether different feeders attract different kinds of birds, and measure the amount of bird seed consumed. *(Note: These activities are a way to get students more comfortable with recording their bird data and prepare them for the next lesson during which they will submit their data to Project FeederWatch.)*

Ask students to reflect on their designs, in class or for homework. The questions can also be used for a class discussion.

Ask:

- **Which feeder seemed to attract the greatest diversity of birds? Why do you think that feeder was popular?**
- **What feeder designs and materials were sturdy, and which parts fell apart? How can we improve feeder design in the future?**

If time allows, invite students to reinforce their feeders or build new ones using what they've learned. Maintain seed in your feeders throughout the PFW season.

ACTIVITY 5: COLLECT FEEDERWATCH DATA

The image shows a screenshot of the Project FeederWatch Tally Sheet form. The form is titled "Project FeederWatch Tally Sheet" and includes fields for "FeederWatch ID number", "Password", and "Date/Time". Below these fields, there are instructions for using the form, including a section for "Bird Counts" with checkboxes for "Use the space to the right to tally the number of individuals" and "Use the space to the right to tally the number of birds". There are also sections for "Effort", "Snow depth", "Eye disease", and "Behavior Interactions". The form is designed to be used for recording bird counts and observations.

Resources Needed

- Project FeederWatch Poster
- Tally Sheets or PFW Mobile App

Getting Ready

- Make copies of the PFW tally sheets if needed.
- Select your FeederWatch count site for your observations. The sites should be prepared with your students' feeders. Choose clear and recognizable boundaries for the count sites.
- Select your FeederWatch count days for your observations. You should always schedule two consecutive days to do counts. I suggest that they schedule the count days in advance and note them on the PFW's Bird-Watching Days Calendar or another calendar posted in the classroom.

Students may begin collecting FeederWatch data when the count site is prepared and you feel confident in their ability to accurately identify and count birds. Remind students that standardizing the way citizen scientists count the birds they observe is an important part of making sure the data collected for PFW is reliable. Model how to accurately record bird counts for your students. Have a large tally sheet at the front of the classroom and verbalize the observations you make of birds. Explain why you record the numbers that you do, making sure that you do not count birds that simply fly over your count site and that for each species of bird, you only write down the highest number that you see at your site at any given time. Students may also be invited to call out birds and numbers that they see.

Decide the best method for your students to record data, whether through the tally sheet or the app. You may want to organize the class into groups that produce one data set each and provide them with your own guidelines, such as, "at least two students in the group must see and identify a bird in order to count it." Take some time to review tally marks to make data recording quick and easy. For younger students, fill in the names of birds they are likely to see on their tally sheet before each observation.

Summarize the class's findings into one class checklist before inputting the numbers into the PFW website. This is useful because it will allow you to double-check the accuracy of the data and also compile the data into one master class list. (*Note: you should not enter multiple lists containing essentially the same data into PFW.*) Save your class checklists so you can demonstrate to students their growing body of data both in print and online.

TEACHER TIP: HOW TO ENCOURAGE QUALITY DATA COLLECTION

Some educators express concern that their students' data may not be good enough to include in the PFW database. Let students know why their data are important and need to be reliable. Encourage your students to only record data they are confident about and keep notes or take photos of birds they are unsure of to investigate later. You might wish to consider how you'll respond if students report seeing birds you know are unlikely. For example, one field-test educator stated:

"As a serious birder, I feel uneasy about submitting data that is inaccurate. I also don't want to tell students, 'No, you couldn't have seen that.' As an example, Lesser Goldfinches are an uncommon bird here in December, and I've never seen them on campus. Yet I had one group who insisted they saw five of them. I questioned them about how they knew they were Lesser Goldfinches, and they gave an appropriate answer. Other groups didn't see them either. How do I handle situations such as this?"

We'd like to offer these possible responses if you are concerned about a student's identification of a species.

- What makes you think it was that species? Do the field marks match?
- Is that species found here at this time of year?
- Did other groups see that species?
- What other species could it have been? What makes you confident that it was that species?
- Let's not enter that bird this time, since we aren't sure about it. But next time you see that kind of bird, point it out to the class so we can figure it out together.

Compiling a class count will also help mitigate these kinds of issues. Even if students have kept individual or small-group checklists during the count, take a moment after the count to compile this data into one class checklist for submission. For example, ask: "How many Black-capped chickadees did you see?" and come up with a consensus of how many were actually present during the count.

Share data submission tasks with students. For example, you might let groups of 2-3 students take turns entering the PFW data. Eventually some or all of your students may become interested in collecting data at home with their families.

ACTIVITY 6: GOING FURTHER WITH PROJECT FEEDERWATCH

Resources Needed

- Computer with Internet Access
- Project FeederWatch Explore website (feederwatch.org/explore)
- Several weeks or months of PFW data collected from your count site.

Getting Ready

- Review the “Explore” section on the PFW website.

Now that your students are more familiar with PFW data, go further by exploring how this data is important, use it to understand what’s happening in your schoolyard, and/or address your own questions about birds.

- *What birds have we seen?*
- *How do you think we might attract more birds to our schoolyard?*
- *What questions do you have about birds?*
- *How do you feel about participating in citizen science?*

Depending on student interest and your timeline, you might complete the following options:

OPTION 1: CREATE BIRD PROFILES

This activity can be completed as a whole-class activity for younger students or an individual/partner activity for older students. If your students create more than one bird profile, invite them to present, compare, and contrast them, noting the similarities and differences. Invite students to make a poster or digital presentation of one bird species they have seen on the schoolyard using class data, PFW data in the “Explore” section, and outside research. For example, students can share life history facts about their species, share a range map, and note any changes in population and common region(s) where that species is found, and why these changes might be occurring. An excellent source for further research is the All About Birds website: allaboutbirds.org/news/?pid=1189#.

OPTION 2: WHAT WE WONDER

Take students learning to the next level by embracing their questions about birds and turning them into scientific investigations. Our free downloadable curriculum, Investigating Evidence (birds.cornell.edu/k12/investigating_evidence), will guide the way.

OPTION 3: EXPLORE AND IMPROVE HABITAT.

Search your schoolyard for “wild” foods you think a bird might eat, like berries, seeds, and insects. Ask questions such as: *How many different kinds of food can we find, and how does our habitat support the food needs of birds? Where can birds find water and cover on our schoolyard? What dangers face birds on our schoolyard, and how might we make it better for birds?* Working in small teams, invite students to brainstorm ways they might further improve the schoolyard habitat and implement changes if you can.