

Use of Project Feeder Watch to Engage Undergraduates in Bird Studies and Behavior

Katherine S. Wydner

Saint Peter's University, Biology Department, 2641 Kennedy Blvd, Jersey City NJ 07306 USA
(kwydner@saintpeters.edu)

Project FeederWatch (PFW) is an annual winter survey of birds that provides information about long-term trends in bird distribution and abundance across North America. From November to April, birds at and around feeders are monitored according to an established protocol and data are reported to a database managed by the Cornell Lab of Ornithology and Bird Studies Canada. Data are collected on species of birds and the highest number of individuals observed for each species. Environmental factors such as weather conditions and snow cover are taken into account. PFW data are useful because they inform on where birds are as well as where they are not. Using information on how PFW has been successfully implemented at Saint Peter's University, this exercise has been designed to educate and engage students with respect to birds and their behavior. PFW protocol is explained with regard to its use with a team of students. Detailed information is provided, including an introduction to various types of bird feeders and how to identify common feeder birds as well as how to be prepared for the surprise visitor. At the mini workshop, we discussed PFW methods, walked outside, visited feeders, and practiced bird identification and data collection.

Keywords: bird studies, ornithology, ecology, experiential learning, Project FeederWatch

Link to Supplemental Materials: http://www.ableweb.org/volumes/vol-40/55_Wydner

Introduction

Project FeederWatch (PFW) is an annual winter survey of birds that provides long-term information on bird distribution and abundance across North America (Wells et al. 1998). From November to April, birds at and around feeders are monitored weekly according to an established protocol; data are reported to a website managed by the Cornell Lab of Ornithology and Bird Studies Canada. PFW has revealed long-term trends in bird populations, enabled creation of dynamic maps showing seasonal movements of birds, monitored the spread of avian diseases, and provided insights into bird behavior. As a citizen scientist endeavor, begun in the winter of 1987-1988, PFW's engagement of the public has been key to effective continent-wide monitoring of birds for more than thirty years (Bonter and Hochachka 2008).

The health of bird populations is closely tied to the health of the environment. As our planet faces the challenges of global climate change and other stressors such as urbanization, habitat loss, and human activities in general, birds are literally the "canaries in the coal mine". Thomas Lovejoy, a conservation biologist who helped bring the term "biological diversity" into widespread use,

has said, "If you take care of the birds, you take care of most of the big problems in the world."

Saint Peter's University, located in an area of high housing density in Jersey City, NJ, has provided a setting for studying birds in an urban ecosystem. As each generation of urban birds faces the stresses, food limitations, predators, and threats associated with life in cities, the survivors are undergoing adaptive evolution. The most abundant species seen on our urban campus, the house sparrow (*Passer domesticus*), has a long history of association with humans. Ravinet et al. (2018) examined the evolution of commensalism between house sparrows and humans through comparative analysis of the genome of several house sparrow populations and their wild relatives. Strong evidence was found for positive selection of a chromosome region containing two genes – an amylase gene (*AMY2A*) linked to adaptation to high starch diets and a skull shape gene (*COL11A*) that may have increased beak size and bite force. Variations in these genes were potentially advantageous for enabling house sparrows to live off human-cultivated foods following the advent of farming in the Middle and Near East around 11,000 years ago.

Supplementary feeding of birds, a popular pastime in cities and suburbs, likely continues to influence the evolution of bird species that come to feeders. A study

conducted in the United Kingdom, where bird feeding is widespread, has shown that the beaks of great tits (*Parus major*) have become longer in the UK than in continental Europe; great tits with gene variations for longer beaks ate more often from feeders and had a reproductive advantage (Bosse et al. 2017). Do feeder birds become dependent on human provisions? A study in Wisconsin revealed that woodland chickadees took only 21% of their daily food intake from feeders and that supplemental nutrition only made a difference in survival during severe winter spells (Brittingham and Temple 1992). Less is known, however, about the effects of feeding birds in urban habitats.

PFW has revealed changes in bird abundance and distribution related to both supplemental feeding and climate change. Greig et al. (2017) found that Anna's hummingbirds (*Calypte anna*) have moved 400 miles northward in range over the past two decades and have preferentially colonized urban locations where supplemental nectar feeders are provided. Prince and Zuckerberg (2014) found that climate change has provided an opportunity for smaller-bodied, southern species of birds to move into northerly bird communities. Strong et al. (2015) uncovered links between climate variability (temperature and precipitation) and continent-wide irruptions of winter finches such as pine siskins (*Spinus pinus*) linked to regional seed crop variability. PFW data have also tracked the spread of non-native species such as the monk parakeet (*Myiopsitta monachus*), a South American native that has become established in parts of the United States (Davis et al. 2013).

PFW has contributed valuable data on the appearance and spread of avian diseases. Dhondt et al. (1998) and Hochachka and Dhondt (2000) documented the effect and spread of an infectious eye disease (a mycoplasmal conjunctivitis) among house finches (*Haemorhous mexicanus*) in the Northeast. PFW data were critical in tracking the spread of this disease because data were available from *before* the outbreak as well as during and afterwards. Hartup et al. (2001) used PFW to examine the spread of this disease among additional finch species.

PFW recently invited participants to report behavioral observations related to two aspects of social dominance: displacement and depredation. Displacement occurs when one bird yields to another, moving away when another bird flies or hops toward it. Depredation occurs when one bird, successfully or unsuccessfully, attempts to prey on another bird. PFW data are being used to develop a complex hierarchical web of social dominance among species that come to feeders (Miller et al. 2017). One study used PFW behavioral data to investigate a mimicry

hypothesis pertaining to downy and hairy woodpeckers (*Picoides pubescens* and *P. villosus*, respectively), two species that resemble one another closely, except in size (Leighten et al. 2018).

PFW is thus a powerful and versatile research tool for monitoring bird populations that can be used to investigate factors such as climate change, urbanization, supplemental feeding, disease spread, and avian behavior. In our four years as PFW participants at Saint Peter's University, we have recorded data on the winter species that spend time on our urban campus. We have been interested to see how much species diversity is present, how much it varies from year to year, and if there are any significant trends that we can detect. Going forward, we are interested to see if restoring natural habitat in our PFW observation area will increase the number and kinds of birds we see. As we submit our observations to the PFW website, we know that our data will contribute to many studies related to trends among winter bird populations across North America.

PFW is an excellent educational tool to engage undergraduates in experiential learning. Its many advantages include the fact that participation in PFW is inexpensive, does not require laboratory space, and can be adapted flexibly to a number of learning settings: a field experience required for a course, a research project for students, a voluntary club activity, etc. PFW can be used with introductory or advanced biology students. No prior experience with birds is required and students can learn as they go along. Basic PFW data can be integrated into studies that investigate some specific issue; advanced statistics can be incorporated into PFW analyses if desired. In an age when technology dominates our attention, PFW is an excellent way to reconnect students with nature. Watching birds is regarded as having health benefits (relaxation and stress release), and PFW can serve as the start of a lifelong avocation. Because PFW can accommodate a team of students with centralized submission of data, it can give multiple students (i.e. a sizable group) a chance to participate in research rather than just a few. PFW data can provide a source for annual poster presentations by undergraduates. Finally, PFW illustrates what can be accomplished through the power of teamwork.

The goal of this laboratory exercise is to introduce students to Project FeederWatch. Specifically, students will (1) learn how to create a Project FeederWatch site, (2) follow official PFW protocol, (3) observe and learn about birds experientially, and (4) learn how PFW can be used as a research tool.

Student Outline

Project FeederWatch: A Research Tool for Studying Winter Birds and their Behavior

Objectives

In this activity, you will:

1. Create a Project FeederWatch (PFW) site
2. Follow official PFW protocol
3. Observe and learn about birds experientially
4. Understand how PFW can be used as a research tool

Introduction

Why study birds? Birds, with their grace and mobility of flight, capture our imaginations. As Roger Tory Peterson, founder of the first modern field guide to birds, once said, “The only creatures with feathered wings are angels and birds”. A scientific way to summarize the value of birds is to look at them in terms of their *ecosystem services*. Ecosystem services are benefits that humans derive from the natural world. Ecosystem services that birds provide for us include provision of food, control of pest species (harmful insects and rodents), support for ecosystems through nutrient cycling, and cultural contributions through art, religion, and our leisure activities.

Birds are major players in ecosystem processes and functioning because of their abundance; estimates place the total number of individual birds on Earth at between 200 and 400 billion (Gaston and Blackburn 1997). Birds are also dominant components of ecosystems due to their high level of biodiversity. There are approximately 10,000 species of birds in the world, and besides humans, birds are the only animals found on every continent.

Unfortunately, about forty percent of the world’s bird species are showing declines in their populations (Allinson, 2018). The health of bird populations is closely linked to the health of the environment. As our biosphere faces the challenges of global climate change and other stressors such as urbanization, habitat loss, and human activities in general, birds are literally the “canaries in the coal mine”. Thomas Lovejoy, a conservation biologist who helped promote the term “biological diversity”, has said, “If you take care of the birds, you take care of most of the big problems in the world.”

One way to study birds and document trends in their populations is through Project FeederWatch (PFW). PFW is an annual winter survey of birds that provides long-term information on bird distribution and abundance across North America. From November to April, birds at and around feeders are monitored weekly according to an established protocol, with data reported to a website managed by the Cornell Lab of Ornithology and Bird Studies Canada (<https://feederwatch.org/>). This continent-wide study, begun in the winter of 1987-1988, has revealed long-term trends in bird populations, enabled creation of dynamic maps showing seasonal movements of birds, helped scientists monitor the spread of avian diseases, and shed light on bird behavior.

In this investigation, you will create a PFW site, follow official PFW protocol to collect data, observe and learn about birds experientially, and become aware of how PFW can be used as a research tool.

Overview of Methods and Data Collection

Wells et al. (1998) describe the Project FeederWatch (PFW) protocol. Instructions for setting up the PFW area and for data collection are explained at the PFW website: <https://feederwatch.org/about/detailed-instructions/>. First, a PFW area must be identified and its borders clearly defined. At least one feeding station must be placed within this area. The PFW area should be monitored on two consecutive days at intervals of at least five days between observations, between the start of the PFW season in November and the end of the season in April. Observations to record include (1) species, (2) maximum number of individuals of each species seen at a time, (3) time of day and length of observations (“effort”), and (4) physical factors such as weather conditions and snow cover. Birds do not have to visit a feeder; birds are counted if they interact with the PFW area for any reason, such as attraction to vegetation and food sources. Flyovers, however, are not recorded. Data are entered at a portal on the website (<https://feederwatch.org/pfw/data>). Behavioral interactions relating to social dominance can be reported (<https://feederwatch.org/about/detailed-instructions/#record-behavior-interactions>). The Data Entry Task bar includes links for your data to be viewed as tables (downloadable) and graphs (Seasonal Count Explorer or Bird [species] Trend Graphs). The Explore tab (<https://feederwatch.org/explore/>) displays collective PFW results for regions, states, and provinces in the form of tables and graphs. Statistical practices and terms such as Percent of Sites Visited, Average Group Size (aka “flock size”), and PFW Abundance Index are explained at <https://feederwatch.org/explanation-terms/>.

Procedure:

You can work singly, in groups, or together as a class to follow the steps outlined below - these are modified instructions from the PFW website (<https://feederwatch.org/about/detailed-instructions/>). Check with your instructor. Note that

the instructions on the website are written for an *individual*, but you may be working as part of a group and may need to coordinate with others in your group.

1. *Choose a Site*

Select an area that is convenient to observe. It should contain at least one feeder and if possible, plantings for birds and a source of water such as a birdbath. The size of the area can be as small as a single feeder or as large as (or larger than) two tennis courts. Whatever its size or shape, the boundaries of the area must be clearly defined and kept the same from week to week. Once you have selected your site and decided on the number and type(s) of bird feeders, you or your instructor need to complete an online description of the site at the Data Entry portal (<https://feederwatch.org/pfw/site/manager>). As a new participant, you can plot your count site on a Google map by clicking on the Create, Edit, or Describe Your Count Site button.

2. *Select Bird Feeder(s)*

When completing the site description, you will be asked to report the number and types of feeders that you will be using. Information on types of feeders is available on the PFW website (<https://feederwatch.org/learn/feeding-birds/>). The type of feeder can influence the bird species attracted. Since an effort should be made to keep seed in the feeder at all times, not just on count days, consider using a feeder that holds a large quantity of seed, especially if the feeder will not be checked every day. If squirrels are in the area, you may want to invest in a squirrel-resistant feeder or add a “baffle” to prevent squirrels from reaching your feeder(s). Common types of baffles resemble a hollow cone or cylinder that attaches to a pole below a feeder. Although it’s okay to hang a feeder from a tree limb, placing a feeder on a pole about 10 feet away from the overhang of strong branches is recommended to prevent squirrels from jumping to the feeder. Do not place feeders too close to shrubs or other cover where a predator such as a cat can wait to ambush birds.

3. *Select Type(s) of Food*

PFW protocol does not ask you to report the type of food used for birds other than asking if you are using suet, fruit, or sugar water when you complete the site description. However, the choice of food will influence the species that you attract. If your PFW site contains only one feeder and you wish to attract a variety of birds, consider choosing a good quality mix of seeds or black oil sunflower seeds, which are the single most preferred food source for seed-eating species. The PFW website contains a guide to foods (seed, fruit, mealworms, suet, sugar water) and information on the preferences of various species (<https://feederwatch.org/learn/feeding-birds/>).

4. *Assemble Your “Team” of Students*

Follow your instructor’s recommendations; you may work individually, but this project works well as a group or class activity. No prior experience with birds is required; you can learn as you go along. There are many inexpensive field guides available. In addition, there are free Apps for your smartphone to assist with bird identification. Merlin Bird ID (<http://merlin.allaboutbirds.org/>) and Audubon Bird Guide (<https://www.audubon.org/>) are available for Android and iPhone.

5. *Establish Weekly Schedule for Observations*

The PFW season opens on the second Saturday in November and spans 21 weeks, ending in early April. Each weekly count period consists of two consecutive days. Leave at least five days when you do not count birds between your two-day counts. Counts must be made during daytime. For consistency, keep the pattern of two-day counts the same throughout a season. For example, if Thursday and Friday are convenient for you and/or the rest of your team, perform the count on those days every week. It is okay to skip a week (or more) or shift the pattern of observing days if necessary – all counts are appreciated. Do not pick and choose dates that have “better birds” as this could cause a bias in the data.

6. *Follow PFW Protocol*

Read and follow the instructions below. If you have questions, check with your instructor. Detailed instructions are available at the website (<https://feederwatch.org/about/detailed-instructions/>), which also contains a printable “Tally Sheet” which can serve as a guide (<https://feederwatch.org/wp-content/uploads/2013/07/TallySheet.jpg>).

- During the two-day count, stop by the feeder for as little as a few minutes at a time, but try to make multiple visits and observe for as long as time allows.
 - It is fine to observe birds from a window.
 - Binoculars are helpful, but not required.
 - If possible, make observations in the morning and afternoon of both count days, with a goal of at least two hours of total observation time (“effort”).

- Record the following for each count:
 - **Maximum number of each species** seen during a time interval
 - **Effort** (time of day and time in minutes or hours spent observing the feeder area).
 - **Temperature, precipitation, snow cover** (if present)¹
 - **Any sick birds** (especially house finches, goldfinches, etc.)

- Guidelines on what to count:
 - All individuals of each species in view at the same time
 - Birds attracted to food or water that you provide
 - Birds attracted to fruits, plantings, or structures in the area
 - Hawks or other predatory birds that are attracted to birds in the count area

- Guidelines on what NOT to count:
 - Birds that simply fly over the count area
 - Birds seen on non-count days
 - Birds that are heard but not seen – birds must be **seen** to be counted
 - Males and females seen at separate times should not be added together into the count (doing so would create a bias toward higher counts for sexually dimorphic species)

- Other pointers on counting:
 - If you see no birds, report “zero” birds
 - If you see the same few birds or only common species, that is fine: ordinary birds are the heart of PFW!
 - **Unknown or rare birds:** Take photographs if possible, make a sketch, or write down notes to help identify the species later or to document the sighting of a bird that is rare for that location or time of year!
 - Don’t be concerned by fluctuations in birds seen from week to week – this could be due to many factors, such as weather or predators

7. *Optional: Report Behavioral Interactions*

PFW invites participants to report behavioral interactions relating to social dominance: displacement and depredation.

Displacement occurs when one bird yields to another, moving away when another bird flies or hops toward it. **Depredation** occurs when one bird, successfully or unsuccessfully, attempts to prey on another bird. In each case, the “**source**” (the species that initiates the interaction) and “**target**” species must be known. Source and target species may be the same or different; interactions may be successful or unsuccessful. Instructions are available at <https://feederwatch.org/about/detailed-instructions/#record-behavior-interactions>.

- Did you observe **displacement** or **depredation**?
- Was the interaction successful or unsuccessful?
- Record the “source” and “target” species.

8. *Establish Central Reporting System*

Weekly PFW data – species counts, effort, snow cover, etc. – are submitted to the Data Entry portal on the website (<https://feederwatch.org/pfw/data>). If you are a part of a team, there needs to be a centralized reporting system. For a group of students working together, choose one individual (“team leader”) as the one who enters data at the Data Entry portal. (Alternatively, you can take turns.) Members of a team can email their data to the team leader, who compiles and submits the information. The effort of all participants must be added together, and the highest tally of birds for each species determined.

Another approach, which is efficient and allows for good record-keeping, is to create a shared online spreadsheet where team members can submit their data. An example is a Google Sheet, as illustrated in Figure 1. Google Sheets is a free online spreadsheet App bundled with Google Drive and works similarly to Excel. The team leader creates a new Google Sheet weekly (copy the old one, clear submissions, add new dates) and shares it with members of the team. Team members access the sheet, add their name, fill in a row with the requested information, and add comments. The team leader summarizes the information below the entries, and enters the data to the PFW website. Note that information entered at the PFW Data Entry portal can be edited as needed due to errors, omissions, etc.

¹ Starting in 2018-2019, PFW no longer requires participants to report temperature and precipitation information. However, for personal research, you can keep your own records. Historical and local weather information can now be accessed online.

Your Name	Date	Time	Total Minutes	Species Name	Maximum No.	Leuca Seen (Y/N)	Temperature	Sunny? Cloudy	Precipitation (Y, Av. Snow Depth	Other Notes	
Justin Example	Nov. 18	8:00 AM	5 min	House Sparrow	10	No	45F	Partly Cloudy	None	None	
Alaa Barbour	Dec. 22	2:58 PM	5 min	House Sparrow	28	Yes	41F	Sunny	None	None	
Kathy Wydner	Dec. 23	10:00 AM	20 min	House Sparrow	35	No	43F	Sunny	None	None	
				American Robin	2						
				Starling	1						
SUMMARY	Dec. 22	PM	25 min	House Sparrow	35	Leuca seen 12/2	Temp Range = 37-52 F	12/22: Sunny	None	None	Dec. 22: 37-52F
	Dec. 23	AM		American Robin	2		12/23: Sunny				Dec. 23: 37-48F
				Starling	1		Based on checking historical weather info for the two dates				

Figure 1. Example of a Google Sheet that can be created and shared among team members for entry of weekly PFW data. Although PFW no longer requests your local temperature and weather data, it may be useful to collect it for your own reference. The example shown above was used at Saint Peter’s University, and the column marked “Leuca Seen (Y/N)” refers to a partially leucistic (white-backed) female house sparrow that we tracked for three winters using PFW.

8. Enter Data In Website Portal (<https://feederwatch.org/pfw/count/enter?new#/new>)

Now it’s time to enter data at the website portal. There are three main steps, as shown in Figure 2.

1. Select your count site and dates.
2. Enter weather and effort.
3. Enter birds.

You will be guided through the steps of entering data. If you report the presence of a species that may be susceptible to a disease, such as house finch eye disease, you will be prompted to answer questions such as “Did you check for eye disease?” If you report a bird that is rare for the date and location, or unusually high numbers of a species, you will be prompted to enter more information. There is a general “Comments” space where you can type any special notes related to the count period or observations. After you have clicked “Submit Count”, the next screen will show a summary of your count data, and will give you the option to click on the button labeled “You may now enter behavioral interactions for this count”, which will then take you to the screen shown in Figure 3.

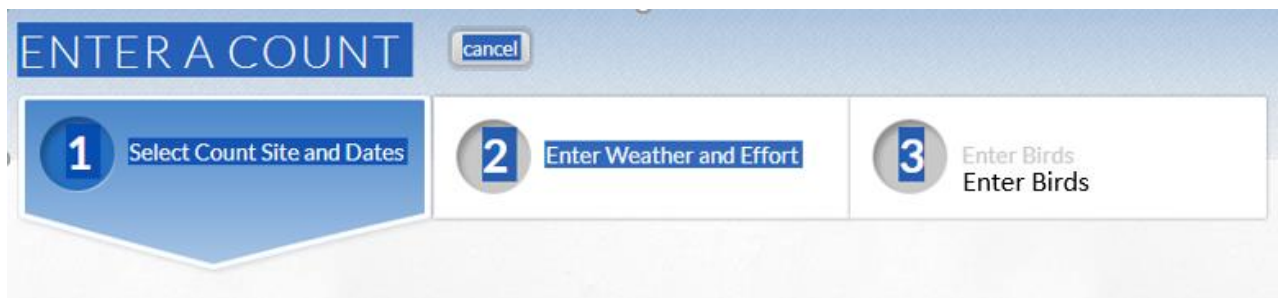


Figure 2. View of the webpage heading at <https://feederwatch.org/pfw/count/enter?new#/new> which is accessed by clicking the button called Enter Bird Counts at the Data Entry Homepage (<https://feederwatch.org/pfw/data>).

Add Interactions

Please add the interactions that you observed during this count.

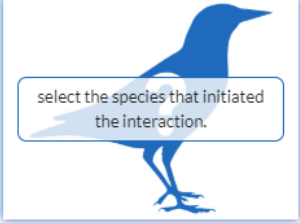
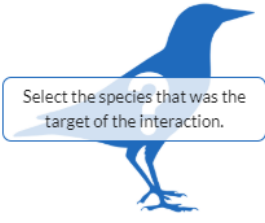
Source Species	Interaction Type ?	Target Species	Count
 <p>select the species that initiated the interaction.</p>	Select one... <input type="radio"/> Successfully <input type="radio"/> Unsuccessfully	 <p>select the species that was the target of the interaction.</p>	<input type="text" value="1"/> The number of times this interaction was observed.
Comments: If you wish, describe the interaction in more detail. <input type="text"/>			<input type="button" value="Add Interaction"/>

Figure 3. View of the screen for entering behavioral interactions that appears after you have entered all count data at <https://feederwatch.org/pfw/count/enter?new#/new>. You select the type of interaction (displacement or depredation) whether it was successful or unsuccessful, the source and target species, and the number of times the interaction was observed. You are also given a chance to describe the interaction in more detail (under “Comments”).

Presentations of Your Data

When you log into your PFW account, you can review your submitted observations throughout the PFW season (and all year as well). You can view your counts as tables, which can be downloaded. You can also view your data in visual formats, with two major options: **Seasonal Count Explorer** (Fig. 4) and **Bird Trend Graphs** (Fig. 5).

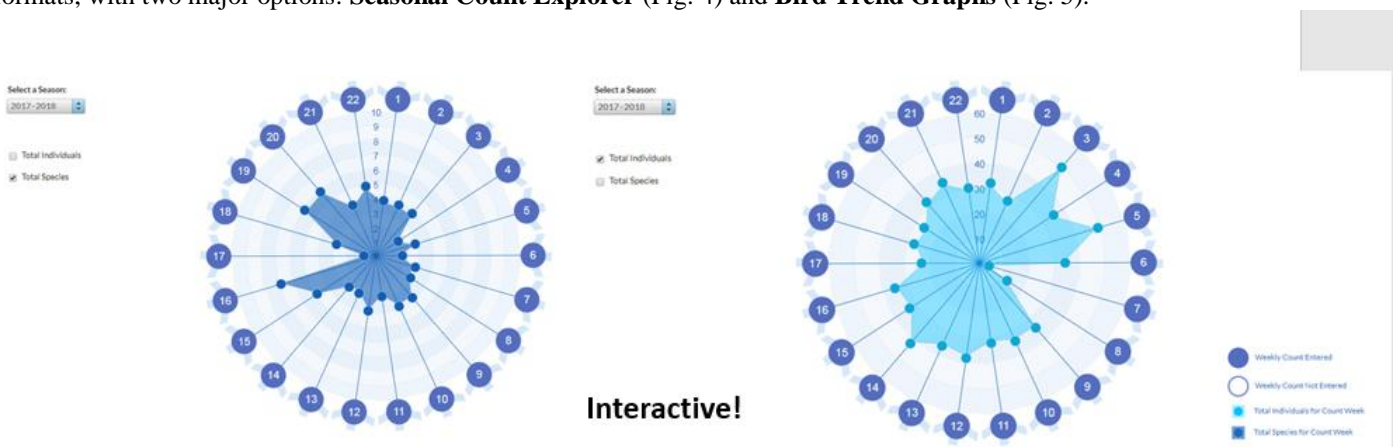


Figure 4. Seasonal Count Explorer is an interactive feature that allows you to view your seasonal count data. It can be selected as an option under <https://feederwatch.org/pfw/explore>. Each circle with a number represents one count date of the season, with a maximum of 22 counts days possible over the 21 week PFW season. You select the season you wish to explore and whether you want to view the total number of species, individuals, or both for each week in which data has been entered. In the above examples, the 2017-2018 season has been selected, and the graph on the left shows the number of species observed for each count period while the graph on the right shows the total number of individuals for each count period. If you place your cursor over any circle, you will see bar graphs summarizing your results for that count.

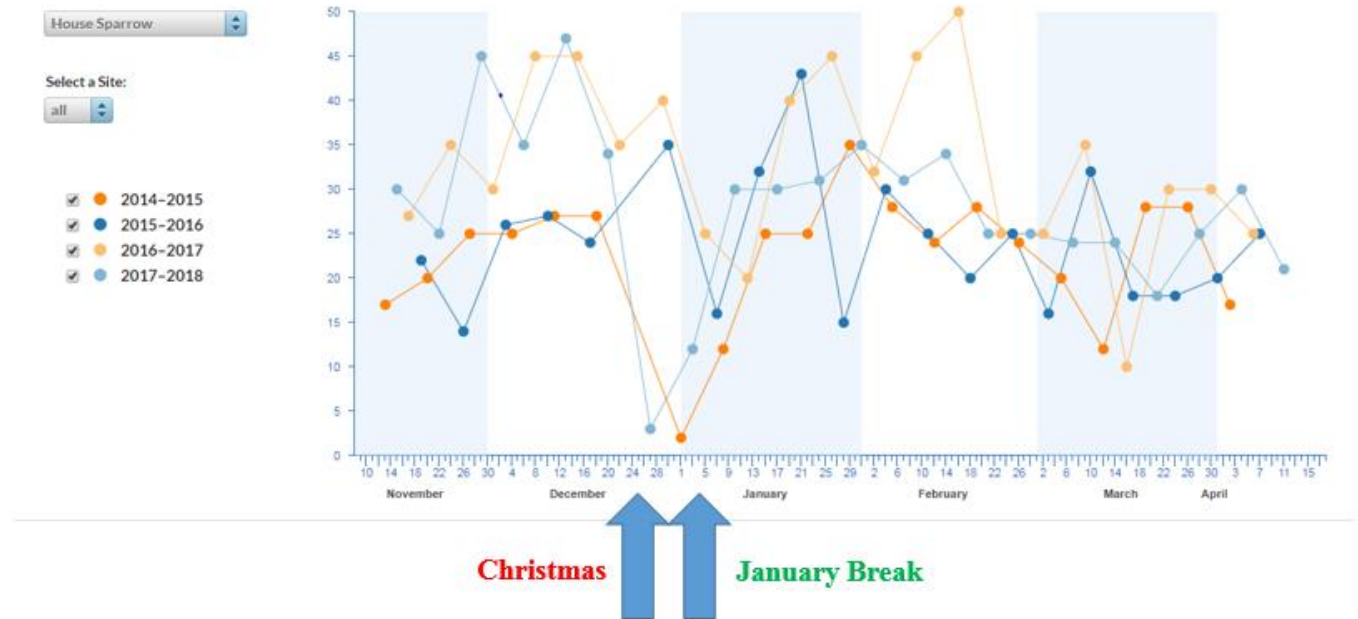


Figure 5. Bird Trend Graphs are another feature that allows you to view your seasonal count data. They can be selected as an option under <https://feederwatch.org/pfw/explore>. The x-axis shows calendar dates and the y-axis shows numbers of individuals. You can select the species you wish to explore as well as the seasons. In the above example, four PFW seasons have been selected for counts involving house sparrows on the Saint Peter’s University campus. The blue arrows and the notations for Christmas and January Break were added later - after a screen shot of this graph had been saved. The arrows point out weeks when students and faculty were mostly off campus and the counts were low due to very limited “effort”.

A Review of Your Results: Questions to Consider

Answer the following questions at the end of your Project FeederWatch season. Information relating to Percent Sites Visited, Average Group Size, and PFW Abundance Index (<https://feederwatch.org/explanation-terms/>) can be found by exploring your account data and the PFW website, which contains many interactive features (<https://feederwatch.org/explore/>).

1. How many species in total did your PFW team identify during the PFW season? List the species.
2. Which species was (or were) most abundant? Were any species observed every week, or for most weeks?
3. Are all the species you observed among the Top 25 most common species that come to feeders in your region, state, or province? If any were not, list those species.
4. Pick one species of interest from your list, and check on “Percent Sites Visited” for your region, state, or province.
5. How do “Average Group Sizes” for species observed at your PFW site compare to Average Group Sizes for those same species for your region, state, or province?
6. What is the PFW Abundance Index? What does it tell you? How is it related to “true population size”?
7. Did you observe any interesting bird behavior, such as displacement or depredation? If so, describe one or two examples.
8. Did you notice any associations between weather conditions and numbers of species or individuals? If so, describe.
9. Does your data suggest any hypotheses that you could test?
10. If you get the chance to participate in PFW next season, would you make any changes to what you did this year? Why or why not? Explain.

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Materials

Students will need access to a computer with Internet to access the Project FeederWatch website. They will also need an outdoor area suitable for placement of a bird feeder, and permissions from the appropriate campus authority if the feeder is on campus. At least one bird feeder is required for the project; the feeder(s) can be suspended from a tree branch or mounted on a pole. A baffle to deter squirrels from reaching the feeder(s) is recommended if there are squirrels in the area. A supply of seed or other food for birds needs to be available for the duration of the project. A source of water such as a birdbath is recommended. If binoculars are available, they are helpful. Knowledge for identifying birds correctly is important, so an introduction to the common feeder birds expected for the local area is helpful to get students started. There are also many excellent aids for bird identification, including pocket field guides; excellent free birding Apps available for Android and iPhone are Merlin Bird ID (<http://merlin.allaboutbirds.org/>) and Audubon Bird Guide: North America (<https://www.audubon.org/>). The annual fee for participating in PFW is \$15 for members of the Cornell Lab of Ornithology and \$18 for non-members. One fee allows reporting for up to 3 count sites.

Notes for the Instructor

This project is an excellent way for students to learn experientially. It is very flexible and can work in research situations as well as part of coursework.

Some notes: (1) Students should understand that they are contributing important scientific data. Let them know that if they can't identify a species, it is better not to count it than to make a wrong observation. (2) If rare or unusual species are seen, photographic documentation is important. If students see a bird that they can't identify, ask them to take the best photo of it that they can, at various angles. Most students have a cell phone that can take photos. If no one can identify it, photos of the mystery bird can be submitted to the PFW website along with a description. (3) PFW is not designed to detect all birds in an area. There may be species that only show up on non-count days. PFW is set up to **reveal relative abundance of species**, and to show how this changes over time and over geographical distances. Absence of birds from PFW reports does not mean they are not present in your local area: Species may be rare or uncommon or not attracted to what you are providing (directly or indirectly). "Effort" plays a factor (how many hours?). Participants must stick to established protocol in order for data reported to be pooled for analysis. As a PFW participant, your greatest contribution is to the overall PFW database which is used to generate the "Big Picture". (4) Due to time constraints I

have not yet found the time to explore the application of statistics to PFW data, but participants can request raw data sets by contacting the administrators at the Cornell Lab of Ornithology. (5) Feeders should be cleaned at least once or twice per season. In the case of sick birds, take the feeders down and consult the PFW website managers.

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About the Author

Katherine S. Wydner is an Associate Professor in the Biology Department at Saint Peter's University where she has been teaching a variety of courses since 1996: general biology, astrobiology, genetics, microbiology, and natural ecosystems of New Jersey. A graduate of Princeton University (AB, Biology) and Rutgers University (PhD, Cell and Developmental Biology), she has participated in Project FeederWatch since 2013 and has been fascinated by birds since she was 8 years old.

Appendix A Illustrations from Project FeederWatch

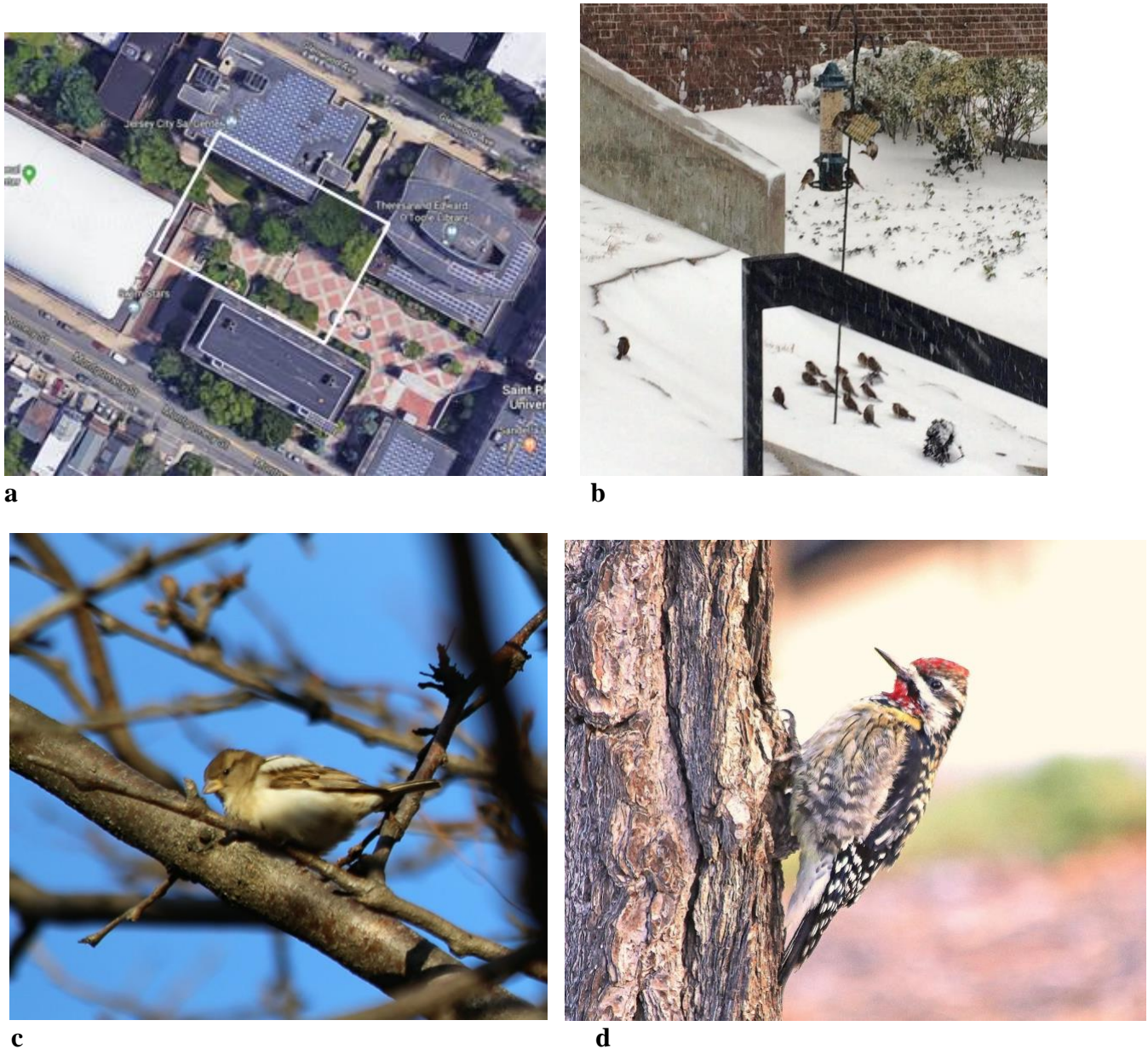


Figure 6. Project FeederWatch at Saint Peter's University, Jersey City, NJ.

a) Google Earth view: the Saint Peter's PFW count area is under the white rectangle. The area is slightly larger than the size of two tennis courts, bordered on three sides by buildings, and includes part of a courtyard and walkway. b) Our feeder station, shown here during a blizzard, consists of two cages of suet and a hanging feeder: a Brome Squirrel Buster Plus that holds three quarts of seed (photo by Chelsey Holloway 1-23-2016). c) "Leuca" was a partially leucistic female house sparrow that was present throughout three seasons of PFW at Saint Peter's (photo by K. Wydner 12-16-2016). d) A winter rarity for Hudson County, NJ in December, this yellow-bellied sapsucker entered our PFW area to feed on the sap of this pine tree (photo by K. Wydner, 12-28-2017).

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