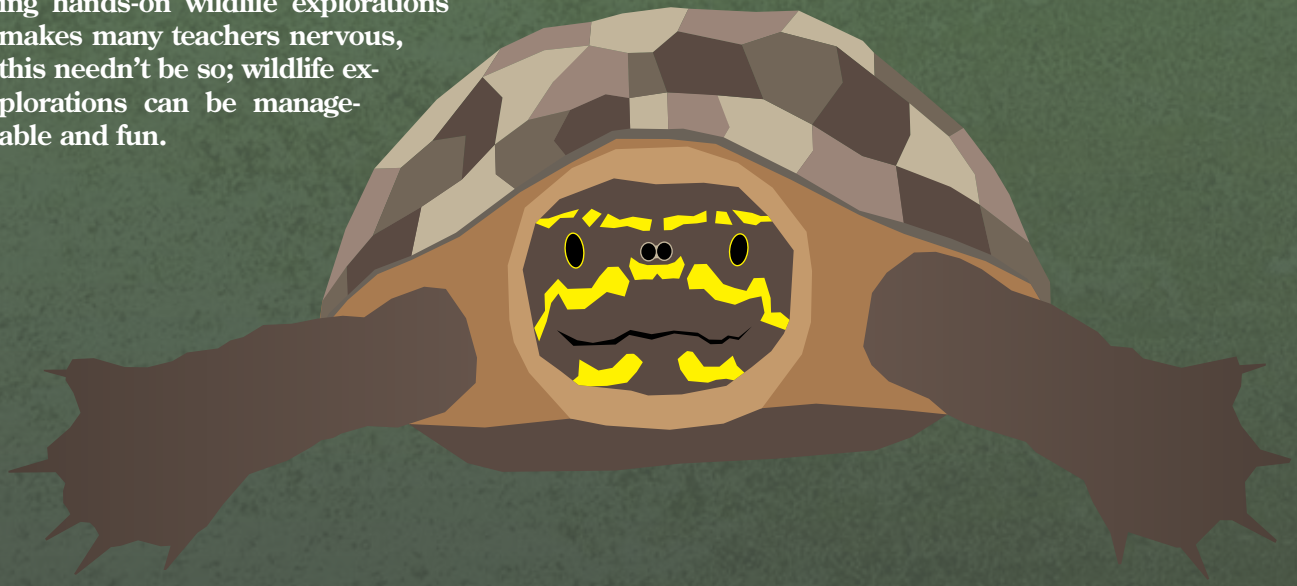
TURTLE CONSERVATION AND CITIZEN SCIENCE

A WINNING COMBINATION FOR YOUR CLASSROOM

BY SUSAN SUMMERS

According to Richard Louv, author of *Last Child in the Woods*, "disconnection from nature…has enormous implications for human health and child development…Children need nature for the healthy development of their senses, and therefore, for learning and creativity" (2005). How can science teachers help their students learn the joy of the natural world? By helping them discover nature, engage with it, and be present in it in a safe and nurturing way. While the idea of implementing hands-on wildlife explorations makes many teachers nervous, this needn't be so; wildlife explorations can be manageable and fun.



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Removing the trap.

Recently at the Virginia Living Museum, we looked to middle school students when we designed a multiyear program to investigate the impact of invasive turtles on native species. This program can serve as a model for teachers, as well—invasive species are a problem for many wildlife communities around the country.

The National Invasive Species Council defines an invasive species as one "that is "non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can be plants, animals and even microbes" (2001). Often people do not realize how much of a threat invasives pose to local species: They can bring in disease, exclude native plants and animals, and take over ecosystems completely by outcompeting native wildlife. Some examples of these problems have been in the news: Burmese pythons in the Everglades National Park, rapa whelks in the Chesapeake Bay, and zebra mussels in many freshwater lake communities across the United States.

Invasives are often introduced to animal communities by well-meaning, exotic-pet owners who release their pets outside once the thrill of owning the pet has ended. Over the years, more and more nonnative turtles have found a home in our local lake; we wanted to find out the ratio of natives to nonnatives. Luckily for us, a student at a local university had done a similar project 10 years earlier documenting turtles in the very same lake, which meant we had baseline data for our research. (If this kind of information is not available to you, you and your students will be collecting the baseline data and adding to it each successive year.)

We hoped that engaging middle school students with this project would help them learn about fieldwork, wildlife conservation, and herpetology. Despite not being in a formal classroom, we have had great success. Students have been introduced to fieldwork in a way that helps build inquiry skills, including:

- planning and conducting investigations;
- using scientific equipment; and collecting, organizing, and interpreting data.

Students have learned the following science content:

- interactions among populations in a biological community;
- adaptations of organisms to survive within an ecosystem;
- characteristics that define a species;
- changes to an ecosystem due to disturbance; and
- factors that increase or decrease population size.

Additionally, this program showcased different career paths in herpetology (specifically related to turtles); and the background and education needed to pursue these careers.

Turtles waiting to be processed.

FIGURE 1 Materials

Hoop traps/turtle nets

4 3 ft. diameter, 3 in. sq. mesh nets ($59.72; Memphis Net and Twine. This was a decreased price for three or more. Other sources include Miller Net Company and Nylon Net Company. All of these companies have websites for online orders.) These traps are designed to catch turtles and keep them alive by allowing them easy access, but no exit. They are baited to entice the turtle in. Before proceeding with the project, staff practiced with the equipment and determined where to place traps and how to remove them safely with students.

Hardware

- 2 mallets (Harbor Freight Tools; $9. Other sources include Northern Tool + Equipment, Lowe's, and Home Depot.) We chose bright-orange mallets so that we would not misplace them. The mallets were used to place the pipes.
- 2 pieces PVC pipe (6 ft. long) per net ($75 at a hardware or plumbing-supply store) and twine ($4.50 at a hardware store). The twine was used to hold the nets extended in the water.

Bait

Bait is available at any grocery store for around $1 per tin. We used smoked sardines or smoked oysters; the smellier the product the better. We were always happy when a great oil slick moved out from the bait to entice the turtles in. We cracked open the lid and tied it to the trap so it dangled in the water.

Chest waders

For our project, staff placed the traps, but students did help remove them wearing waders, so a variety of sizes was helpful ($50–$200; available at most sporting-goods stores, or staff or parents may be willing to loan their personal waders for the duration of the project).

Plastic bins

2 large (30 gallon) plastic bins (approximately $10 apiece at a hardware or big-box store). These bins, which were used to hold animals caught in the nets, were sturdy, easy to wash, and too high for turtles to climb over. Once the turtles were processed, the animals were released.

Data-collection materials

- 2 calipers ($9.99 apiece; Harbor Freight Tools) were used to measure turtles
- 22 triangular files ($7–$10; Harbor Freight Tools) for filing notches in shells. Other sources of calipers and files might include Northern Tool + Equipment, Lowe's, or Home Depot
- pencils
- clipboards
- data sheets

Protective gear

- gloves ($5.50 for three pairs; available at hardware stores). Each student wore leather work gloves when handling animals.
- Safety glasses are needed when filing notches in turtle shells to protect against flying debris.

Measuring turtles.

The project

How do teachers prepare for such a project? Begin by contacting your state wildlife conservation office. We spoke with the Virginia Department of Game and Inland Fisheries to discover exactly what would be required of us and whether or not it was something students could participate in safely. Next we applied for a permit and paid the $40 fee. (When doing a research project such as this, it is vital to know which permits are required; discussing your project with state officials is extremely important). If you do not want or are unable to conduct a study that requires permits, there are many other wonderful projects that can provide similar educational content. Journey North, Monarch Watch, Project FeederWatch, and FrogWatch USA are just a few examples of programs that can help you to teach similar life science concepts and do not require permits.

The permit required was very detailed: Museum staff needed to include the dates we would be trapping turtles, which species of turtles we would be catching, and what we would be doing with these animals. In order to answer the questions, staff reviewed the research paper from 10 years prior and noted the species collected; performed observations of the turtles in our lake, making a list of all species present; looked to reference books and websites (our state herpetological society and wildlife department) for lists of pond turtles whose range was in our area; and listed any turtles we might catch, even if they weren't the target species. This could easily have been done by students, but because of the restrictions we had with student scheduling, staff did this. Once the permit was filled out and granted, materials were purchased, and work with students began.

Materials were purchased by museum staff, some online, others at local stores (see Figure 1). It is important to have all of the materials prior to trapping. Teachers interested in this project should note these costs and determine if this is feasible prior to applying for permits. Check with your administrators to make sure that all aspects of this program meet with their approval.

Implementation

Prior to beginning, we made sure to review safety procedures for being in the field, and confirmed that all paperwork related to the project had been completed by parents and received by the museum. We required parental permission for handling and working with turtles, as well as emergency information sheets in case of injury. Teachers will need to review their school's field-trip procedures and guidelines prior to starting their own programs.

Before each trapping session, adults placed the traps and allowed for a wait time of six hours or more.

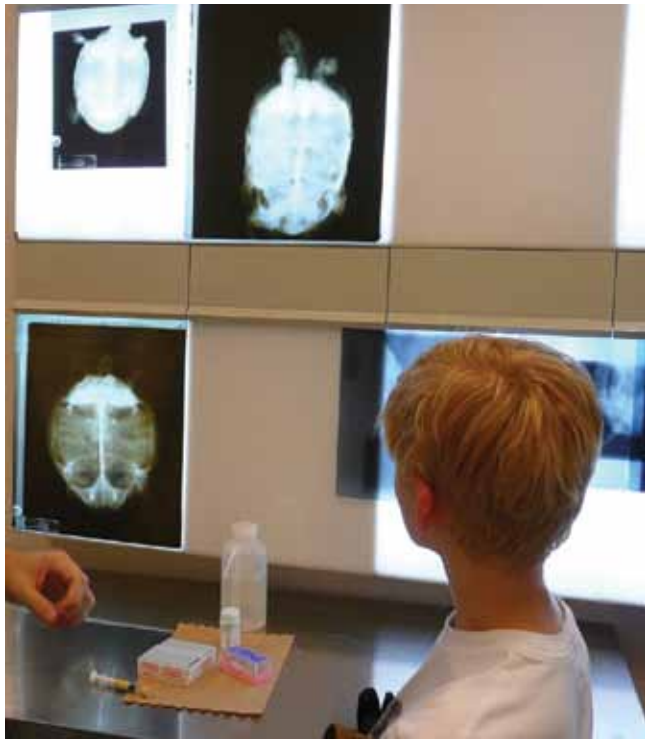
Reading the caliper.

Students did not assist with this part of the program, as often it would occur at a time inconvenient for student schedules. Because basking turtles do not become active until later in the spring, when the water temperature is above 75° F, we did not begin our program until late May. Additionally, our programs occurred after school hours, from 6 to 8 p.m. Teachers can decide how scheduling would work best for their circumstances. We conducted three two-hour sessions, each of which began with a short lecture.

At the first session, we discussed turtle biology, behavior, anatomy, and physiology, and exactly what students would be doing. Students familiarized themselves with equipment, data collection, and what we would be looking to discover, and practiced on empty shells (which we had collections permits for, but you could use stuffed animals) prior to handling real animals. Once all were comfortable with the equipment, we went and removed the traps from the lake. To ensure that all students are able to see and work with turtles, we recommend an upper limit of 15 students for data processing. This could easily be done by rotating groups from lecture to processing stations. Traps were removed from the lake with student assistance—staff and some students entered the lake in waders, while other staff and students waited on the bank to receive the net. Only staff removed turtles from the nets and placed them into large plastic bins. When the first turtle was being processed, staff discussed proper handling procedures, safety for both students and turtles, and respect for the animals while working with them. Since turtles bite, it is important to always be aware of where the head of the animal is and not antagonize the animal while it is in your care. Processed turtles were gently released into the lake by students. Any snapping turtles that were collected were immediately released by staff; no students handled a snapping turtle.

Processing of turtles comprised identifying the turtle and measuring its plastron, carapace, and shell height. Finally, we filed a notch in each turtle's shell corresponding to a specific number. This type of notching, which is done with a triangular file, is akin to how we would file a notch in our fingernail and is not painful to the turtle. (You might require students to wear safety goggles at this time.) Each student was given a task during data collection, ensuring that everyone was able to work with the turtles. All students were required to wash their hands after handling a turtle.

During the second session, our lecture was about



Turtle husbandry.

veterinary care and turtles. We discussed problems and concerns for wild turtles, as well as housing and caring for turtles in our museum. During our last session, we discussed sea turtles, including biology, behavior, and concerns for these animals. After each lecture, we pulled traps and processed turtles. Because nets are sometimes empty, we had additional programming prepared: identifying turtles through binoculars, collecting invertebrates in our lake, and doing water-quality investigations. We did not always need these, but it was important to have them ready.

Prior to the first session, teachers may want to assess what students already know about turtles, lake ecosystems, and invasive species by giving them a brief questionnaire. Additionally, after the last session, a follow-up will allow teachers to gauge students' reactions to fieldwork and discover what they might have learned from the program.

Student reaction

This was a very hands-on experience for students, and they were always willing to get their hands dirty. Turtles are often covered with algae and mud, and usually uncooperative. Students discovered that fieldwork can be messy and doesn't always go according to plan—

Turtle release.

some days we didn't collect a single animal.

As mentioned previously, during the successive sessions of this program, we presented talks on turtle care and husbandry, what it means to be a herpetologist in a museum, and sea-turtle biology and conservation. We gave students reference manuals to take home once our trapping concluded. Despite some surprises, summer weather, and mosquitoes, students seemed to enjoy their participation in this project. In fact, several volunteered to staff a table describing the project to the general public during a special event.

Results

As we are still in the early stages of data collection, our results have been inconclusive. Originally, the data showed that the nonnatives outnumbered the natives, but last year it was the exact opposite. We can only guess what our results will be this year. Each year of the program we intend to build in new elements: This year we plan to collect data on water quality; to post a blog, written by students, about their experience; and perhaps to write up the findings for our local herpetological society newsletter. Because we didn't have a prolonged opportunity to work with students, we were unable to discuss with them in detail what they learned. But classroom teachers and their students could work together to create a webpage and post their thoughts about, and concerns for, turtles in their area. They also could discuss and implement ways to share what they learned within their school community, and possibly in the community at large.

Conclusion

Is your classroom adjacent to a pond? Perhaps this project is for you. With a little effort and expenditure, you can have students involved in a project that might spark an interest they didn't know they had. Additionally, you might consider contacting a local museum, university, or wildlife research center, any of which may be willing to work with you on such a project. A connection with these facilities and their professionals can only enhance your curriculum.

Getting your students involved with wildlife and nature can be fun and rewarding. Let yourself be drawn outside and experience natural science with your students; a whole new world might open up to you. ■

Acknowledgment

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