

INNOVATIVE APPROACHES TO INTEGRATING RESEARCH AND K-12 EDUCATION TO ADVANCE ESTUARY STEWARDSHIP

WEBINAR SUMMARY REPORT | JULY 2020

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ABOUT THIS DOCUMENT

The individuals featured in this report participated in a panel webinar on July 28, 2020 to discuss the partnerships and creative processes that spark new projects, adaptations to support social distancing, and ideas for research about student and teacher learning. This document was prepared by NERRS Science Collaborative staff, with input from the panelists - Sarah Nuss, Julie Binz, Elizabeth Edmondson, and Joan Muller.



About the NERRS

The National Estuarine Research Reserve System (NERRS) is a national network of 29 coastal reserves located across the United States and Puerto Rico. Each site includes programs focused on land stewardship, research and scientific monitoring, training programs for the public and local officials, and education.

About the NERRS Science Collaborative

The NERRS Science Collaborative is a NOAA-funded program that provides grants and other support for user-driven collaborative research, assessment, and transfer activities that address critical coastal management needs identified by the reserves.



National Estuarine
Research Reserve System
Science Collaborative

ABOUT THE SPEAKERS



Julie Binz, Education Coordinator, ACE Basin National Estuarine Research Reserve, South Carolina

Julie Binz is the education coordinator at ACE Basin Reserve in South Carolina where she leads boat- and field-based experiences for a range of school and community groups. Julie has been working for many years on a unique program that helps classes grow marsh grasses in school greenhouses and transplant the grasses into local shoreline restoration sites. Learn about her recent projects: [Spreading the Seeds of Estuary Health](#) and [From Seeds to Shoreline](#).



Elizabeth Edmondson, Principal Investigator, VISTA ELIS at Virginia Commonwealth University

Elizabeth Edmondson helps train pre-service teachers and leads a number of research projects as part of the School of Education at the Virginia Commonwealth University. Elizabeth will be part of a multi-university team working with the Chesapeake Bay NERR to train pre-service science teachers on how to incorporate environmental education into their classroom curriculum. To learn more, read [Elizabeth's bio](#).



Joan Muller, Education Coordinator, Waquoit Bay National Estuarine Research Reserve, Massachusetts

Joan Muller is the education coordinator at Waquoit Bay Reserve in Massachusetts where she provides professional development for teachers and organizes programs for community members. Joan has partnered with a number of researchers and found creative ways to integrate [blue carbon](#) and [oyster ecology](#) into middle and high school curriculums. She's also been customizing programs for hard to reach audiences through initiatives such as [Deaf Students on the Estuary](#).



MODERATOR: Sarah Nuss, Education Coordinator, Chesapeake Bay National Estuarine Research Reserve, Virginia

Sarah Nuss has been the education coordinator at the Chesapeake Bay Reserve in Virginia since 2005. In addition to pursuing a PhD in Curriculum Learning Design, Sarah develops education, interpretation and outreach programs for a range of audiences, and one current area of interest is professional development for graduate students and pre-service teachers. She has led several Science Collaborative projects, including: [Climate Education for a Changing Bay Expansion](#) and [Creating an Alliance of Scientists and Educators in Virginia](#).

BACKGROUND AND INTRODUCTION

Engaging youth and K-12 teachers can expand the broader impact of research and advance coastal stewardship goals. But what are the best strategies for effectively reaching this unique audience and what innovative techniques are being tested? On July 28, 2020, the Science Collaborative hosted a webinar featuring three panelists with experience leading innovative projects that connect K-12 teachers and students with the important research and stewardship activities happening in and around National Estuarine Research Reserves. After providing a brief glimpse into their recent projects, panelists discussed lessons learned and ideas for next steps. Sarah Nuss, an experienced reserve educator, moderated a discussion about timely topics, including the partnerships and creative process that spark new projects, broader impacts observed, adaptations to support social distancing, and ideas for research about student and teacher learning.



SUMMARY STATISTICS

This webinar engaged 139 people, representing nine different regions of the country and a range of experience with collaborative science projects. Participants indicated their affiliations as follows: 17% work for the Reserve system, 25% work for non-profit organizations, and 19% work for a university or college. The most common groups represented in the webinar included the Grand Bay and GTM National Estuarine Research Reserves, and representatives from eight Sea Grant programs.

DISCUSSION SUMMARY

Before responding to participant questions, each panelist provided brief introductory comments related to their experiences and respective areas of expertise.

Sarah Nuss, the session moderator, began by introducing the topic and outlining the goals for the session. As she explained, the panelists have experience working on innovative projects that:

- a) translate research from the reserves and bring it to other audiences, including students, teachers, pre-service teachers, and the public; and
- b) provide opportunities for collaboration and the transfer of ideas.



Capturing Attendee Feedback

This session included a Google document intended to provide a place for all session attendees to provide links to additional resources, ideas for educational research projects, and contact information to encourage future collaboration. The feedback captured in the Google document is included at the end of this summary report.

In-session Polling

What roles have you played in k-12 educational efforts?

- I work with youth (59%)
- I help train teachers or other adults (53%)
- I'm involved in coastal research or management (60%)
- I'm involved in research about teaching and learning (20%)
- Other (17%)

Which of these topics are most interesting to you?

- How to jump-start a new educational project idea (59%)
- Innovate techniques for reaching youth (75%)
- Innovative techniques for reaching teachers (64%)
- Ideas for research about teaching and learning (41%)
- Adapting to social distancing guidelines (64%)

Sarah concluded with a brief overview of her work as the Education Coordinator at the Chesapeake Bay National Estuarine Research Reserve in Virginia. Her efforts to date include training graduate students to write and pilot test lesson plans for K-12 classrooms in the Chesapeake Bay area, and integrating sea level rise research and monitoring work into high school science education programs through the Climate Education Program.





Julie Binz talked about how the Seeds to Shoreline project, which started as a South Carolina Sea Grant-driven pilot program in two states, has evolved into a regional effort that spans multiple grades and involves several schools and partner organizations. The project provides students with the opportunity to harvest, grow, and plant native *Spartina* grass in areas of eroded marsh, as well as opportunities to conduct their own experiments with growth media and watering techniques. Prior Science Collaborative support has allowed the ACE Basin, Guana Tolomato Matanzas (GTM), North Carolina, North Inlet-Winyah Bay, and Sapelo Island National Estuarine Research Reserves to collaborate among a network of regional partners. Now in its tenth year, project participants include all the National Estuarine Research Reserves in the Southeast region, as well as several other Sea Grant programs.



Joan Muller shared her experiences working with teachers in Teachers on the Estuary (TOTE) workshops. She described how the workshops, held at all the reserves throughout the United States, have provided forums for interaction with teachers and pre-service teachers. In one project, teachers and sign language interpreters even co-developed conceptual American Sign Language signs for scientific words that were previously finger-spelled.

Joan's education efforts complement and leverage research projects at the Waquoit Bay Reserve. These efforts include: coordinating the creation of a blue carbon high school curriculum based on research from the Bringing Wetlands to Market project, later refining it using actual data from the research project; and educating teachers, students and community members through a variety of applied lessons using an oyster aquaculture education demonstration site.

At her university, **Elizabeth Edmondson** helps train the next generation of new teachers and is involved in a suite of educational research initiatives. She was also a K-12 teacher in a prior career, which has given her an appreciation for the needs of pre-service teachers.

Elizabeth highlighted some of her recent work with pre-service teachers as part of a project called Teaching to Increase Diversity and Equity in STEM (TIDES), which is supported by a multi-university Bay Watershed Education Training (BWET) grant from the National Oceanic and Atmospheric Administration, and is led by the Chesapeake Bay National Estuarine Research Reserve and Virginia Institute of Marine Science. The project aims to: a) help pre-service teachers understand and develop self-efficacy related to planning meaningful watershed education experiences; b) help faculty better understand how to incorporate these kinds of projects; and c) build a network of pre-service student teachers so that they can call upon and work with each other once they are in the classroom.

Following the panelists' opening remarks, Sarah moderated a discussion of how project ideas emerged, and how projects are adapting to new social distancing guidelines.

Tell us a bit about how your project ideas emerged. How did you identify the audience and need, and how did the partnerships develop?

- **Julie** - South Carolina Sea Grant started the program ten years ago with one school because there were no student salt marsh restoration opportunities in the state. An underlying goal was to expand reach and impact through partnerships, so they enlisted the ACE Basin Reserve educators, South Carolina Department of Natural Resources oyster and living shoreline restoration biologists, and Clemson Extension for their agriculture resources, e.g., greenhouses and expertise in growing plants. Then a few years ago, we partnered with ten other environmental education centers across the coast to create hubs of resources for teachers to implement this project. We expanded to the other Southeastern states using their Sea Grant and NERR educators to support teachers. Now we have over 40 schools and 2,000 students participate each year.
- **Joan** - During the development of the first time the original blue carbon curriculum, the educators had to apply for a separate science transfer grant for the education component; they were not part of the original grant, though they worked with the researchers and had them review the curriculum. The second time around, the Education Coordinator was part of the main grant and focused on making activities based on data from core samples and carbon storage models, some of which involve students collecting their own data in the salt marsh. We also developed an activity that used Sentinel Site data, where students could monitor near their schools to learn about how reserves monitor salt marshes for sea level rise.
- **Elizabeth** - Many states have science teacher conferences, which are a great way to present what you're doing and meet faculty from other universities that are working with teachers. That's how this project started. Networking is very important. Pre-service teachers are a newer audience for the Reserve system, but research says they're a perfect group to work with because you can have a big influence on their future teaching style.



How are your programs and projects adapting to support social distancing guidelines? What alternative techniques seem to be working for you?

- **Joan** - We recently hosted a teacher workshop during the pandemic. We started small with a one-hour webinar focused on getting students outside in their own backyards or looking out windows. Current classroom teachers who had been through our trainings helped explain the new activities. Teachers appreciated hearing how the activities worked for other teachers. Participants indicated they liked being able to talk to each other, discuss barriers, and give suggestions. We also did another collaboration with a monitoring technician who trained people on how to use Water Quality monitoring data online.

Our remote teacher workshop sessions were short - around 90 minutes, once a week - with guest presenters. They included a live session out in the marsh, where our stewardship coordinator gave a tour of our marsh site, and we included a segment with Zoom breakout rooms so the teachers could discuss their ideas with others of similar grades. We try to make it interactive and use whiteboard features and polls.

- **Julie** - In early spring when all the schools shut down, we took all the plants from the schools and staff helped plant the Spartina in shoreline sites. All the partners made a video so they could show the students how their work contributed to local restoration efforts. Schools that were interested also had live interactive virtual field trips.





What sort of educational research questions are the reserves well positioned to tackle? What educational research questions would you like to see addressed that might build on or benefit your work?

- **Elizabeth** - Environmental education is a rich area for research, especially with respect to pre-service educators. Often when we work with pre-service teachers, we only look at short-term impacts concerned with what happens when they're with us, but we don't often look at longer term impacts. Some questions we're interested in:
 - Do programs for pre-service teachers affect behavior when they have classrooms of their own?
 - Is there a change in impact if we're reaching teachers earlier, during their training?
 - What is it that pre-service teachers actually take back to their schools and use?
 - What are the barriers teachers face when they're back in the classroom?
 - Are we changing attitudes about the environment?
 - Are teachers nervous about things? Not knowing the answers?

Webinar participants offered a few other ideas for educational research topics:

- What is the impact of TOTE workshops on teachers' instructional practice?
- What experiences do pre-service teachers get in teaching outdoors?
- How does an intervention like TOTE change their practice?
- How does introducing long-term monitoring to students impact student science success?

What one piece of advice would you give someone else starting a new educational partnership?

- **Julie** - Bring partners together early to create roles that make sense and complement their skills and current set of responsibilities. Don't try to fit people into roles that aren't the best for them.
- **Joan** - Volunteer to help fellow researchers with their field work when they need extra hands. These experiences have deepened my understanding of the science and have led to new partnerships and projects down the road.
- **Elizabeth** - Find motivated graduate students that are looking for projects, and give them the opportunity to gain real-world experience by working with you.
- **Sarah** - Be flexible and patient in your interactions with partners, and be aware of what's happening in the world, especially right now.

QUESTION AND ANSWER

This section summarizes questions submitted by participants during the webinar and responses provided by the panelists. Due to time constraints, not all questions were answered during the webinar. For questions not answered during the webinar, panelists helped to provide written responses, which are included here. For privacy purposes, the names of the individuals who submitted questions are not provided in this document. If you would like to follow up on any of the questions below, please contact us at nerrs-info@umich.edu.

Q: Can you say more about how the virtual whiteboard worked for you?

A: We showed a NOAA video about estuaries, and we had workshop participants use the Zoom whiteboard to type out reasons why they valued estuaries.

Q: Can you explain what you mean by Sentinel Sites?

A: **Sentinel Sites** are a network of long term monitoring stations that are tracking how natural systems are changing. Sentinel Site locations are typically located within NERR sites, Marine Sanctuaries or Marine Protected Areas. To learn more about our student sentinel sites, you can check out the activity on page 47 of this [2016 Student Sentinel Site Lesson Plan Booklet](#).

Q: Julie, how much grass is grown annually through this program?

A: This is where we lean on our facilities and hubs. We grow backup plants in case all the kids' plants fail. This year, we had 66,000 seedlings. A large majority of our backups come from oyster restoration staff that are doing living shorelines work.

Q: For the oyster experiments, do they need cooled water, or does room temp work? Our Pacific oysters need COLD water!

A: We use water from the Bay. I'm not sure if room temp water would work!

Q: Has Julie had success with growing Spartina from clippings? Or only seeds?

A: We grow hydroponically with rhizomes. So if we have clumps that have the root structure, we can put them in the baskets in the hydroponic system and then they grow offshoots from the roots. We can grow them that way or from seed, hydroponically.

Q: Julie, how do you see your project (Seeds to Shoreline) working in the virtual world moving forward in the coming year?

A: We created online versions of many of these resources, like the salt marsh field guide, with virtual use in mind. There are also posters and coloring books for different age ranges, and a website we created for the Science Transfer project. Of course, there are lots of lesson plans that have to do with salt marshes and ecosystems. We talked a lot about moving forward for this school year. In a distance learning situation, we're thinking of ways to support families and parents in working on the project in some way, and involve more community members.



SHARING IDEAS AND RESOURCES

The following tables were developed based on webinar attendee feedback provided via an in-webinar group Google document and a post-webinar exit survey. Webinar participants shared projects, programs or resources that others might find helpful in their education work (Table 1). Table 2 lists attendees who agreed to provide their contact information to encourage future partnerships and facilitate the sharing of ideas.

Table 1. Projects, programs or resources that others might find helpful

RESOURCE	ADDITIONAL NOTES
Virginia Science Educator Alliance	A project Sarah Nuss referenced
Climate Education for a Changing Bay Expansion	A project Sarah Nuss referenced
Seeds to Shoreline	A project Julie Binz referenced
Spreading the Seeds of Estuary Health	A project Julie Binz referenced
Blue Carbon High School STEM Curriculum	A project Joan Muller referenced
Oyster Aquaculture and Ecology	A project Joan Muller referenced
Deaf Students in the Estuary	A project Joan Muller referenced
New Virginia facilitator guide for MWEEs	A resource Elizabeth Edmondson recommends. Update coming soon.
Professional Preparation for Science Teachers in Environmental Education	An article about the impact of engaging pre-service teachers in EE
Blue Carbon HS Data Activities	Blue Carbon HS data activities, Joan Muller referenced
MS/HS Sentinel Site Activities	Sentinel Site MS/HS Activities (Coastal Impacts of Climate Change) Joan Muller referenced
eePRO Learning (NAAEE)	Professional development for environmental educators
eePRO Research Library (NAAEE)	Combines research for the field of environmental education and the movement to connect children and nature, and includes multiple ways to search for articles, syntheses, and research summaries.
ASTE -- Association for Science Teacher Education https://theaste.org/	Great conference to attend to learn more about pre-service teacher education and to meet education professors/researchers.
Influence of the natural setting on environmental education outcomes	Dale, R. G., Powell, R. B., Stern, M. J., & Garst, B. A. (2020). Influence of the natural setting on environmental education outcomes. <i>Environmental Education Research</i> , 1-19.
Do pre-visit preparation and post-visit activities improve student outcomes on field trips?	Lee, H., Stern, M. J., & Powell, R. B. (2020). Do pre-visit preparation and post-visit activities improve student outcomes on field trips? <i>Environmental Education Research</i> , 1-19.
Current: The Journal of Marine Education (NMEA's journal) https://www.current-journal.com/issue/archive/	Good references for marine education research; the URL links to the journal's online archives.
Practitioner Guide to Assessing Connection to Nature	The Practitioner Guide to Assessing Connection to Nature provides practitioners, organizations, researchers, and others with tested tools for measuring connections to nature. The guide provides information to help you choose an appropriate tool or approach for your needs, specific to your audience and their experiences, to assess connection to nature.

ATTENDEE ROSTER

To foster connections and future collaborations on innovative K-12 research and projects, attendees were encouraged to provide their contact information. 139 people attended the webinar, and the following opted to provide their information.

Table 2. Attendee Roster

NAME	AFFILIATION	EMAIL
Sarah Nuss	Chesapeake Bay NERR, VA	meguire@vims.edu
Julie Binz	ACE Basin NERR, SC	binzj@dnr.sc.gov
Elizabeth Edmondson	Virginia Commonwealth University	ewedmondson@vcu.edu
Joan Muller	Waquoit Bay NERR, MA	joan.muller@state.ma.us
Kenneth Rainer	NOAA OCM Lynker	kenneth.rainer@noaa.gov
Terri Kirby Hathaway	North Carolina Sea Grant	hathawayt@ecu.edu
Annie Lederberg	Billion Oyster Project	alederberg@nyharbor.org
Maria Metler	Vashon Nature Center	maria@vashonnaturecenter.org
Dani Dilullo	Louisiana Sea Grant	ddiullo@lsu.edu
Mindy Richlen	Woods Hole Oceanographic Institution	mrichlen@whoi.edu
Aaron Wendt	Virginia Dept. of Conservation & Recreation - Shoreline Erosion Advisory Service	aaron.wendt@dcr.virginia.gov
Nicole Iadevaia	Coastal & Heartland National Estuary Partnership (CHNEP)	niadevaia@chnep.org
Kirstin Wakefield	MARACOOS and Mid-Atlantic Coastal Acidification Network (MACAN)	kirstin@maracoos.org
Sandra Huynh	Grand Bay NERR, MS	sandra.huynh@dmr.ms.gov
Sheila Scolaro	Tampa Bay Estuary Program (TBEP)	sscolaro@tbep.org
Amanda Knobloch	Patuxent Environmental and Aquatic Research Lab (PEARL) - Morgan State University	amanda.knobloch@morgan.edu
Jordan Findley	Tampa Bay Watch	jfindley@tampabaywatch.org

More Information

This summary report is available online in the Science Collaborative resource library. Visit the [webinar page](#) to access the recording and related resources. Have additional questions or ideas? Email Nick Soberal (nsoberal@umich.edu).