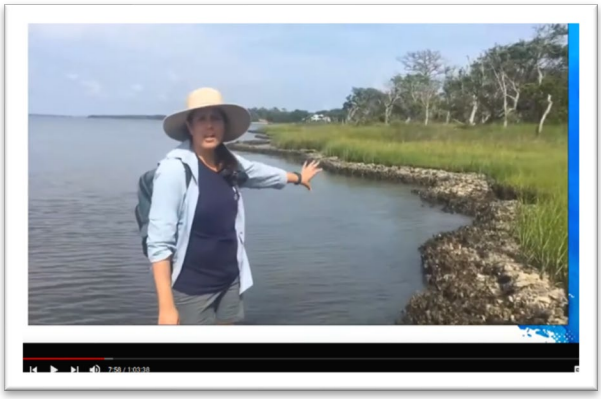
2020 FINAL REPORT

The following report addresses key outcomes of the *2020 At Water's Edge | Current Watershed Science for the NC Classroom* Teacher Institute led by the UNC Institute for the Environment (UNC IE) with funding provided by the Albemarle-Pamlico National Estuary Partnership (APNEP).

Due to COVID-19, the *2020 At Water's Edge* Teacher Institute was held virtually from July 6-9, 2020. Twenty-three middle and high school science teachers participated in this professional development experience.

This multi-day teacher professional development institute provided teachers with a virtual investigation of watersheds, particularly the watersheds that drain to the Albemarle and Pamlico Sounds, and provided access to quality, science-based activities and resources that support the North Carolina Essential Standards in 8th grade science, Earth/Environmental Science and Advanced Placement (AP) Environmental Science.



Rachel Bisesi, NC Costal Federation, sharing her knowledge about estuaries and living shorelines in a virtual field trip.

Institute Goals

1. Increase teacher knowledge of watershed science and human impacts to watersheds.
2. Provide resources, including ideas for hands-on learning, to teach watershed science.
3. Increase teacher confidence in conducting watershed activities in classroom and virtual learning environments.

Institute Content

Teachers participated in a variety of sessions focused on building knowledge of watershed science and promoting awareness of curricula and online resources that help students explore their local watersheds. Programming included proven environmental education curricula such as *Project WET*, along with online mapping tools and other resources for use in virtual classrooms. Throughout the institute, teachers had the opportunity to engage with scientists like Mike Piehler from the UNC Institute for the Environment, and Molly Bost and Carson Miller from the UNC Institute of Marine Sciences, as well as experts such as Lauren Daniel, from the NC Division of Water Resources, and Terri Kirby Hathaway, from NC Sea Grant. Teachers were introduced to current content pertaining to watershed science, human impacts to watersheds and the water cycle. Furthermore, teachers learned about current threats to

Lori Davis, NC National Estuarine Research Reserve, sharing her knowledge about the Rachel Carson Reserve in a virtual field trip.

healthy watersheds including pollution and stormwater runoff, climate change and saltwater intrusion.

Since group hands-on activities were difficult to implement in a virtual setting, many guest presenters provided demonstrations of hands-on activities that teachers could duplicate with their students. Participants also experienced virtual field trips to places found in the Albemarle-Pamlico region, including the Rachel Carson Reserve, an estuary, and a salt marsh (including a living shoreline project) to simulate first-hand explorations. Teachers were able to access these virtual field trips for use with their students during the academic year.

Terri Kirby Hathaway, NC Sea Grant, sharing activities that can accompany the NC's Amazing Coast book.

Each teacher received instructional materials including curriculum-related videos, maps, posters, books, and other support materials for use in the classroom. Teachers were introduced to online mapping tools that can be used to explore the unique features of their river basins and resources (e.g., data visualizations).

Teachers earned up to 15.5 contact hours to submit to their school district for Continuing Education Units (CEUs) required for the renewal of their NC teaching certificates and towards becoming Certified Environmental Educators in North Carolina. Due to the virtual nature of the institute, teachers were not required to attend all sessions and therefore may have earned less than the possible 15.5 contact hours. Most of the sessions were attended by 85% or more of the cohort. Following the summer institute, monthly networking sessions were scheduled based on interest from the teachers and provided the option to earn an additional 6 contact hours.

Alignment to APNEP's Comprehensive Conservation and Management Plan

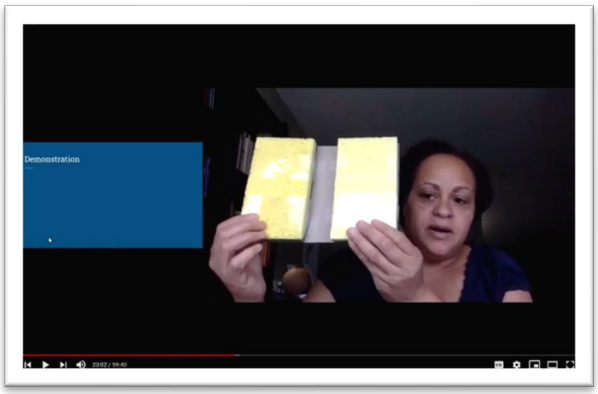
The UNC IE's efforts to engage teachers is directly relevant to APNEP's Comprehensive Conservation and Management Plan Component D; Engage. The efforts described in this report address both *Objective D1: Foster environmental stewardship* and *Objective D2: Conduct targeted environmental education efforts regarding sustainable use, habitats, and ecosystem services*. To improve awareness and understanding of environmental issues facing the Albemarle-Pamlico region, teachers were engaged in hands-on activities designed to showcase the terrestrial, aquatic, and marine ecosystems within the APNEP region. By using the interdisciplinary approach of environmental education, teachers learned how to address important watershed issues with their students, both in the classroom or virtually. Furthermore, activities fostered individual and collective stewardship of the region's resources, including interactions with scientists and others conducting relevant research in this region through virtual field experiences that modeled current research efforts including citizen science projects. For

2020 At Water's Edge participant demonstrating an activity from the Project WET curriculum.

example, teachers learned about living shorelines and oyster restoration efforts by direct virtual observation of a living shoreline project at the Trinity Center with the NC Coastal Federation.

Participant Recruitment and Demographics

Eighth through twelfth grade science teachers were recruited using a variety of outlets: the NC-EE listserv, NCSciTeach listserv, EarthSciTeach listserv, posting on the APNEP website, as well as emails to past IE workshop participants. In addition, APNEP region teachers were targeted specifically by emailing district level science and professional development coordinators, requesting that they forward the application materials to teachers in their districts.



2020 At Water's Edge participant demonstrating an activity from the Project WET curriculum.

The twenty-three participants came from the coast, piedmont and mountains of NC, representing six river basins (Pasquotank, Tar-Pamlico, Neuse, Cape Fear, Yadkin-PeeDee, and French Broad). **Fifteen (65%) teachers were from the APNEP region**. Twelve counties were represented by program participants: Alamance, Cabarrus, Cumberland, Dare, Durham, Granville, New Hanover, Pitt, Rowan, Wake, Wayne, and Yancey. 52% percent of participants taught middle school only, 44% taught high school only, and 4% taught grades spanning middle and high school. Collectively, these twenty-three teachers are estimated to have the opportunity to have reached over 3,380 students in the 2020-21 school year.

Rachel Bisesi demonstrating an activity that simulates brackish water found in estuaries.

End-of-Institute Evaluation

Twenty-two teachers completed an end-of-institute evaluation. Results are summarized below and n=22 unless otherwise stated. Overall, 100% of respondents believed the Institute to have been an "Excellent" or "Very Good" experience. Highlights of the institute cited by participants included interactions with scientists and experts, access to resources for classroom (and virtual) use, and time for networking with colleagues and learning about remote learning options. Goal specific evaluation data are reported below.

Goal 1: Increase teacher knowledge of watershed science and human impacts to watersheds:

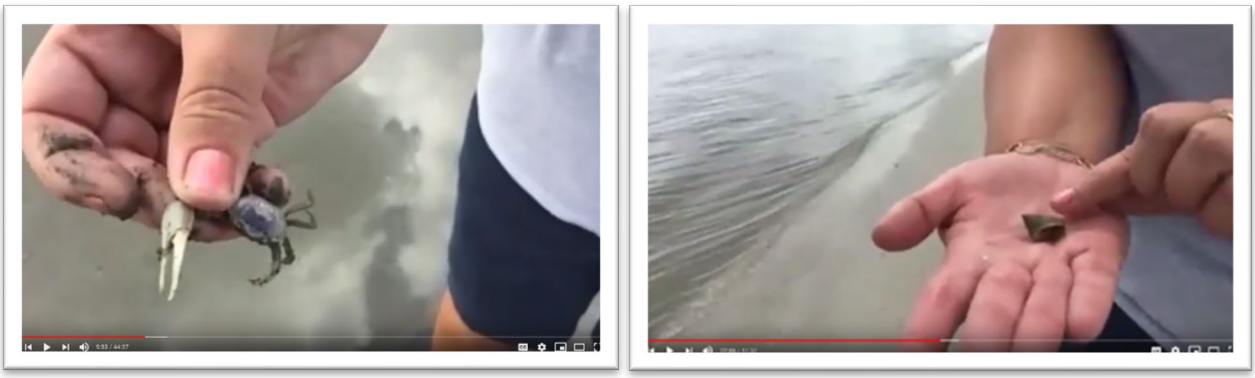
- 100% of respondents either strongly agreed (73%) or agreed (27%) that **"this workshop deepened my content knowledge about watersheds."**
- 100% of respondents (n=21) either strongly agreed (71%) or agreed (29%) that **"this workshop deepened my content knowledge about how human activities impact watersheds."**

Furthermore, 95% of respondents (n=21) either strongly agreed (90%) or agreed (5%) that there was value in having access to scientists during the workshop. One teacher noted, **"I now have connections to people and resources that will help me develop lessons that I have wanted to have but didn't have anyone that I could contact to help me."** Teachers appreciated both the formal and informal interactions with researchers, including graduate students, as they described their research projects and made watershed-related research real for the teachers. Teachers also enjoyed hearing about current watershed concerns and efforts to address those concerns, such as living shorelines.

Goal 2: Provide resources, including ideas for hands-on learning, to teach watershed science:

- 100% of respondents either strongly agreed (82%) or agreed (18%) that that institute **"introduced me to new tools and techniques that I can use in remote learning situations."**
- 96% of respondents either strongly agreed (91%) or agreed (5%) that this institute **"provided hands-on activities I can use with my students."**

100% of teachers cited hands-on activities and demos (e.g. Project WET lessons and GooseChase scavenger hunt) and virtual field trip experiences (e.g. monitoring living shorelines with the NC Coastal Federation) as highlights. One participant noted, **"this week will greatly enhance my teaching of the hydrosphere. There are many lessons and activities I can incorporate and real-life scenarios to implement to engage my students."**



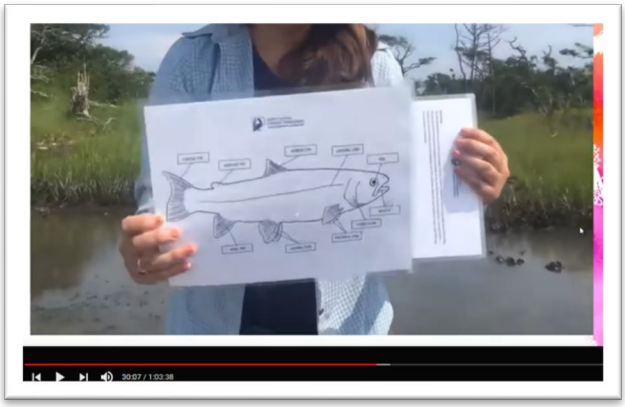
Lori Davis sharing examples of wildlife she found at the Rachel Carson Reserve during a virtual field trip.
Left: fiddler crab, Right: periwinkle snail

Goal 3: Increase teacher confidence in conducting watershed activities in classroom and virtual learning environments:

- 100% of respondents either strongly agreed (82%) or agreed (18%) that they **"have increased confidence in regard to teaching about watersheds, including coastal ecosystems"** as a result of this institute.
- 100% of respondents (n=21) either strongly agreed (90%) or agreed (10%) that they **will update their watershed-related instruction as a result of this institute.**
- 100% of respondents reported that they **planned to incorporate one or more of the lessons, activities, materials or ideas into their instruction in the next academic year.**

Follow-up Evaluation

A follow-up evaluation was distributed in December 2020, after the last monthly networking session to assess teacher's plans to use lessons/resources from the program and to determine the perceived benefit of the monthly networking sessions. Thirteen teachers completed the follow-up evaluation. Results are summarized below and n=13 unless otherwise stated. A majority of respondents reported that they **incorporated one or more of the lessons, activities, materials, or ideas into their instruction.** Many teachers noted that they conduct their hydrosphere unit in the spring, and therefore, indicated that they plan to use the lessons/resources later during this academic year. When asked which lessons/activities modeled during the workshop they conducted:



Rachel Bisesi sharing resources participants can use with students when exploring coastal ecosystems.

- **69% of respondents cited that they incorporated activities (38%) or plan to incorporate activities (31%) from *Project Wet* and *It's Our Water* into instruction** this year, including activities modeled during the institute such as "Branching Out," "Get the Groundwater Picture," and "The Pucker Effect".
- **54% of respondents cited that they incorporated activities (8%) or plan to incorporate activities (46%) from NC Coastal Federation into instruction** this year, including activities modeled during the institute such as "Shoreline Simulation" and "Estuary in a Jar".
- **46% of respondents cited that they incorporated resources (15%) or plan to incorporate resources (31%) from UNC researchers into instruction** this year, including research from Mike Piehler, Molly Bost, and Carson Miller from the UNC Institute of Marine Sciences.
- Many teachers indicated that they **incorporated some of the virtual tools modeled during the institute into instruction** this year, including Padlet (69%), Nearpod (69%), Screencastify (69%), Flipgrid (62%), and Screen-o-matic (46%).

Terri Kirby Hathaway explaining how to do the five-finger sand sample activity virtually.

The follow-up evaluation also asked a few questions about the benefit of the monthly networking sessions following the summer institute. These sessions were added because teachers requested time to network with each other since this component was missing due to the virtual nature of the institute. 85% of respondents cited that they attended one or more of the monthly sessions. Many teachers commented that they enjoyed the sessions where **"teachers were able to share what was working [in their virtual classrooms]"** and they liked the **"networking and sharing of**

resources, ideas, lessons, and how to adapt hands-on activities". One teacher stated, **"I can say with certainty that I leave each virtual meeting with this group with a new idea and a good conversation."**

Several teachers also mentioned that they have begun **planning for or creating a new outdoor learning space at their school** and are looking forward to **participating in similar, related professional development opportunities**, as a direct result of participating in this program.

Conclusion

While this institute was different than other institutes conducted in previous years due to COVID-19, we conclude that this professional development program met its objective of providing teachers with an in-depth investigation of watershed science, based on the evaluation results highlighted above. The content covered and activities conducted throughout the institute were relevant to a range of science subject areas, and teachers identified ways in which they have already incorporated lessons and resources from the institute into their instruction. Participants also commented on the benefits of networking with other teachers, trying out new lessons first-hand, and learning about virtual tools that they could incorporate into their remote instruction. Overall, participant satisfaction was high, and teachers enjoyed the variety of sessions, access to scientific experts, and demonstrations of hands-on activities. Teachers indicated that the training was effective at increasing their content knowledge and confidence in conducting watershed activities. As one participant stated, **"This has been one of the best PD sessions I have ever done as a teacher. I really appreciate the practical information, interesting content, and resources provided."**

Finally, if allowed by local guidelines, it is our goal to offer a one-day in-person session during the spring (2021) to conduct hands-on activities with institute participants. Before planning, we will survey the teachers to determine their comfort meeting as a group. During the workshop we will abide by all safely protocols and conduct all activities outside and socially distanced. Following the workshop, we will provide an update to this report regarding the activities conducted and feedback received from participants.

View of the Trinity Center in Salter Path, NC from the sound side.

APPENDIX

Facilitators

The following individuals contributed directly to the 2020 institute by delivering content and/or facilitating virtual field experiences:

Rachel Bisesi, NC Coastal Federation
Molly Bost, UNC Institute of Marine Sciences
Bill Crowell, Albemarle-Pamlico National Estuary Partnership
Lauren Daniel, NC Division of Water Resources
Lori Davis, NC National Estuarine Research Reserve
Captain Paula Gillikin, NC National Estuarine Research Reserve
Terri Kirby Hathaway, NC Sea Grant (now retired)
Carson Miller, UNC Institute of Marine Sciences
Mike Piehler, UNC Institute for the Environment & UNC Institute for Marine Sciences
Megan Rodgers, UNC Institute for the Environment
Lisa Tolley, Office of Environmental Education and Public Affairs
Marty Wiggins, Office of Environmental Education and Public Affairs
Sarah Yelton, UNC Institute for the Environment

Leveraged Funding

We leveraged an estimated $1,904 in additional funding to support this institute through personnel time contributed by the various institute facilitators listed above, valued at $27.20/hour using the Independent Sector 2020 estimated value of volunteer time.