

The Clifton Institute

Inquiry-based Field Trips Report on the 2022-2023 School Year

The Clifton Institute is unusual in being not just an education center nor a research field station nor a conservation organization, but a combination of all of those things. There are active research projects taking place on the same property that we use for our education programs. Another unusual thing about our organization is that our educators gave backgrounds in research and community science. That means we are uniquely well suited to combine outdoor education and scientific research, and in 2022 we embarked on an ambitious and innovative project to get children involved in real scientific research.

The Clifton Institute has been providing environmental education field trips to our community for over ten years, but before the 2022-2023 school year we overhauled our field trip curriculum. Our new inquiry-based field trips are based on five ongoing research projects, which you can read more about in the following pages. When a class arrives for a field trip, we meet them on the lawn in front of the farmhouse we use as headquarters. We introduce the students to the day's research project and teach them to identify the plants or animals on which they'll be collecting data. Then our educators divide them into small groups and each team walks to a study site to spend about an hour collecting data. Back on the lawn, the educators work with the students to graph not just that day's data but all of the data collected by students so far that season and students practice drawing conclusions from the data and brainstorm ways to apply the results to land management decisions. At the end, we wrap up with a creative activity, for example, the students might make a poster about native grasslands to share back at their school.

Scientific investigation, reasoning, and logic are in the Virginia Standards of Learning for every grade. In the national Next Generation Science Standards, the core practices for K-12 science education are asking questions, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence, and evaluating and communicating information. We designed our field trips to practice all of these skills. Studies have found that actively participating in science and interacting with scientists lead to feelings of increased competency and positive feelings towards science in people of all ages. We have absolutely found that to be true.

While this project is in its infancy, we are committed to making it a part of our programming in perpetuity. In this report, we want to share some of our successes (and challenges), results from the data students have collected so far, and what we've learned about how to provide this kind of programming.

Front cover: Fifth grade students sample insects in our native grassland.

Back cover: Education Fellow Jacob Ewert leads a group of third grade students back to the farmhouse.



Education Associate Bridget Bradshaw points out a butterfly in our grassland.



Managing Director Eleanor Hanris puzzles over an insect caught by a student.



cliftoninstitute.org 🗧 🔁 @clifton.institute 🚺

In the 2022-2023 school year,

1,321 children attended 47 field trips

824

children attended 11 off-site visits

18

teachers attended 3 training days

The Clifton Institute is a 501(c)(3) non-profit organization located in Warrenton, VA. Our mission is to inspire a deeper understanding and appreciation of nature, to study the ecology of our region, to restore habitat, and to conserve native biodiversity. We provide environmental education, do scientific research, restore habitat for native species, and help landowners manage their properties for native biodiversity. Our 900-acre property is permanently protected under a conservation easement and provides a beautiful and easily-accessible location for all of our programs.

@clifton.institute

Research

The table below shows the basic components of each of the five research projects students can participate in here: the big idea we hope they learn, what question we are trying to answer, how we collect data, and what species we teach the students to identify. Each project (with the exception of waterfowl behavior) is connected to one our staff is working on, so the students are helping answer a real research question, not just filling out worksheets. Each project focuses on a different field skill (using sweep nets to sample insects, using quadrats to sample plants, using binoculars to watch ducks, etc.), but they all give children the opportunity to practice making observations, asking questions, formulating hypotheses, and using evidence to back up a claim. During every field trip the students work with not just their own data but the data collected by all the previous classes. This allows them to feel like part of a community working together on a mission.

	Vernal Pool Monitoring	Budout Phenology
Big Idea	Vernal pools are important habitat for amphibians.	It is important to monitor nature throughout the year.
Essential Question	How are amphibian popula- tions changing over time?	Are plants changing when they bud out over time?
Data Collected	Number of egg masses in different pools	Number of buds, leaves, and flowers on different trees
Species Identified	Spotted Salamander, Eastern Newt, Wood Frog	Tulip Tree, Dogwood, Spice- bush, Persimmon, Pawpaw, Pin Oak

Projects

The students do remarkably well at collecting accurate data, as shown by the consistency of the results from class to class. For example, the students from multiple clases have found two species of grass, Indiangrass and Purpletop, to be significantly different in burned and mowed fields (see the graph to the right). Because of the students' accuracy, we'll be able to use their data to better understand how to manage different habitats and to monitor how populations of plants and animals are responding to climate change and other disturbances.



Insect Investigation	Native Grassland Restoration	Waterfowl Behavior
Insects are important food for many bird species.	Grasslands are home to many declining species.	We can learn about animals by watching their behavior.
Do mowing and burning affect insect communities?	Do mowing and burning affect plant communities?	How do different species of waterfowl spend their time?
Number of insects in fields that are mowed and burned	Plant species in fields that are mowed and burned	Length of time waterfowl en- gage in different behaviors
Orders of arthropods (e.g. grasshoppers, dragonflies, spiders)	Little Bluestem, Indiangrass, Purpletop, Coralberry, Black- berry, Crownbeard	Canada Goose, Trumpeter Swan, Ring-necked Duck, Bufflehead

Students look for amphibian egg masses in one of our vernal pools.



A high school class gets briefed on how conduct plant surveys in our grassland.

Students use journals to record their observations of the waterfowl on the pond.

Lessons

Learned

In-school Visits

As powerful as a single field trip can be, they are even more meaningful when the students have multiple opportunities to practice new skills and to get comfortable being outside. To that end, in spring 2023 we started offering free in-school visits to classes who were scheduled to come on a field trip. First, we give an introduction to the research project the students will be participating in. Then, time and space allowing, we take the students outside at their schools to practice the data collection methods. Finally, we leave time for the students to ask questions about what the field trip will be like. We plan to offer these all year long in the coming years.

Supporting Teachers

Our ultimate goal is for students to spend time in nature and do science projects all year long. We can only visit so many schools, so to further that goal we also provide resources for teachers to use in their classrooms both before and after their field trips. But even if teachers see the value of outdoor experiences, they are often intimidated by the prospect of managing children outside or by having to identify plants and animals that may be unknown to them. To support teachers this past school year we started offering professional development days to show them how we collect data with students, how to learn native species, and how to incorporate nature and ecological explorations into their curricula.



After a recent field trip a teacher wrote: "All students left with a newfound appreciation for and curiosity about our native wild-life and nature in general. [The educators] encourage the children to ask questions and share their observations. All children are treated with respect and their comments and ideas are validated and explored. Due to the guidance and support of [the educators], students genuinely see themselves as valid members of our community who have the power to impart change."

What's in a name? In case collecting data doesn't sound like very much fun, in the past year of providing these field trips, we have seen the joy children get from learning to identify plants and bugs and amphibians. It's hard to love something if you don't know its name and teaching students not just the species on our property but tools they can use to identify species anywhere sets them up for a lifetime of learning and stewardship. We now design our programs around the core skills of learning to identify between 3 and 15 native species.

The data's in the details. Creating data sheets for students to use has required rounds and rounds of iteration. We've learned that students find estimating percent cover too confusing, so we've simplified collecting data about plants to recording whether or not a given species is present. We've learned that students find it easier to fill out a column rather than a row in a table. Whatever species we don't include on a data sheet students seem to find immediately, so we include as many common species as we can. We're excited to share these lessons with anyone else trying to do similar projects with children.

Education Fellow Jacob Ewert and Education Associate Bridget Bradshaw work with students to draw conclusions from graphs of the group's data.

Teachers walk out to the native grassland to learn about insect and plant survey methods.

Managing Director Eleanor Harris finds a

praying mantis in a schoolyard.

Learn more and register for a field trip at cliftoninstitute.org/fieldtrips

Rexial

Sign up for our monthly email newsletter at cliftoninstitute.org/signup

Donate to support our field trips at **cliftoninstitute.org/donate** or email Managing Director Eleanor Harris at **eharris@cliftoninstitute.org**

> What did you discover that surprised you