



## Birdwatching: A Field-Based Unit or Short Course

Donald Winslow

### Abstract

I taught Birdwatching for the Indiana Academy's 2023 May Term. The latitude and flexibility of a standalone course provided opportunities for creative student expression. The focus was on recreational observation of birds with a modest introduction to the science of ornithology. Students gained skills in bird identification, interpretation of behavioral observations, and ecological study design. The only textbook was a field guide. Students were instructed to install and use the free mobile app Merlin. We met each morning for a total of 10 class sessions, each 3-4 hours long. Topics included binocular use, bird identification by sight and sound, the eBird project, avian physiology, note-taking, bird behavior, study design, North American birds, distribution ranges, bird nests, habitat, and subspecies. We took field excursions every morning, usually on foot but with two trips by van to nearby birding hotspots. Students demonstrated their identification skills every morning in field quizzes. Each student kept a journal of field observations. Students worked in pairs to design a study on behavior and one on ecology. The instructor developed a list of questions of interest, and students collected data to answer them by observing birds in the field. Each student wrote two research reports presenting the results of these investigations. On the last day, students completed a final examination. Scores on these assessments indicated that the student learning outcomes were achieved by most students. This course could be adapted as a unit at the end of a spring semester course in biology or zoology.

I just saw a hawk alight on a branch in the woods in back of our house. The breast was light-colored, and the wings and back were darker. The relatively short tail indicated that it was a *Buteo* rather than an *Accipiter* (Peterson, 2020). The overcast sky made it difficult for me to resolve a lot of detail, but the light speckles spread uniformly across the wings revealed it to be a Red-shouldered Hawk (*Buteo lineatus*). Songbirds started mobbing the hawk. When it flew, the striped tail confirmed the identification (Figure 1).

Teachers are always looking for lessons that will inspire students (Dajani, 2013), experiences that will spark their own interest and lead them to further discovery. Birdwatching is an enjoyable pastime that provides opportunities for learning about biology and the natural world (Paige *et al.*, 2010). Spring is an excellent time to introduce students to birding.

The Indiana Academy for Science, Mathematics, and Humanities is a high school for high-ability students in grades 10-12 (Indiana Academy, 2024). The school is located on the Ball State University (BSU) campus and is considered a department within the BSU



**Figure 1.** Red-shouldered Hawk (*Buteo lineatus*) perched on a branch in a tree. Photo by Donald Winslow.

Full listing of authors and contacts can be found at the end of this article.



Published by the Hoosier Association of Science Teachers, Inc. (<https://hasti.org/>) ISSN 2475-451x

© Winslow, 2024. **Open Access** This journal is distributed under the terms of the Creative Commons Attribution NonCommercial NonDerivative 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits unrestricted use, distribution, and reproduction without revision in any non-commercial medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license.

Teacher's College. Most of the students are residential, although some students commute. The Indiana Academy offers college-level courses and opportunities for creative exploration (Gooding, 1996). In addition to fall and spring academic terms, the Academy also conducts a two-week May Term at the end of the school year. During May Term, each student is enrolled in one course.

During May Term 2023, I taught a course in Birdwatching. There were no prerequisites for this course, and it fulfilled no requirements beyond an elective. This self-contained nature afforded flexibility and latitude and provided opportunities for students to express their creativity.

The content of the course included recreational observation of birds along with a modest introduction to the science of ornithology. Topics in ornithology included fundamentals of ornithology, avian systematics, classification of birds by order and family, subspecies, morphology, physiology, behavior, observation of bird behavior, taking field notes, ecology, habitat, distribution ranges, bird nests, and design of behavioral and ecological studies. Birding topics included binocular use, the Merlin app (Cornell Lab of Ornithology, 2024a), and identification by sight and sound. A couple of topics, North American birds and the eBird Project (Cornell Lab of Ornithology, 2024b), pertained both to ornithology and to recreational birding.

Class met each weekday morning for a total of 10 class meetings. Class sessions were 3-4 hours long and included lectures, labs, and field trips. Most classes lasted from 8-11 AM, but the two Thursday classes were scheduled from 8 AM-12 PM to allow for longer field trips by van. The drive to the furthest field site took about 30 minutes. During lectures we discussed birds and birding. In lab we examined bird study skins and mounted specimens.

The Academy has a small teaching collection of bird specimens that were donated by the Smithsonian Institution some years ago. It is worth noting that most bird species are protected under the Migratory Bird Treaty between Canada, the United States, and Mexico. The U.S. Migratory Bird Treaty Act prohibits the possession of most wild birds or their parts without a permit (Migratory Bird Permits, 1974). In Indiana, permits should be obtained from the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service, 2024) and the Indiana Department of Natural Resources (DNR) to possess feathers and dead bird skins for educational purposes. Museums occasionally have excess specimens to donate

to educational institutions, or an instructor can apply for a salvage permit from the DNR to collect road killed birds and feathers.

Course materials included a field guide (Peterson, 2020), the Bushnell All-Purpose Binoculars (Bushnell, n.d.), a field and lab notebook, and the Merlin (Cornell Lab of Ornithology, 2024a) and eBird (Cornell Lab of Ornithology, 2023) mobile apps. Students' lab fees paid for the field guides and binoculars, so they were able to keep these after the course. Recent changes in state law may prevent schools from charging students for books in future courses, but these materials were chosen to be relatively inexpensive yet high in quality. The mobile apps, both developed by the Cornell Lab of Ornithology, are free to download and install.

We went outside every day to observe birds (Figure 2). On a typical day, we would spend one or two hours in the field and the remaining time in the classroom (which is a biology laboratory) discussing topics and/or examining bird specimens. On field trips, students learned to identify local birds by sight and sound. Students practiced using binoculars effectively. Students observed the behavior of wild birds and collected data to answer questions on behavior and ecology. Each student kept a journal of lab and field observations. Students were instructed to record the date, times of observations, location of field site, weather conditions, bird species encountered, and behavioral observations in their journals. Students worked in pairs to design two studies, one on the behavior of birds and one on ecology.



**Figure 2.** The Birdwatching class in Christy Woods on the Ball State University campus, May 2023. Photo by Kendall Harris.

Most field excursions were on foot. Our class met just across the street from Christy Woods on the Ball State University campus, and there were other nice birding locations within walking distance. We took two longer trips by van to nearby birding hotspots, one to Prairie Creek Reservoir and the other to Province Pond. Every morning, we conducted field quizzes in which I pointed out birds for the students to identify. This provided opportunities for learners to demonstrate the bird identification skills they were acquiring. I continued to quiz them on birds until every student had an opportunity to identify a bird, with students who had already identified one ineligible to answer subsequent queries. Unfortunately, I underestimated the capability of the Merlin app, which will indicate the identity of a bird that is singing from the audio recorded by the microphone. Regardless, most students gained skill in the identification of local birds, and Merlin is a useful tool for developing that capability. The daily bird quiz typically took 15-20 minutes of class time. The schedule of topics and activities for the two-week course taught in 2023 is shown in Table 1.

On the second day, the students learned to use eBird to report bird observations. Although the eBird mobile app can be used to record observations in the field in real time, my preference is to make a list on paper and enter them later on the eBird website (Cornell Laboratory of Ornithology, 2024b). We surveyed Christy Woods and entered our list on the website when we returned to lab. I used my eBird account to do so; when there are multiple observers on an excursion, it is

advisable for only one to enter data. The eBird interface presents a map to locate the site of the observation and also asks for other general information before allowing the observer to enter data on bird species detected.

During lab sessions, students worked in pairs or alone to examine study skins. I instructed students to draw pictures in their journals. Students wrote the species name (common and scientific) next to each drawing, indicating important field marks with arrows. Attention was given to differences in plumage between sexes, ages, and seasons.

For the field studies, the instructor developed a list of behavior and ecology questions. Each student pair chose one behavior and one ecology question from the list. Student pairs collected data to answer questions by watching birds in the field.

Behavior questions posed by the instructor included the following: What are the boundaries of a bird's territory? How much time does a breeding bird spend in various behaviors? How does a bird interact with other birds of the same species? How frequently does a bird feed its nestlings? How much time does an incubating bird stay on the nest? What habitat do birds of a particular species choose for nesting, feeding, etc.? How many individual songs does a bird have in its repertoire?

Ecological questions posed by the instructor included the following: How many birds of a particular species are found in a certain area? How many breeding territories for a species are found in an area? How many bird species are found in a certain area? How

**Table 1.** Schedule of topics and activities for the two-week Birdwatching course.

Date	Activities
15 May 2023	Introduction to class, fundamentals of ornithology, avian systematics, binoculars, Merlin
16 May 2023	Walking excursion to Christy Woods, avian morphology, identification by sight, eBird
17 May 2023	Walking excursion to White River, avian physiology, identification by sound, field notes
18 May 2023	Trip to Prairie Creek reservoir, bird identification, classification of birds by Order, quiz
19 May 2023	Discuss bird behavior and examine study skins, birds of Muncie area, bird Families, quiz
22 May 2023	Avian ecology, design behavioral and ecological studies, North American birds, quiz
23 May 2023	Observation of bird behavior, field quiz, distribution ranges, bird nests, habitat
24 May 2023	Collection of ecological field data, interpret behavioral and ecological data, field quiz
25 May 2023	Trip to Province Pond Wetland Conservation Area, field quiz, behavior report due
26 May 2023	Subspecies, field quiz, lab practical, final exam, ecology report due, field journal due

many breeding bird species are found in a certain area? How many migrating birds are found in a certain area? What are the locations of the nesting territories of one or more species? How do habitat characteristics affect the abundance of birds? How do habitat characteristics affect the bird species present?

The students conducted their research studies during the second week of class. I found that it worked fairly well for the student pairs to devise methods to answer their research questions with minimal intervention by the instructor. However, it may be advisable to provide some introduction to the scientific method. Each pair of students took about an hour during the first class meeting of the second week to design both studies. Observations for the behavioral study were made the next morning, and observations for the ecological study were made the morning after that. Later in the same morning, student pairs were given about an hour to analyze and interpret the results of their studies. Each student wrote two reports presenting the results of their investigations. A research report rubric is shown in Table 2.

### Safety Guidelines

In the lab, safety protocols specific to the laboratory room should be followed. No food, gum, or drinks

should be allowed in the lab. Each student's workspace should be kept clear and free of clutter besides necessary materials (pens/pencils, notebooks, etc.). Any hazardous materials (such as debris from specimens that have been chemically preserved) should be disposed of according to site-specific protocols. Students should promptly notify the instructor about any glassware breakage or equipment problems so that proper safety and equipment protocols are followed.

In the field, students should wear sturdy shoes and protective clothing. Students should stay near the group. When there are pairs of students working on specific projects, the teams may be a bit dispersed, and the instructor should circulate among the teams to help the students and keep track of them. Students should be instructed to watch their step and to watch for moving vehicles. After field excursions, each student should check themselves thoroughly for ticks. Any student bitten by a tick should visit the nurse.

In terms of field conduct, students should be instructed to remain quiet and focused on observing birds, be considerate of classmates, and keep device notifications silenced. Students should be instructed not to engage in conversations that are not relevant to the task at hand; more birds will be seen that way.

**Table 2.** A rubric for the behavior and ecology research reports. (25 points available)

Criterion	Ratings	Points
Report is in research report format (Objectives, Methods, Results, Discussion, etc.)	1 or 0	1 point
Objectives section is present.	1 or 0	1 point
Objectives are stated.	1 or 0	1 point
Research questions are expressed.	1 or 0	1 point
Methods section is present.	1 or 0	1 point
Methods are in past tense.	1 or 0	1 point
Sufficient detail is included for someone else to repeat the study.	1 or 0	1 point
Results section is present.	1 or 0	1 point
Results are stated in the text of the Results section.	1 or 0	1 point
Text refers to tables by number.	1 or 0	1 point
Tables are present.	1 or 0	1 point
Table numbers are present with each table.	1 or 0	1 point
Table captions are present.	1 or 0	1 point
A map is included.	1 or 0	1 point
A graph or photo is included.	1 or 0	1 point
The map is labeled as a figure.	1 or 0	1 point
At least one graph or photo is labeled as a figure.	1 or 0	1 point
Figure numbers are present.	1 or 0	1 point
Figure captions (legends) are present.	1 or 0	1 point
Findings are stated in the Results section.	1 or 0	1 point
Discussion section is present.	1 or 0	1 point
Findings are interpreted in the Discussion section.	1 or 0	1 point
Figures are referenced in the text.	1 or 0	1 point
Findings are related to stated objectives.	1 or 0	1 point
Suggestions for future research projects are given.	1 or 0	1 point

### Techniques for Teaching Bird Identification

When a student spots a bird, it becomes that student's own discovery. The ability to quickly raise the binoculars to obtain a good view of the creature enables the learner to take control of the subject matter. The student can use field marks to identify the bird and then observe its behavior to see what it is doing.

Students can learn to identify birds by sight and sound. One skill that is important is effective binocular use. When a bird is spotted, the student should look at the bird while moving the binoculars in front of their eyes. This will place the bird image in the field of view of the binoculars. The binoculars can be focused with the central knob, and the viewer can adjust for differences between the eyes with a focus knob on one ocular.

To identify birds, one should learn the field marks of birds that are commonly seen in the area. A field mark is a shape, marking, or plumage pattern that is characteristic of a particular bird species. A field guide will often indicate these field marks with arrows, facilitating learning.

One can learn bird songs and other vocalizations of particular species by listening to audio recordings. There are collections of recordings available online, but the easiest way to learn bird calls is with the Merlin app (Cornell Lab of Ornithology, 2024a). Merlin provides recordings of each species to listen to on demand. In addition, Merlin will identify the birds itself as it records sounds in the surroundings. By looking at the names of species Merlin associates with the sounds it detects, the student can learn to recognize bird calls without the aid. It should be stressed that Merlin should be regarded not as a means of identification but as an aid to identification, just as a binocular and a field guide are aids to identification. It is quite accurate but does make mistakes.

### Course Outcomes

Student learning outcomes included identification of spring birds of the Muncie area by sight and sound, classification of bird species by order and family, the ability to describe avian morphology and physiology, interpretation of behavioral observations, and design of studies on ecological interactions involving birds.

On the last day of class, we took one more bird walk, we had one last field quiz, the students took a written examination and completed a lab practical

examination, and the students turned in their journals. The written examination consisted of multiple choice and short free response questions on paper. For the practical examination, I set bird specimens out at stations with questions at each station, and students circulated among the stations to answer the questions. I graded the journals while they were taking exams so that I could return the journals to them promptly.

Final grades were based on the field quizzes, final exam, lab practical, lab/field journal, and participation (Table 3). Scores on these assessments indicated that the student learning outcomes were achieved by most students. A straight grading scale was used, although a C is required to pass a course at the Indiana Academy (Table 4). Final grades were pleasantly high, despite so much of the assessment occurring toward the end of the brief term.

**Table 3.** Points awarded for assignments.

<b>Assignment</b>	<b>Points</b>
Field quizzes	100
Final exam	100
Lab practical	50
Lab reports	50
Lab/field journal	50
Participation	50
<b>Total</b>	<b>400</b>

**Table 4.** Grading scale for Birdwatching course.

<b>Points</b>	<b>Letter grade</b>
360-400	A
320-360	B
280-320	C
0-280	D*

\*A C is required to pass a course at the Indiana Academy.

May is the perfect time for birding, and I truly enjoyed teaching this standalone course. Students also had a good time. Although not all schools will be able to offer a full course in birdwatching, this course could be adapted as a unit at the end of a spring semester course in biology or zoology. Many schools are situated in landscapes that will attract lots of bird species, especially in May when many songbirds are migrating. Birdwatching provides an ideal opportunity for an immersive active learning experience in a natural setting.

### References

- Bushnell. (2024). [All-Purpose 10X42 Binoculars for BassPro](#). Bushnell Corporation, Overland Park, KS.
- Cornell Lab of Ornithology. (2023, March). [Enter sightings with eBird Mobile](#). Cornell University, Ithaca, NY.
- Cornell Lab of Ornithology. (2024a). [Merlin: Identify the birds you see or hear with Merlin Bird ID](#). Cornell University, Ithaca, NY.
- Cornell Lab of Ornithology. (2024b) [eBird: Discover a new world of birding](#). Cornell University, Ithaca, NY.
- Dajani, R. (2013). [Universities must inspire students as well as teach](#). *Nature*, 502, 411.
- Gooding, D. C. (1996). Scientific discovery as creative exploration: Faraday's experiments. *Creativity Research Journal*, 9(2/3), 189-205.
- Indiana Academy for Science, Mathematics, and Humanities. (2024). [The Indiana Academy for Science, Mathematics, and Humanities](#). Ball State University, Indiana Department of Natural Resources. (2024). [Permits and Commercial Licenses](#). State of Indiana, Indianapolis.
- Paige, K., Lawes, H., Matejic, P., Taylor, C., Stewart, V., Lloyd, D., Zeegers, Y., Roetman, P., & Daniels, C. (2010). "It felt like real science!" How Operation Magpie enriched my classroom. *Teaching Science*, 56(4), 25-33.
- Peterson, R. T. (2020). *Peterson Field Guide to Birds of Eastern and Central North America* (7th edition). Mariner Books.
- Migratory Bird Permits. (1974). [Code of Federal Regulations 50 C.F.R. 21](#).
- U.S. Fish and Wildlife Service. (2024). [3-200-10c: Special Purpose Possession – Education](#) (Possession Live and/or Dead Migratory Birds for Educational Purposes).

### Author

Donald Winslow (donald.winslow@bsu.edu) is an Assistant Teaching Professor at the Indiana Academy of Science, Mathematics and Humanities, Muncie, IN, USA