2016 PROGRESS REPORT

The following report addresses key outcomes of the 2016 Sound Learning Teacher Professional Development Institute led by the UNC Institute for the Environment (UNC IE) with funding provided by the Albemarle-Pamlico National Estuary Partnership (APNEP).

The 2016 *At Water's Edge | Current Watershed Science for the NC Classroom* Teacher Institute was held at the Trinity Center in Salter Path, NC from July 26-29, 2016. Twenty middle and high school science teachers participated in this immersive professional development experience.

This multi-day teacher professional development institute provided teachers with an experiential, in-depth 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. The goals of the institute were to:

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

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* and its NC-specific companion curriculum, *It's Our Water*, along with online mapping tools and field experiences. Throughout the institute, teachers had opportunities to engage with current content pertaining to watershed science, groundwater-surface water interactions, human impacts to watersheds and the water cycle. Teachers learned about current threats to healthy watersheds including pollution and storm water runoff, climate change and saltwater intrusion. Teachers toured a reverse osmosis facility to learn about the issues that water utilities face when ensuring a healthy and plentiful source of drinking water, especially on the coast where saltwater intrusion and storm surges can affect water quality and water infrastructure.

Hands-on activities combined with authentic outdoor learning experiences were emphasized throughout the institute. Participants experienced first-hand explorations of the maritime forest, estuary, salt marsh (including living shoreline projects), and coastal blackwater

river ecosystems found in the Albemarle-Pamlico region, examining biotic and abiotic features using relevant technologies.

Each teacher received instructional materials including curriculum-related videos, maps, posters, books, and other support materials for use in the classroom. The agenda included team-based directed planning time to create "watershed team projects," providing teachers with the opportunity to work alongside colleagues to integrate content covered during the institute into classroom instruction and to adapt resources and activities featured to their schools' river basins. 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). Each team was asked to compile resources that they would use to teach about watersheds and the river basin in which their school is located and also to create a brief slide presentation to share the last day of the institute. These resources were made available to the entire group via a shared Google Drive folder.

Teachers earned 2.8 Continuing Education Units (CEUs) required for the renewal of their NC teaching certificates and 20 hours of credit towards becoming Certified Environmental Educators in North Carolina (10 hours each in Criteria II and III).



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, field-based activities designed to provide authentic and meaningful experiences with 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 and in outdoor environments. 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 hands-on field experiences that modeled current research efforts including citizen science projects.. For example, teachers learned about living shorelines and oyster restoration efforts by direct observation and monitoring of a living shoreline project at Jones Island 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.

The 20 participants came from the piedmont and coast of NC, representing five river basins (Pasquotank, Tar-Pamlico, Neuse, Cape Fear, Yadkin-PeeDee). **Thirteen (65%) teachers were from the APNEP region**. Thirteen counties were represented by workshop participants: Beaufort, Chatham, Craven, Durham, Forsyth, Franklin, Nash, New Hanover, Orange, Pasquotank, Rowan, Wake and Wayne. 55% percent of participants taught middle school only, 40% taught high school only and one teacher taught middle and high school. Collectively, these 20 teachers are estimated to have the opportunity to reach over 2,800 students in the 2016-17 school year.

Evaluation

Eighteen teachers completed an end-of-event evaluation. Results are summarized below and n=18 unless otherwise stated. Overall, 100% of respondents (n=16) believed the Institute to have been an "Excellent" or "Very Good" experience. Highlights of the institute cited by participants included opportunities to conduct hands-on activities and have field experiences, access to researchers, access to resources for classroom use, especially "scientifically rich, classroom-appropriate data & lessons," and time for networking with colleagues. 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 (78%) or agreed (22%) that **"this workshop deepened my content knowledge about watersheds."**
- 100% of respondents either strongly agreed (56%) or agreed (44%) that **"this workshop deepened my content knowledge about how human activities impact watersheds."**

Furthermore, 100% of respondents either strongly agreed (94%) or agreed (6%) that there was value in having access to scientists during the workshop. 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 teachers with resources emphasizing hands-on learning to teach watershed science:

- 100% of respondents either strongly agreed (83%) or agreed (17%) that **"this workshop provided me with STEM resources to teach watershed science."**
- 100% of respondents strongly agreed that this institute **"provided hands-on activities I can use with my students."**

75% of teachers cited hands-on activities (e.g. defining a watershed using topographic maps) and field experiences (e.g. monitoring living shorelines with the NC Coastal Federation) as highlights.

Goal 3: Increase teacher confidence in describing a watershed and conducting watershed activities:

- 100% of respondents either strongly agreed (89%) or agreed (11%) that they **"have increased confidence in regards to teaching about watersheds,"** as a result of this institute.
- 100% of respondents either strongly agreed (89%) or agreed (11%) 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 upcoming academic year.**

When asked which lessons/activities modeled during the workshop they planned to conduct:

- **88% of respondents (n=16) cited they would incorporate activities from Project Wet and It's Our Water into instruction** including activities modeled during the institute such as "Branching Out," "Get the Groundwater Picture," and "The Pucker Effect."
- Several teachers also mentioned they would also use the **online, interactive map tools** featured throughout the week as well as the **LID Stormwater Education game** and **living shoreline demonstration** from the NC Coastal Federation to explore their river basin with students and enhance their instruction of watersheds.

Conclusion

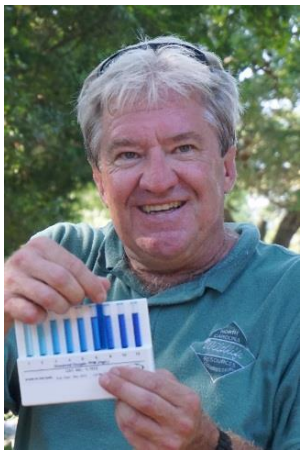
Based on the evaluation results highlighted above as well as anecdotal observations, we conclude that this professional development institute met its objective of providing teachers with an in-depth investigation of watershed science. The content covered and activities conducted throughout the institute were relevant to a range of science subject areas, and through completion of a watershed team project, teachers identified specific ways to fit institute content into their curricula for the upcoming academic year.

Overall, participant satisfaction was high, and teachers enjoyed the variety of sessions, access to scientific experts, and hands-on activities. Respondents to post-institute evaluations indicated that the training increased their content knowledge and their confidence in teaching watershed science. They also benefited from the immersive experiences in the ecosystems of the Albemarle-Pamlico region. By bringing in the study of human impacts to watersheds, teachers were provided with real-life, relevant examples of local issues to incorporate into classroom instruction.

APPENDIX

Facilitators

The following individuals contributed directly to the 2016 institute by delivering content and/or facilitating field experiences:



Rachel Bisesi, NC Coastal Federation
Mike Campbell, NC Wildlife Resources Commission
Bill Crowell, Albemarle-Pamlico National Estuary Partnership
Stacey Feken, Albemarle-Pamlico National Estuary Partnership
Dana Haine, UNC Institute for the Environment
Seola Hill, Bogue Banks Water Corporation
David Kochan, UNC Institute of Marine Sciences
Isabelle Neyland, UNC Institute of Marine Sciences
Kathleen Onorevole, UNC Institute of Marine Sciences
Olivia Torano, UNC Institute of Marine Sciences
Tracey Weidert, NC Office of Environmental Education
Nat Wilson, NC Division of Water Resources
Sarah Yelton, UNC Institute for the Environment

Leveraged Funding

We leveraged an additional **$13,168** in funding to support this institute, mainly through funding from the Duke Energy Foundation to UNC Institute for the Environment's INSPIRES program. From INSPIRES, $12,061 supported UNC-IE personnel, supplies, and participant stipends. Additionally, an estimated 47 hours of personnel time were also contributed by the various institute facilitators listed above, valued at $1107 using the Independent Sector estimated value of volunteer time for 2015 ($23.56/hour).