



Project Location

Northeast

Project Duration

June 2017 to June 2020

Project Lead

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 Research Reserve
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Project Type

Science Transfer – Promoting
 the use of science

Products

- [American Sign Language video lessons on estuaries](#)
- [ASL Clear video modules](#) and new estuarine and watershed vocabulary
- [Deaf STEM Journey video series](#)

Project Partners

- Boston University Graduate Program in Deaf Education
- Narragansett Bay National Estuarine Research Reserve
- Center for Research and Training, The Learning Center for the Deaf
- Waquoit Bay National Estuarine Research Reserve
- Wells National Estuarine Research Reserve

Project Webpage

nerssciencecollaborative.org/project/Muller17

Watershed Stewardship in Action: Deaf Students on the Estuary

Overview

Deaf and hard of hearing people are underrepresented in science and technical fields, including coastal science and management. Teachers working with deaf students face unique challenges: a lack of specialized American Sign Language (ASL) vocabulary to foster student understanding of complex science concepts, few teacher training opportunities that pair hands-on environmental science with meaningful discourse, and minimal support for field-based learning with deaf students. This project addressed these barriers by developing and promoting new signs for key watershed and estuarine concepts, providing professional development for teachers of the deaf, and creating customized field experiences for deaf students at three northeast research reserves.

Education coordinators from the Wells, Waquoit Bay, and Narragansett Bay National Estuarine Research Reserves worked with partners from Boston University and the Center for Research and Training, Learning Center for the Deaf to identify key concepts foundational to understand estuarine and watershed science. Deaf science professionals at ASL Clear developed a lexicon of approximately 50 new American Sign Language vocabulary to capture and communicate these concepts along with video modules. Using the new sign language vocabulary, reserve educators developed a series of customized workshops and field experiences for pre-service and in-service teachers, interpreters, and their deaf students. The project team also created a series of videos featuring deaf science professionals discussing their academic and career journeys. The new resources and programming are helping teachers of the deaf deepen their teaching of key coastal science concepts and encouraging students to consider a wider range of science careers.

Project Approach

To address educational discrepancies for the deaf and hard of hearing in science and technical fields, the project brought together specialists in deaf education, National Estuarine Research Reserve educators, pre-service and in-service teachers, and sign language interpreters across the northeast. Reserve educators identified key concepts and vocabulary related to estuaries, watersheds, water quality, and sea level rise. Recognizing the lack of appropriate signs to discuss many

of these concepts, deaf language experts at ASL Clear developed approximately 50 new signs and a series of five video modules focused on estuaries, watersheds, water quality, and sea level rise. The specialized vocabulary and videos were added to ASL Clear, an online resource to help promote their use within the deaf community.

Reserve staff collaborated with partners to create a customized teacher training that integrated existing Teachers on the Estuary workshops with American Sign Language materials and best practices for working with teachers of the deaf, interpreters, and deaf students. A pilot training was held in fall of 2017 with Boston University pre-service teachers for deaf students at Waquoit Bay National Estuarine Research Reserve. Based on the pilot, the project team developed a revised two-day Teachers on the Estuary workshop that combined classroom, online, and field activities in the estuary. In August of 2018, in-service teachers and interpreters from five schools for the deaf attended the two-day workshop at Waquoit Bay. The workshop focused on environmental literacy and stewardship, introduced teachers to new sign language vocabulary, and included a visit to a salt marsh for observation, measurement, and data collection.



After returning to their schools, participating teachers introduced activities and resources from the trainings into their classrooms and prepared their students for an immersive field study visit to the reserve in their state. Each participating school was given a projecting microscope which enables students to see magnified aquatic life while also watching their teacher explain what they're seeing with signs. Through the process of preparing and supporting field visits, reserve educators learned techniques for how to teach deaf and hard-of-hearing students and gained a greater understanding of deaf culture.

To further encourage young deaf and hard of hearing people to strive for science, technology, engineering or math (STEM) careers, the project team created a series of mini-career education films that feature four deaf people at various stages of science professions. The videos, *Deaf STEM Journeys*, were a creative alternative to a student summit that had to be cancelled due to the pandemic.

Benefits

- Teachers and interpreters for deaf and hard of hearing students have improved resources and skills to communicate and teach estuary and watershed concepts. The deaf community can access 50 new American Sign Language vocabulary and a series of educational video modules. Through the project, 31 pre-service teachers from Boston University and 12 in-service teachers and 16 interpreters for deaf students in the northeast were trained in these new signs.
- Deaf students have a deeper understanding of estuary and watershed concepts through new vocabulary, classroom activities, and field experiences. A total of 164 students from five schools for the deaf participated in field visits at reserves in Massachusetts, Maine, and Rhode Island.

- Deaf scientists have also benefited from the project, as explained by two project collaborators: *“With the vocabulary readily available in ASL through this project, we see the direct benefits within our respective professions. We now can discuss these topics in multiple dimensions with clarity and depth that we did not have in the past.”*
- National Estuarine Research Reserve educators received training and experience working with deaf and hard of hearing students, teachers, and interpreters, and several reserves continue to work with this new audience.
- In time, young deaf students supported and encouraged by this project and other efforts may pursue science careers, creating a pipeline of rising deaf professionals and enhancing diversity in science.

What’s Next

The project has led to long term relationships between reserve educators, University partners and the deaf community, and their work together continues. For example, during the pandemic teacher workshops moved to online platforms and Waquoit Bay Reserve was able to engage a sign language interpreter and several teachers of deaf students joined the trainings. Project partners are also planning additional programs to further raise awareness and enable deaf students to connect with deaf professionals in science fields.

About the Science Collaborative

The National Estuarine Research Reserve System's Science Collaborative supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is managed by the University of Michigan's Water Center through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA). Funding for the research reserves and this program comes from NOAA. Learn more at nerrsciencecollaborative.org or coast.noaa.gov/nerrs.