



# FINAL REPORT

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## **ECHO Watershed Science Education and Outreach - Final Report**

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### EXECUTIVE SUMMARY

Over the course of two school years (2021-22 and 2022-23), ECHO performed targeted recruitment to reach underserved schools and develop partnerships, advancing LCBP's mission for Diversity, Equity, and Inclusion. Participating classrooms were able to access a series of watershed-themed virtual programs, in-school outreach programs and in-person museum experiences.

Objectives stated in the grant:

Students build interest and confidence in their STEM skills by using scientific observation, inquiry, tools, and other technology to explore and communicate watershed science. They will demonstrate knowledge about the natural and physical world, including matter, living things and the environment; and experience science as a resource for lifelong learning. They will approach new problems with curiosity and an iterative mindset that complements more prescriptive core content delivery, increases critical thinking skills, and supports whole-person development.

Teachers will have increased self-efficacy regarding their ability to plan and deliver impactful watershed science virtual learning activities to support their in-class curricula; become more informed advocates for STEM; and integrate science content into their lessons.

Guiding tasks: Teachers and students access watershed science videos and lessons. Teachers and students engage in live, small group virtual follow up sessions. Teachers and students participate in museum field trips for watershed science programs. ECHO reports to LCBP.

60 live sessions took place between November, 2021 and May 2023. Ten schools participated in field trips. As of December 2023, close to 1,600 students had visited the museum as part of this grant partnership.

As a result of this grant, many students attended their first field trip since the start of the pandemic. This grant program also gave ECHO staff the opportunity to develop new partnerships with area teachers and strengthen existing partnerships.

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## 1. PROJECT SYNOPSIS

Over the course of two and a half school years (2021-22, 2022-23 and fall 2023), ECHO performed targeted recruitment to reach underserved schools and develop partnerships, advancing LCBP's mission for Diversity, Equity, and Inclusion. Participating classrooms were able to access a series of watershed-themed virtual programs, in-school outreach programs and in-person museum experiences. To remove bus funding as a barrier for participation, bus costs were included as part of the field trip experience. Students from 97 classrooms visited ECHO's permanent exhibits and had the option to augment their experiences with visits to the LCBP Program Resource Room.

Objectives:

Students build interest and confidence in their STEM skills by using scientific observation, inquiry, tools, and other technology to explore and communicate watershed science. They will demonstrate knowledge about the natural and physical world, including matter, living things and the environment; and experience science as a resource for lifelong learning. They will approach new problems with curiosity and an iterative mindset that complements more prescriptive core content delivery, increases critical thinking skills, and supports whole-person development.

Teachers will have increased self-efficacy regarding their ability to plan and deliver impactful watershed science virtual learning activities to support their in-class curricula; become more informed advocates for STEM; and integrate science content into their lessons.

## 2. TASKS COMPLETED

### Task 1

#### Teachers and students access watershed science videos and lessons

Teachers and students from 60 classrooms were given access to two grade appropriate video lessons on the themes listed below. Follow up lessons included hands-on activities to deepen understanding of concepts in the virtual lessons.

*Ecosystem Explorers* - ECHO educators go behind the scenes with our live animals to learn about their diets and behaviors; conduct fun investigations of pollination, animal adaptations, and biodiversity; and connect with local wildlife biologists.

*Awesome Forces* - We explore the history of the Lake Champlain Basin, teach the cycle of water, discuss pollution/sediment in run-off using the enviroscape, and explain the role of weathering, erosion, and deposition in stream development.

*Champ Investigators* - Students meet Champ's living reptile and amphibian relatives, investigate what adaptations Champ would need to survive in Lake Champlain, interview those in-the-know, and explore what we can do to protect lake monsters and other aquatic animals.

## Task 2

### Teacher and students engage in live, small group virtual follow up sessions

In light of reduced restrictions to in-person learning, students in all 60 classrooms were able to participate in an engineering design challenge lesson in person with an ECHO educator. Teachers were given the option for the lesson to take place during the museum field trip or at school as an outreach visit. Engineering challenges are listed below; the content for each one connected to the topics presented in the video lessons and follow up activities to deepen understanding of core concepts.

**Launch, Fling, Fly** Students learned about the ecology of Vermont butterflies and practiced engineering design skills as they planned, built, and tested a solution to an engineering challenge.

**Vertical Flyers** - Students learned about the role vehicles that move through the air can play in rescue situations. After reviewing how forces push and pull objects, students practiced engineering design skills as they planned, built and tested a solution to an engineering challenge.

**Fish Assist (K-6)** Students learned about Lake Champlain's elusive, endangered lake sturgeon and used the engineering design process to plan, build and test a solution to an engineering challenge.



## Task 3

### Teachers and students participate in museum field trips for watershed science programs

Sixty classrooms from ten rural and/or underrepresented schools were greeted at the museum over the course of two school years. 45 of the classrooms chose to complete their engineering challenge (described above) during their field trip. Bussing expenses came in under the estimated amount. Using remaining funds in the bussing line item, an additional 37 classrooms from existing partner schools visited the museum between October and December 2023, bringing the total number of field trips to 97.

## Task 4

### Report to LCBP.

Quarterly and final reports were submitted on schedule.

### 3. METHODOLOGY

Schools were selected based on location and Free and Reduced Lunch (FRL) eligibility. After developing a list of target schools and districts, ECHO staff sent email invitations to principals and curriculum coordinators. In some cases we were able to capitalize on existing partnerships, but over the course of two years, we also engaged with several new partner schools in rural settings and/or with high FRL rates.

In order to build an understanding of this grant partnership, ECHO staff held in-person and virtual information meetings with administrators and interested teaching teams. Kickoff meetings were also conducted with all teaching teams to orient them to grant activities and further build a collaborative relationship.

Grade level grant guides were provided to all participating teachers. The guides included an overview of grant activities, links to video lessons, and links to follow up hands-on activities that could be completed in the classroom.

[Champ Investigators](#) - grades K-1

[Awesome Forces](#) - grades 2-3

[Untangling Food Webs](#) - grade 4

[Untangling Food Webs](#) - grade 5/6

### 4. DELIVERABLES COMPLETED

#### Task 1 Photos/testimonials about teachers and students' experiences





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Principals whose teachers and students participated in the first year of the grant shared letters of support.

[Letter of support](#) from Edorah Frazer, principal, Robinson Elementary School, Starksboro  
[Letter of support](#) from Sarah Raabe, principal, JFK Elementary, Winooski

Teacher responses to grant activities included:

“My students would have never gotten the opportunity to see and experience Echo otherwise.”

“STEM activities for kindergarten are so important. Their little minds have big ideas. And, tapping into their skills prepares them to become the next generation to better our world! Thank you for funding such a wonderful program!”

“I couldn't really pick one area. The entire experience was valuable and having the bussing funded made the trip (experience) possible.”

One teacher also sent feedback via email:

“On behalf of St. Albans City School, we just wanted to say thank you thank you thank you for the opportunity you gave our students. Many had never been to Echo, and some had never even been to Burlington or on the highway before. The exhibits were so engaging and kept the kids curious and learning the whole time we were there.

This was such an incredible opportunity and a wonderfully fun day for our students. We know that there was a lot of effort put in to make this happen and we are truly grateful to you all!

We hope to continue this partnership in the future and look forward to working with you again!”

Overall teachers found the engineering challenge and the field trip the most impactful aspects of the grant.

### **Task 2** 40 live, virtual sessions

60 live sessions took place between November, 2021 and May 2023.



**Task 3** 10 schools' ECHO field trips

Ten schools participated in field trips. Two of the schools participated over two years, sending different grade level teams on field trips each year. One school, Highgate Elementary, sent all of their grades K-5 classrooms on field trips in the week leading up to their schoolwide STEM festival. As of December 2023, close to 1,600 students had visited the museum as part of this grant partnership.

**Task 4** Quarterly reports to LCBP

[July 2021](#)

[November 2021](#)

[January 2022](#)

[April 2022](#)

[July 2022](#)

[November 2022](#)

[January 2023](#)

[April 2023](#)

[July 2023](#)

[October 2023](#)

[January 2024](#)

**5. CONCLUSIONS**

**Accomplishments:**

This was the first field trip many students had been on since the start of the pandemic. For the youngest students, this was their first field trip experience in their school careers! Many teachers commented how nice it was to have this support as they re-engage with community based learning experiences.

60 teachers increased their self-efficacy regarding their ability to plan and deliver impactful watershed science virtual learning activities to support their in-class curricula; became more informed advocates for STEM; and integrated science content into their lessons. . Close to 1,600 students built their interest and confidence in their STEM skills by using scientific observation, inquiry, tools, and other technology to explore and communicate watershed science.

This grant program also gave ECHO staff the opportunity to develop new partnerships with area teachers and strengthen existing partnerships. Many of the teachers we connected with through this grant have become ECHO STEM champions. They have encouraged their colleagues to bring students to the museum. Several have partnered with us for professional development through a yearlong STEM Teacher Institute that they report has been transformative for their teaching.

**Lessons learned:**

Teachers appreciated the option of scheduling their in-person lesson with an ECHO educator at school or at the museum. In the future, it would be advantageous to continue to offer teachers choices like this to the extent that our staff has the capacity.



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This was the first opportunity to use curated video resources developed as part of ECHO's Virtual STEM Academy in 2020-21. Feedback from teachers provided a helpful perspective for our team as we consider how to provide effective virtual programming in the future.

**Future work:** We are looking forward to welcoming more students to the museum in 2024 through the ongoing generous support of the Lake Champlain Basin Program. The Lake Champlain Junior Ranger program will connect students with the staff and displays in the Resource Room. Students from an additional 60 classrooms will learn about the Lake Champlain Basin and how to support healthy ecosystems. This grant program will assist in improving Lake outcomes by inspiring citizen action, deepening knowledge about the Lake ecosystem and promoting positive stewardship behaviors.