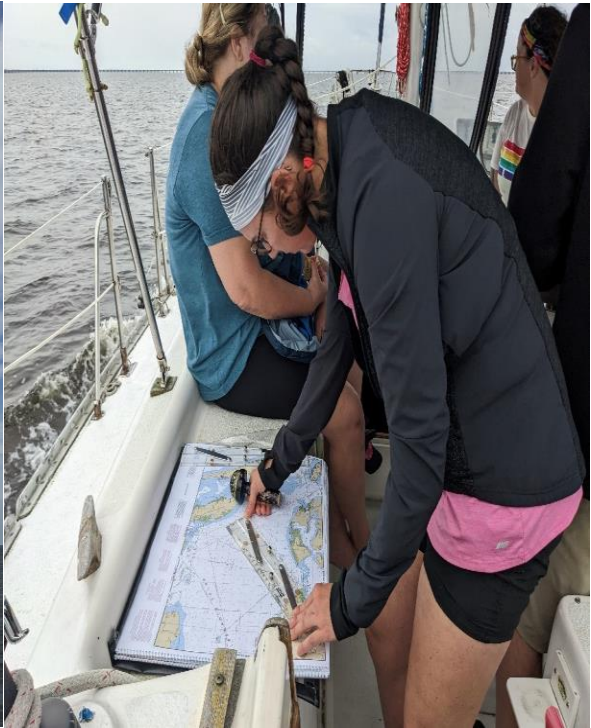


***Following the River: An Exploration of the Virginia Southern  
Watersheds and Pasquotank River Basin  
Final Report  
Summer 2023***



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## ***Following the River: An Exploration of the Virginia Southern Watersheds and Pasquotank River Basin***

### **Project Summary:**

Two-thirds of Virginia Beach is part of the Albemarle-Pamlico Sound watershed. There is a need for quality programs and information on what is referred to as the “Southern Watersheds” in Virginia Beach and as the “Pasquotank River Basin” in North Carolina. Going forward, we will refer to this joint area as the VA Southern Watershed/Pasquotank River Basin. In the Virginia Beach school system, the emphasis is on the Chesapeake Bay and very little information or instruction centers on the watersheds that drain into North Carolina. In the first year of the grant (2022), LRNow’s goals were to create a resource guide and lesson plans for Virginia and North Carolina educators about the headwaters of the Albemarle Pamlico Sound. To accomplish this, we developed and ran two immersive teacher training courses in the months of June and July. After these two training courses, one on a sailboat and one at Back Bay National Wildlife Refuge and False Cape State Park, the teachers completed lesson plans and started developing an electronic resource guide that teachers can utilize in the upcoming school year.

This grant year, we repeated the two successful teacher training courses, following the same model as the previous year. We again took a cohort of five 9-12<sup>th</sup> grade teachers on a six-day sail/motor trip down the watershed to learn all about the habitats, history, economics, land use, and challenges. At several cities, we stopped and invited experts to join us or got off and visited historical or natural history sites. This year, the trip began with an exploration of the coastline of Elizabeth City and the Pasquotank River in the skipjack *Applejack* and a tour of the Museum of the Albemarle. Both experiences gave the teachers a new perspective on the importance of the Pasquotank River and ties between Virginia and North Carolina. Later the first day, in Coinjock we boarded the sailboat *Sea Weasel* that would be our home for the next five days. It took us across the Albemarle Sound to the Dowry Creek and Bellhaven area, down to Hatteras Island, across the Pamlico to Roanoke Island, back up to Coinjock, into the North Landing River, through the locks to the Elizabeth River and dropped us off in Norfolk and the Bayport Marina. As we followed the river on this voyage of discovery, we all became more familiar with the rich resources that are in North Carolina and met many people who enriched our experience with firsthand stories about the area.

The second training course was a two-day workshop to explore the history and natural history of the North Landing River and Back Bay sub-watersheds. The first day started out in Back Bay National Wildlife Refuge exploring from the Back Bay to the Atlantic Ocean. This year the teachers had the opportunity to do some seining and to go with a game warden to electroshock fish and learn more about what lives in Back Bay. After lunch, on the first day, we boarded a tram and traveled to False Cape State Park. Using kayaks, we explored the marshes and shoreline of Back Bay, learned about the people and culture of this area, and saw the ghost forests. The second day, we explored the land areas in False Cape State Park and learned more about the history and cultural history of the area, as well as seeing dune succession, as we progressed to the beach on the Atlantic Ocean. At the beach, we did an activity in which the teachers were given a few items and created a dune that would withstand a hurricane. We also explored new ways to engage students in observations and created ephemeral art.

Two weeks later, all ten teachers came together at Back Bay National Wildlife Refuge and worked for two days to create lesson plans for Virginia and North Carolina educators on the Virginia Southern

Watersheds/Pasquotank River Basin. Each day, they were exposed to activities, speakers, and field experiences that they could bring back to their classrooms and integrate into their lesson plans.

### **Project Scope of Work:**

1. Provide a hands-on environmental education training opportunity in the Virginia Southern Watershed/Pasquotank River Basin for up to ten K-12 teachers from various disciplines that includes water quality, aquatic vegetation, and coastal habitats.
2. Expose these teachers to activities, speakers and field experiences that would help broaden their understanding of the watershed: the flora and fauna, the history, and cultural history, and current threats.
3. Guide the teachers and give them the time and opportunity to take what they have learned and craft hands-on meaningful lesson plans and resources to share with their students and peers.

### **Overview of the Day-to-Day Activities and Lessons:**

#### **Part 1: Sailing the Watershed (June 19-24, 2023)**

**Day 1:** The teachers met at Kellam High School where we were met by a teacher from Renaissance Academy on the Activity Bus. She drove us down through the North Landing Watershed to Elizabeth City. While there, we toured the city and visited some of the landmarks. Both history and natural history topics were explored. In the late afternoon, we drove to Coinjock to meet the boat.

Activities:

- Tour with George Jackson: George Jackson, a local resident, and expert on the history of the area, gave us a tour of the Pasquotank River and the shoreline of Elizabeth City in his skipjack. He highlighted the Pasquotank River and its role in the development of industry along its banks, as well as its strategic location during WWII for the building and flying of blimps. Don Pendergast, the Director of the Museum of the Albemarle, came with us and gave us the benefit of his vast knowledge of the area.
- Tour of the Museum of the Albemarle: The curator gave us a guided tour of the museum. We saw exhibits on the indigenous tribes who lived in this area; the changes in of the waterway, including the building of the Albemarle-Chesapeake canal; and discovered the close relationships between Virginia and North Carolina throughout history. We were also given a tour of the collections area and a view from the top of the building.



- Plankton lesson at Port Discover: Kelly Harris introduced us to the plankton we might find in the river. We then went down to the river and collected data on turbidity, light levels, and salinity. We grabbed a water sample and headed back to the building. With high powered microscopes the teachers scanned the samples for plankton. This was a good introduction for the non-science teachers, since every day we were going to be doing water quality data collection with some of the same tools. Kelly also discussed ideas that the teachers could share with their students.
- Board the Sea Weasel in Coinjock: We drove to Coinjock, passing over the Albemarle Sound to meet the Sea Weasel. We switched places with the crew that brought the ship to Coinjock and quickly got underway. We are now officially the crew of the boat.
- We anchored in Broad Creek in the lee of the islands due to high winds. That evening, we spent our first night cooking and sleeping aboard our new home.

**Day 2:** We crossed the Albemarle and passed through the Alligator River bridge. So many new experiences for the teachers. They learned to drive the boat, put up the jib, and tie knots.

Activities:

- Sailing the boat: The teachers learned to work as a crew to get the sails up, control the sails, and then reef them (bring them down and stow them).
- Due to high winds and rain, we were unable to do too much teaching. We were able to discuss the term “Shifting Baselines” and related it to the fishing industry and the view that people have of the health of the environment.
- We spent the night at Dowry Creek Marina and learned the calls of many frogs.

**Day 3:** We were able to get under sail with two of the three sails as we crossed the Pamlico Sound and headed to Hatteras Island. Again, we had rain off and on all day with low visibility at times. It was all about changes. Changes in the weather, changes in scenery, changes in the people who use the river, changes in attitudes, changes in us.



#### Activities:

- Barbara from the Frisco Native American Museum: Barbara welcomed us to her museum and gave an excellent presentation about the relationships between the settlers and the tribes that occupied this land. We saw artifacts made by the indigenous peoples all around the US and especially in Virginia and North Carolina.
- Hatteras Island Ocean Center: We rounded out the day with a kayak adventure on the marshes behind the center. We came back to the center, toured their exhibits, and learned about their sea turtle nesting program.

**Day 4:** Sailed along the Inner Coastal Waterway as we made our way north to the Roanoke Sound.

#### Activities:

- Again, the weather was rainy and the winds high enough to do some sailing. We spotted the Oregon Inlet Bridge and the Bodie Lighthouse, but most of the shoreline was lost in the rain.
- After docking at Manteo, we headed to the brackish marsh on Festival Island in Manteo. We listened to soundscapes, explored the shoreline, and learned the difference between grasses, sedges, and rushes. We also listened to a concert being held on the island. This became a talking point, as we discussed the income taken in by having tourism vs the costs to the environment and the cost to repair damages.

**Day 5:** Coastal Studies Institute and sailing back to Coinjock

#### Activities:

- John McCord of the Coastal Studies Institute: John picked us up in the morning and drove us to the Coastal Studies Institute on the south end of the island. He demonstrated the Ocean Energy Program that they offer to teachers. We were introduced to electricity, toured their wave tank, then given tinker toys, duct tape, a magnet and a coil of wire and asked to build something that would harness the power of the waves to create energy.

- We had good weather as we boarded the *Sea Weasel* for our return to Coinjock. On board we had a lesson on observation using the “I notice, I wonder, it reminds me of” inquiry-based techniques to discover new ways at looking at everyday objects.

**Day 6:** Left Coinjock and traveled up the North Landing River and into the Elizabeth River. We saw eagles, learned about the great Albemarle/Chesapeake Canal system, heard stories about the amazing variety of plants and animals in the North Landing River and witnessed the changes that have happened in both waterways. We went from wilderness to industrial in a matter of hours. We sailed across Hampton Roads past the Navy base and the shoreline of downtown Norfolk and docked in Oceanview. There we bid farewell to the *Sea Weasel*.

## **Part 2: Kayaking from Back Bay National Wildlife Refuge to False Cape State Park (July 17-18, 2023)**



Seven teachers participated in this portion of the program. We spent the morning of the first day in Back Bay National Wildlife Refuge and learned about the habitats, flora, fauna, and some of the challenges this area faces. We split the group in half. One half did electroshock fishing with Chad Boyce from the Virginia Department of Wildlife Resources and the other seining in Back Bay. Then we switched so that everyone had both experiences. After lunch, we boarded the tram to drive to False Cape State Park along the impoundment roads. This gave us a clear picture of the priorities and goals of the Wildlife Refuge which is primarily managed for wildlife with people and recreational secondary. In contrast, False Cape State Park is primarily managed for people and recreation with wildlife management as secondary.

Everyone boarded a kayak and took a short kayak paddle around the edges of Back Bay. Then the skies opened, and the winds picked up. We hurried back to the launch site and quickly stowed the kayaks. While waiting for the rain to subside, we shared our shelter with a cottonmouth snake. In the evening, we walked to Wash Woods, which was once a thriving town with stores and churches. Now, all that is left are graves and the steeple from one of the churches.



The next day we sat on the beach as the sun came up, and introduced the teachers to the “I notice, I wonder, it reminds me of” activity. We created a wonderful piece of ephemeral art. After breakfast we headed out on a dune succession walk. We learned about the area's flora and fauna and viewed evidence of past inhabitants along the way. When we reached the beach, the teachers were given a few items and asked to build a sand dune that would withstand a hurricane.

### Part 3: Writing Lesson Plans (July 25 & 26, 2023)



All ten teachers had to attend two all-day writing sessions held at Park Headquarters for Back Bay National Wildlife Refuge. In the morning, we had a guest speaker, then broke out into teams to work on lesson plans. After lunch, they got back to writing activities. At the end of the first day, we collected all the work on a shared drive. The second session was run the same, except each teacher did a short write-up of their lesson plan on a large sheet of paper and posted them around the room. All the teachers were asked to read each other's lesson plans and add ideas, comments, or suggestions.

These were later given to the teachers to use as they finalized their plans. During each session, the teachers received a raffle ticket for a boat tour of the North Landing River with Erik Moore. Six teachers won this opportunity to see up close the small creeks and marshes in the North Landing River watershed on August 19.

Due to the diversity of the subjects the teachers taught, we ended up with lesson plans that used the Albemarle-Pamlico watershed information to teach algebra (Quadratic Equations), poetry, watersheds, endangered species, as well as human impacts on the natural environment. Most of the teachers plan to test and evaluate their lesson plans in spring 2024. They will be revised and made available, along with the lesson plans from 2022, through the LRNow website to teachers in Virginia Beach and eastern North Carolina.

We could not have had this incredible adventure without funding from this grant and the support of our many partners. In addition to supporting staff time, this grant funding allowed us to offer these two unique experiences and offer stipends to the teachers that participated.

We added to the resource guide that was started last year. There are links to topic areas. Each topic includes websites, videos, power points, lesson plans, tools, and related literature, as well as images, maps, and organizations working in the Albemarle-Pamlico Watershed. The teachers this year used the stockpile resources to help flesh out their lesson plans. The guide will be a living document with new resources being added by partners and teachers going forward.

### **Results and Discussion:**

Again, we had difficulty getting teachers to sign up for the two sessions. We ended up allowing teachers to participate in both adventures if they chose. Ten teachers participated in one or both adventures. Those that participated in both said that they were happy that they did because it gave them a chance to explore the watershed from the water and then to take the time to see it up close on the land excursion. One teacher wrote, "I appreciate the historical and biological value of the Albemarle-Pamlico watershed and I better understand its connection to Virginia Beach...it has sparked new ideas for labs and exploration activities." Inna Landstown Middle School.

The sail trip experienced many days of bad weather. After the first day, the crew learned to accept being wet all the time and moved on from there. Due to having to share close quarters with the changing weather, the crew bonded quickly and spent a lot of their time, sharing ideas as we moved from port to port. The experts and excursions that we lined up at each of the ports were amazing.

Again, we encountered inclement weather during the kayaking trip at False Cape State Park. Despite the rain, the experience allowed the teachers to really become immersed in the watershed, both literally and figuratively. Many of these teachers had never been to this part of their watershed. The teachers received broad experience in this area and learned about research and legislation happening in their watershed and about the flora and fauna. Allison, a 4<sup>th</sup> grade teacher stated, "This experience was phenomenal! I have been going to the North Landing River and Back Bay for years. Over the past few days, I have learned so much more about this area, as well as expanding my knowledge of the watersheds."

At the end of the program, we asked the teachers to fill out a reflection and a short assessment. The most telling result of the assessment was the difference between the answers to the question "On a scale of 1-10, what was your comfort level teaching about watersheds and especially the Southern Watersheds before the training?" and the question "After completing your entire adventure, what is your comfort level now teaching about watershed, especially the Southern Watersheds?". Many of the teachers started out at a comfort level of 0-1 and ended up at a 7-10, the same as last year.

The last question was "On a scale of 1-10, after completing your adventure and the writing sessions, what is the likelihood that you will teach watershed education and include the Southern Watersheds?" Most of the classroom teachers circled 8-10. What a great start in getting the schools to teach about this incredible watershed across the disciplines and a testament to the power of experiential learning.

### **In-Kind Services and Volunteer Hours:**

US Fish and Wildlife Service- Back Bay National Wildlife Refuge

- Erica Ryder gave many hours in planning the second experience

- Led hikes at the refuge
- Provided space for the two writing sessions
- Gave a presentation about the importance of weather in fire fighting
- Provided free access to the refuge and tram transport (\$250 contribution)

Virginia Department of Conservation and Recreation- False Cape State Park

- Rachel Harrington gave many hours in planning the second experience
- Led hikes at FCSP (\$75 contribution)
- Allowed us to use the Lodge for free for 2 days (\$754 contribution)
- Led a free kayak adventure (\$140 contribution)
- Gave multiple presentations and hikes during the second experience

Department of Wildlife Resources

- Chad Boyce did two electroshock demonstrations for the teachers

Museum of the Albemarle

- Provided a free guided tour of the museum
- Provided Don Pendergast as a guide on the Pasquotank River

George Jackson

- Provided a guided skipjack tour of Elizabeth City (\$10 contribution)

Frisco Native American Museum & Natural History Center

- Provided a discount fee to the museum (\$20 contribution)

Coastal Studies Institute

- Provided transportation to and from the Institute (\$50 contribution)

Weasel Creek Watershed Expeditions

- 60 hours (about 2 and a half days) of volunteer time helping to develop and teach the programs aboard the boat (\$1,800 contribution)
- The salary of the captain (\$500day x 5= \$2500)

**CCMP Goals, Outcomes, Objectives and Actions Addressed:**

**D1.1: Communicate the importance of stewardship and offer opportunities for volunteering to further APNEP's mission.**

When we were at Back Bay National Wildlife Refuge and False Cape State Park, the rangers talked to the teachers about opportunities to do stewardship projects that help repair erosion, restore damaged habitats, increase pollinators, and help to keep our waters clean.

LRNow also has tree planting projects that are open to volunteers of all ages. In addition, we talked about projects that address problems on the school grounds or adjacent neighborhoods.

**D2.1: Provide and Promote opportunities for outdoor experiences that connect individuals with the Albemarle-Pamlico ecosystem.**

This program gave teachers first-hand knowledge of the watershed that they will now convey to their students through activities, field work, and direct instruction. Having their own first-hand immersive

experience will make the lessons they develop and their teaching so much richer and more authentic. Kayaking, motor boating or sailing through the watershed formed a connection no typical workshop could. Teachers were asked if they had discussed a partnership with one or more of the presenters they met. All of them said they were either planning field trips to Back Bay National Wildlife Refuge and False Cape State Park, having a presenter come into the classroom, zooming with a presenter, or working directly with APNEP (Albemarle Pamlico National Estuary Partnership).

**D2.2: Provide environmental education training opportunities for educators in the region**

As the teachers prepared for the sailing excursion and the two-day adventure, they learned not only about the natural history of the area, but also the cultural history and economic drivers for the area. They became familiar with and experienced how people traveled the waters before roads and railroads were developed in this river basin. One of the teachers who moved to the area from New Mexico had this to say about the experience, "Thank you for this wonderfully unique experience. For teaching me about the reality of this area. Thank you for letting me have the genuine experience of studying these waters and their ecosystems. Thank you for providing me with the tools to instruct my students about the importance of protecting this area." (Samantha Corporate Landing Middle School).

At the end of the project, the teachers will be teaching lesson plans for their classrooms and their schools that will be available for other teachers to use.

We created a video and added materials and activities dealing with the Virginia side of the watershed to the Reference Guide that will be available to share with North Carolina teachers.