CASE STUDY

Bird Monitoring – 4th Grade

Youth-focused Community and Citizen Science // A project of the UC Davis Center for Community and Citizen Science // **education.ucdavis.edu/ccs**

Youth Community and Citizen Science (YCCS) can take many forms. In the case study below, drawn from in-depth field research, we highlight important project features and describe how educators and youth have taken up three key practices that promote science learning and environmental science agency—the ability to use experiences in citizen science and environmental science to make positive changes in one's life and community.

DESCRIPTION

This yearlong **bird monitoring project** engages a class of fourth graders in the collection, analysis and submission of local bird species data. In so doing, the project connects them to their local government and to a global dataset and community of contributors. Working at two sites—one on the school campus and another in the surrounding neighborhood—students learn about the abundance and distribution of birds in relation to features of their habitat, such as shelter and food available. Students report data to **eBird**, an online bird monitoring program, and use findings to (1) propose habitat improvements for a public pond and (2) implement bird-habitat improvements on their school campus. Students also investigate bird species patterns across seasons and make comparisons between the two research sites to learn about different habitats and the species they attract.

SPECIES OR SYSTEM STUDIED

Birds. Students assess the abundance and distribution of local and migratory birds.

RESEARCH SITE

Wetlands and school arboretum. Students collect, submit, and analyze data from two man-made sites: their school arboretum and a local pond. At the arboretum, they master observation and data collection techniques. At the pond, located about 3 miles from the school, they work with, and within, the broader community.

PARTICIPANTS

Fourth grade class. 25 students at a public elementary school in an agricultural town. A large proportion of students have backgrounds traditionally underrepresented in science.

STRUCTURE

Classroom-based. Students conduct weekly observations at the arboretum during the school day. They compile their data for submission to eBird monthly. In Fall and Spring, students take a field trip to the public pond and submit data for this second site. Discussion and related activities are integrated across the classroom curricula.

DURATION

School year. Students participate throughout the academic year, and then graduate out. The project begins its third year in Fall, 2017.

INSTITUTION

Elementary school classroom. A teacher has developed a project for her fourth grade class that includes Cornell's eBird as part of a larger science project. She solicits the support of the school, families, and the greater community by encouraging them to participate in the data collection process.

CURRICULA AND SUPPORTING MATERIALS

The project is integrated into the NGGS fourth grade science curricula and Common Core State Standards. For example, when learning how to identify birds by sound, students learn about waves and how to read bird song spectrographs. Students also learn how to conduct research and synthesize data from multiple sources.

KEY PRACTICES

There are many strategies to get youth involved in community and citizen science. Through in-depth case studies of diverse YCCS projects, we have documented three youth-centered practices that are effective in promoting learning and environmental science agency. These practices are ***youth sharing findings with outside audiences****,* ***taking ownership of data quality*** *and* ***interacting with complex social ecological systems****.*

SHARING FINDINGS WITH OUTSIDE AUDIENCES

Sharing findings with outside local government and community members affirms that students' work can teach others and make a difference. At the end of the school year, students summarize their project and present findings to the town's Parks and Recreation City Council. Additionally, students share what improvements they think are needed at the pond, such as to increase bird habitat or make the pond a more inviting space for the public.

Speaking to the city council is a responsibility that the teacher lets students carry. With support, the teacher gives the students full responsibility for deciding what to include in their presentation, how to explain their scientific findings, and who will talk during the presentation. In small groups and pairs, students choose sections of the presentation and flesh out exactly what they want to say. The whole class then practices the presentation as a team and develops a Powerpoint presentation using photos they took in the field.

At the end of the presentation, city council members ask the students questions about their scientific findings and suggestions. Last year, the first year of the project, the city council thanked the students for their work. The teacher hopes in subsequent years there will be more follow up regarding the improvements students suggest.

YOUTH OWNERSHIP OF DATA QUALITY

When asked by teachers to support their findings with evidence, students learn that not all data are created equal.

In this project, it is common to hear students asking, "What is your evidence?" after someone shares their findings. For instance, Carlos explained that although they found evidence of an owl from pellets beneath an owl box, this was not data they could submit, since the evidence doesn't help identify which kind of owl was present. Students become bird experts through feather and bird call identification as well as studying bird physiology and habitat. They practice making weekly observations for about three months before submitting any data.

As students compile data as a class, the teacher asks students to sort their findings into "ready to submit" versus "needs more research/evidence." Only the data that is backed with evidence is submitted to eBird. Afterwards, they wait to get confirmation from the Cornell Lab of Ornithology, which organizes the eBird project. For example, last year one of their data entries was rejected as the class estimated the size of a flock of the Brewer's Blackbird, which for scientists at the Lab of Ornithology, was not accurate enough.

INTERACTING WITH COMPLEX SOCIAL ECOLOGICAL SYSTEMS

By learning about birds through careful observations and research, students also become aware of what birds need, and how we can better create and share environments with them.

While learning about bird identification, students become immersed in learning about birds, their habits, physiology, habitat, and diversity. They are able to connect bird adaptations to habitat and habitat diversity to bird species diversity. They also notice how human activity influences birds. For example, each summer when the surrounding tomato fields are harvested, students notice an increase in raptors. Students understand that the harvesting of tomatoes displaces rodents, which attracts birds of prey.

By prompting the students to recollect and reflect on what they see happening around the school and pond, the teacher situates the students' research within the larger ecological content. She has seen that this adds breadth and depth to understanding of natural phenomena.

YCCS PRODUCTS

In YCCS, the work youth do has a purpose—a "product" that has an audience and impact beyond the classroom walls. These products can vary widely by case.

DATA

Submission of monthly data from the arboretum, plus Fall and Spring data from the pond to Cornell Lab of Ornithology's eBird. According to their website, each month 1,000,000 bird observations are reported to eBird ("Cornell Lab of Ornithology, Mission: Citizen Science", October 2016).

Audience: Ornithologists at Cornell lab of Ornithology.
Impact: Contributes to a large body of data that allow scientists to understand how habitat destruction, climate change, pollution, and disease influence bird populations.

Audience: In end-of-year presentations, students present their project, findings and proposed pond improvements to the town's Parks and Recreation City Council.
Impact: The presentation gives students ownership of their data and findings. The presentation also informs the Parks and Recreation City Council of their work and how the neighborhood pond could be improved. Impact on Council policy is *to be determined*. Actions taken to improve the pond habitat as a result of student research and recommendations may take years.

HABITAT CREATION

Plantings and signage in the school arboretum rehabilitate bird habitat and develop the arboretum as an educational space for the school.

Audience: Students and staff at elementary school.
Impact: Students make the arboretum a more inviting place for birds and humans alike and demonstrate to students how scientific findings inform engineering/design endeavors.

COMMUNITY OUTREACH AND EDUCATION

Development of signage at public pond for visitors to learn about the class's citizen science project and instructions for contributing their own observations. Signage at the pond can increase the public's awareness and stewardship of the community's natural resource. Students learn how to communicate their project to the public and grow the project by soliciting the help of others.

Audience: Visitors to the pond.
Impact: Citizen science projects work best when many people participate. Drawing the community into the project validates the students' work. Input of public data creates a learning opportunity, as students have the chance to decipher the quality of the public's data in comparison to their own.

FIELD JOURNALS

Student journals with individual observations and reflections. Students use their field guides to develop their presentation to the city council and to compile data for submission to eBird. Keeping a field journal also lets students see the quantity and quality of their work over time.

Audience: Visiting educators and researchers; students—themselves and their peers.
Impact: Field journals allows students to organize their work, and gauge progress over the yearlong project. It also helps students share the project with others, as demonstrated by students referring to their field notebooks while talking with visiting educators and researchers. For example, many students noticed that their observations became more detailed 5 weeks into the project because they now know more about birds and what to look for.

OUTCOMES & EVALUATION

The students get graded on their participation in the project, as part of overall classroom activity. Additionally, the teacher uses quizzes, formative assessments, and classroom observation to assess students' science learning.