

BERTIE COUNTY

TALL GLASS OF WATER PROJECT PHASE I

Final 12/31/23: Multimedia

Vines Architecture, Architect of Record

Cape Fear Engineering, Civil Engineer of Record

Design Workshop, Landscape Architect of Record

Lynch Mykins, Structural Engineer of Record

Atlantec Engineers, PME Engineers of Record



Tall Glass of Water Phase I

Clockwise from top left:

- Picnic Pavilion w/restrooms and outdoor showers
- Bulletin Board and water bottle refill station
- ADA mobi-mat to beach (adjoins stabilized aggregate path)
- Picnic area
- Birds-eye view

Grantors:

- NC Division of Coastal Management
- NC Parks and Recreation Trust Fund
- NCDEQ Water Resources Development
- USDA Rural Business Development Grant
- NC Attorney General's Environmental Enhancement



Stormwater Repairs to Eroded Slope to Albemarle Sound

Goals:

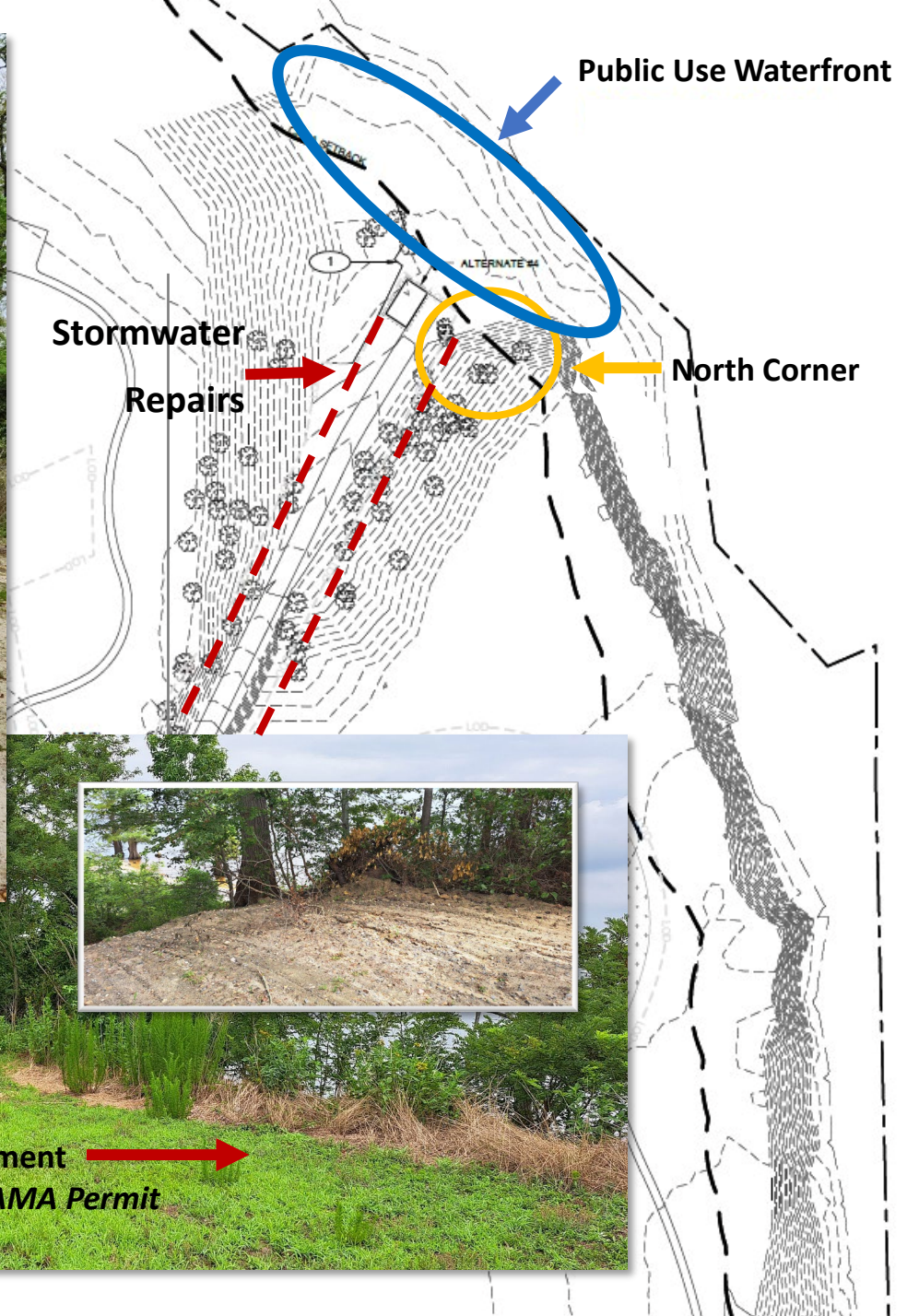
- Correct stormwater damage and provide a drainage solution that filters runoff.
- Enable public use of the waterfront
- Provide educational signage



STABILIZE NORTH CORNER OF CLIFF

Goals:

- Repair north corner of cliff where trees continued to fall, further compromising a primary section of the cliff face.
- Once stormwater measures installed and north corner of cliff repaired, create public use area.



SHORELINE STABILIZATION

Goals:

- Grant goal was to study options, produce engineer drawings and submit for CAMA permit.
- The overall project goal is to stabilize the shoreline cliff area, approximately 450 linear feet.



Coastal Plain Bluff

You are standing on the Talbot Terrace, a geologic formation deposited during the Pleistocene epoch, approximately 2.58 million - 12 thousand years ago. This feature was formed and left behind by the ocean when sea level was about 42 feet (or about the length of a long school bus) higher than today and is composed of minerals, sand, silt, clay, and gravel. The bluffs expose a cross-section of this ancient deposit.

The bluffs are an example of a very dynamic feature that supports and is stabilized by loblolly pine and other plants.

The bluff is a source of sand for the sandy beach. During storm events, large waves from the Albemarle Sound and Chowan River estuary erode sand out of the bluff to form the strandplain beach below. Some bluff erosion is necessary to maintain a sandy beach.

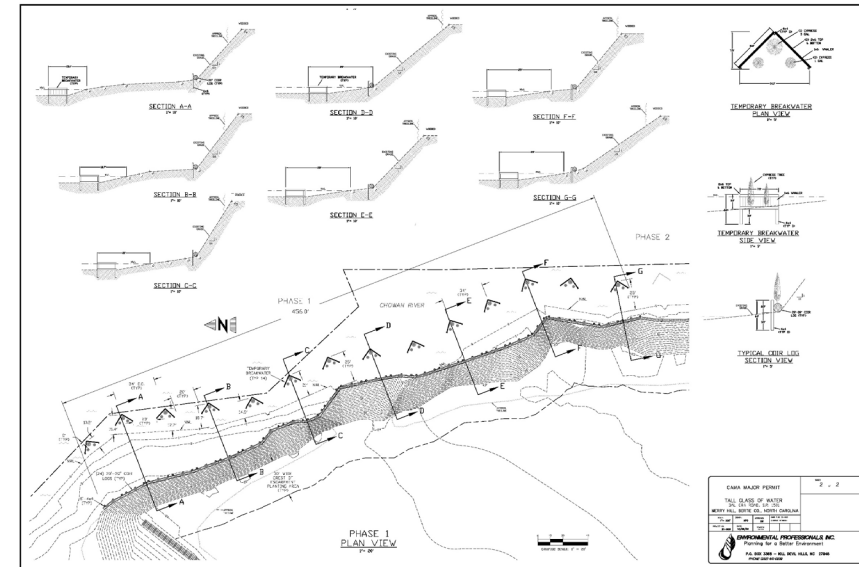
Allowing fallen trees to remain as well as encouraging vegetation growth on top of the bluff and on the cliff face, while still allowing natural processes to occur, is essential for preserving this unique geologic feature.

Bertie County is undergoing a Bluff/Shoreline Stabilization Project.
The associated natural processes will also protect the beaches, as well as the plants and animals that use those areas.
For your safety please do not walk along the base of the bluff or climb the face.
Thank You.



Engineer drawings for 3-part restoration:

- Coir log and cypress breakwater "V"s along water line
- Coir log and cypress reinforced slump blocks at base of cliff
- 30 feet depth vegetation at top of escarpment running approximately 450 linear feet



PUBLIC USE AREA

The sand beach was not a grant activity but without the stormwater improvements the public area would not have been possible.



Photo at Left:
July 22, 2023
Bertie Event
North Carolina's
Year of the Trail



BEFORE



AFTER

CHOWAN UNIVERSITY ACTIVITIES

- **Water Quality Sampling**
- Map wetlands areas of park 147-acres
- Design and produce educational signage
- Install monitoring stations to gauge habitat restoration

CHOWAN UNIVERSITY NEWS RELEASE
 Office of University Relations
 Lou Ann Gilliam
 news@chowan.edu

Chowan University Department of Biology collaborates with Bertie County on their "Tall Glass of Water" Project

University Relations
 From Staff Reports
 September 23, 2021

Marion, NC –Chowan University's Department of Biology is proud to be collaborating with Bertie County on their "Tall Glass of Water" (TGOW) Project. The TGOW Project will leverage natural resources in the area, such as the Salmon Creek State Natural Area, as well as cultural resources to promote sustainable ecotourism and environmental education. Dr. Stan Riggs, an East Carolina University Distinguished Research Professor and Chair of North Carolina Land of Water, states, "This is a crucial program that will positively impact both the county and its citizens as they build an exciting future around their world-class natural resources. Understanding the dynamics of their incredible water resources is key to both the utilization and management of their waterways and is essential to maintain a sustainable environment."

The Biology Department will receive up to 3 years of funding to conduct water quality and ecological monitoring associated with restoration of wetland and native meadow habitats on a 147-acre site at the mouth of the Chowan River. Chowan students will directly contribute to the effort through capstone projects, class activities, and work-study. The capstone projects will be independent student research related to habitat restoration, class activities (e.g. Environmental Science, Wetlands Biology, and Introduction to Geographic Information Systems), and biology majors employed through the University's Work Study Program will collect and analyze water quality and environmental monitoring data. Funding for Chowan Biology's work on the TGOW Project is made possible through Bertie County's recent Environmental Enhancement Grant from the State of North Carolina Attorney General's Office.

Chowan Professor of Biology and Physical Science, Dr. James "Bo" Dame says of the project, "The TGOW Project represents a great opportunity for our students to obtain real-world experience and contribute to a project that will significantly benefit the local community. Another aspect of the project involves environmental education. We anticipate developing a monitoring protocol that will be passed along to the local K-12 schools to carry out after our initial 3-year participation is complete. There is impact on our students as well as the community."



Photo caption: Chowan University Biology major students Nay Jordan, Ty Sharpe and Timothy Moore measuring fish as a part of the ecological monitoring for the Tall Glass of Water Project in Bertie County.

November 2023
Site Visit

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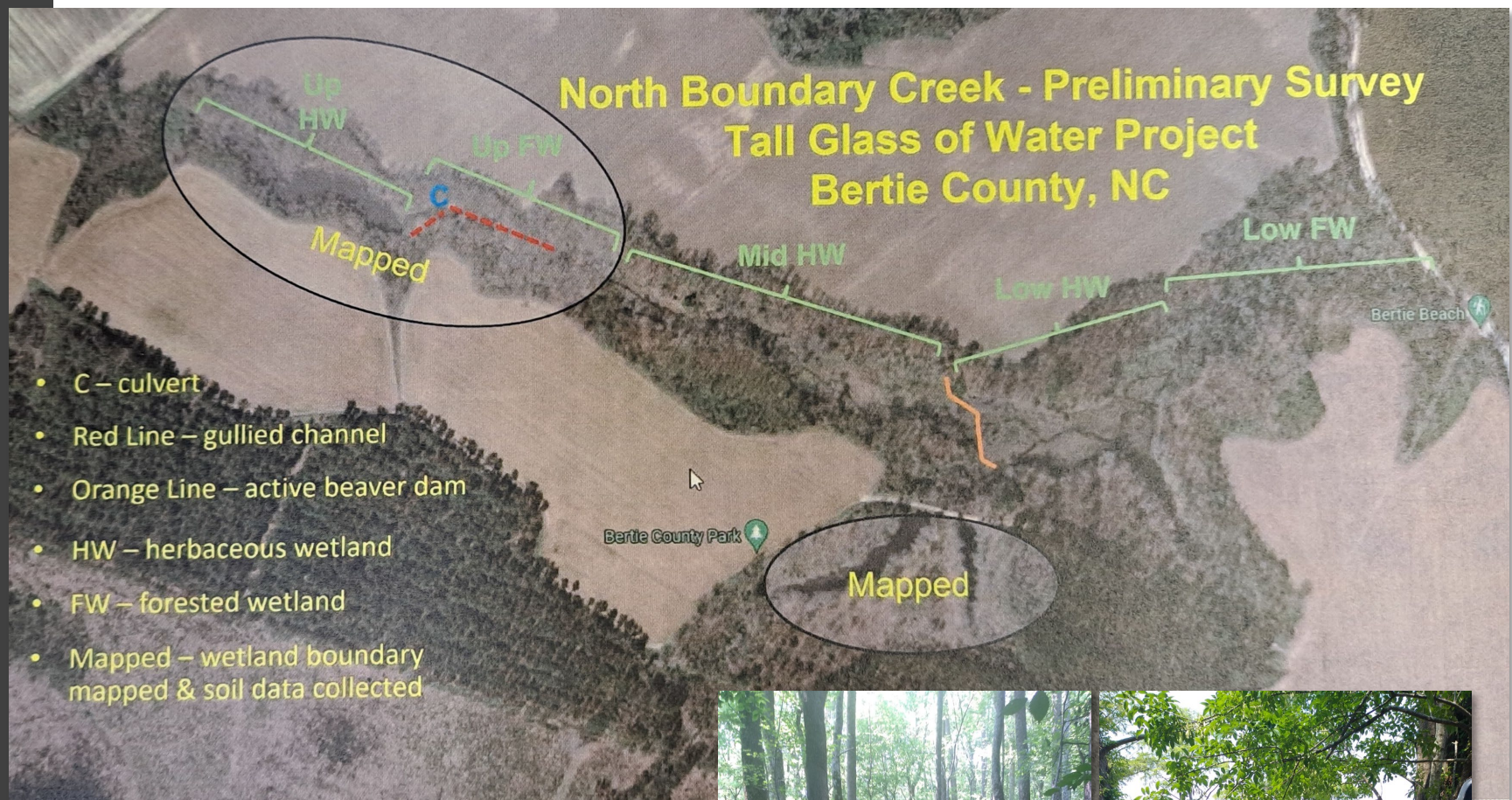
Link to all 2023 site photos:

<https://photos.google.com/u/3/share/AF1QipOFLEe wZv08wlgS6wCFkcJaAwOxr7muJ1OC1XI99ez6ngELg| 4tFtU8Xfpf16Mv A?key=aUFcc0VSZ1IBVHBDa2FValF odmZ1ODVqdjZvbW5B>



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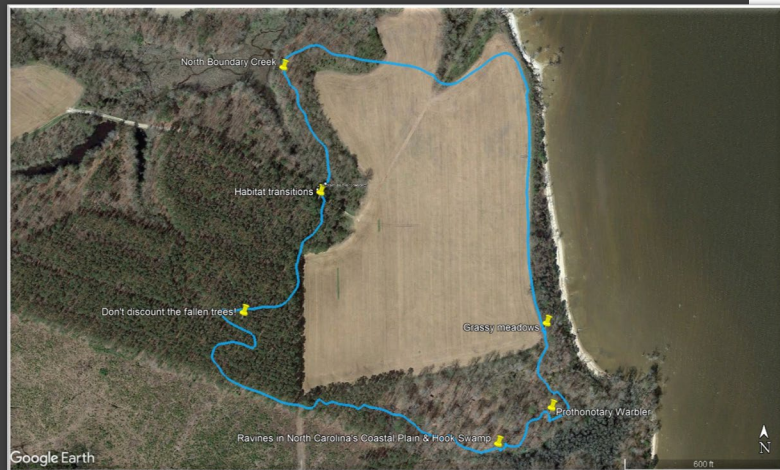
Photos at Right:

July 2022 site visit to project wetland areas with Dr. Stan Riggs, NCDEQ, NC Department Cultural Resources, Chowan University, and project engineers.



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Prothonotary Warbler (*Protonotaria citrea*)

Do you see that bird house on a metal pole in the swamp? That is a nest box installed by the Chowan University Department of Biology for researching the only cavity-nesting species of warbler that breeds in eastern North America—the Prothonotary Warbler.

This migratory bird is also called the golden swamp warbler and the swamp candle. They spend their winters in South America near Columbia and their summers in forested wetlands like the one here, in Hook Swamp. Prothonotary Warblers rely on old-growth swamps for trees large enough to have holes, where they build their nests.

Chowan Biology uses the nest boxes installed here and in four other forested wetlands in northeastern North Carolina to monitor the breeding populations of Prothonotary Warblers found there.

Listen for their *sweet-sweet-sweet* song and watch for flashes of yellow as you enjoy our forested wetlands in the late spring and early summer.



Chowan Biology



Chowan Biology

Prepared by S. Kylander with assistance from Chowan University Biology (2023)

Map at left shows sign locations.

All signage was designed by Chowan Skadi Kylander.

Don't discount the fallen trees!

The decaying logs in this area aren't a mess waiting to be cleaned up. Fallen trees have a lot of functions in the forest. They act as a source of food and shelter for many invertebrates, including insect adults and larvae (such as beetles and their young, "grubs"), snails, and millipedes (a). These invertebrates can then act as a source of food for many other animals, like black bears (b) and Pileated Woodpeckers (c). Additionally, as logs are decomposed by fungi (mushrooms), nutrients are released that can be used by living plants, and the fungi form networks in the soil that also benefit living plants.

Without fallen trees, the network that supports much of the life around you would fall apart! The animals below were photographed on this property. Keep an eye out and you may see them too! But don't approach any wild animal...only observe from a distance.



So from the mould (a) by Emily Dickinson
So from the mould
So first and last
Many a Bull will rise—
Hides away, cunningly, from sagacious eyes.
So from Cocoon
Many a Worm
Leap on Highland gay,
Peasants like me,
Peasants like These
Gaze perplexedly!

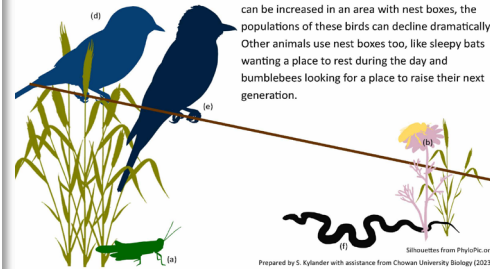
Shilhouettes from PhyloPic.org

Prepared by S. Kylander with assistance from Chowan University Biology (2023)

Grassy meadows

Open grassy fields like this provide habitat for many animals, including insects like grasshoppers (a), bees (b), and beetles, as well as birds that hunt for those insects, like swallows (c, such as Tree Swallows (*Tachycineta bicolor*)), Eastern Bluebirds (d, *Sialia sialis*), and Eastern Kingbirds (e, *Tyrannus tyrannus*). White-tailed deer (*Odocoileus virginianus*) eat the vegetation in meadows, and black bears (*Ursus americanus*) and coyotes (*Canis latrans*) pass through this area. Snakes (f) also hunt in meadows, searching for small animals using the grasses and grass-like plants for cover, and bats (g) swoop over at night, using their ultrasonic calls to find insects fluttering above the plants. And, speaking of plants, many wildflowers grow in grassy meadows, supporting a variety of pollinators.

This meadow has been altered by agriculture. Restoration work done here will try to reduce nonnative species that have been established during that disturbance and reintroduce native species that will better support the animals that use this area. Bird houses will also be installed, providing nesting cavities for native birds like swallows and bluebirds. Without appropriate nest cavities, which can be increased in an area with nest boxes, the populations of these birds can decline dramatically. Other animals use nest boxes too, like sleepy bats wanting a place to rest during the day and bumblebees looking for a place to raise their next generation.



Shilhouettes from PhyloPic.org

North Boundary Creek

If you peer down through these trees, you can catch a glimpse of the North Boundary Creek. Many years ago, a ditch was dug that exaggerated the existing creek, changing how water moves through this area. The deeper creek causes water to move quickly away from where it falls rather than collect and slowly filter through the soil as it is thought to have originally done based on patterns in the local topography, soil layers, and vegetation. Those characteristics in this area are not suited for the current rapid water flow pattern, and restoration efforts will be made here to try to reestablish a basin-like wetland that is capable of storing water longer.

This area has served as a site for several projects for the Department of Biology at Chowan University, including water quality assessments, non-lethal wildlife trapping, wildlife monitoring with remote cameras and microphones, and bird research. Data collected from these projects are contributing to restoration efforts. There are also plans to design projects for local K-12 students in areas such as this one to introduce those students to science and nature.



Shilhouettes from PhyloPic.org

Prepared by S. Kylander with assistance from Chowan University Biology (2023)

Ravines in North Carolina's Coastal Plain & Hook Swamp

The coastal plain of North Carolina is generally very flat due to the ancient geological processes that formed the land you're standing on. So, why are you climbing up and down hills now if this area is supposed to be so flat? Well, these ravines that you're passing through were also formed a very, very long time ago, when the sea level was much lower. When sea level was so low, water in streams flowing towards the coast moved faster, which cut through the ground, deeply incising the substrate. As sea level rose by natural processes in the past, water in streams started moving slower until the water energy in the streams stopped cutting through the land so severely. The land has since been stabilized by the vegetation around you, preserving these amazing high and low places in the generally flat coastal plain. Ravines like this can be found along big rivers in this part of North Carolina, including the Chowan River.

As you hike by Hook Swamp in this ravine, how many different kinds of plants do you see? Many trees, shrubs, grasses, sedges, ferns, and plants with showier flowers can be seen from the trail.



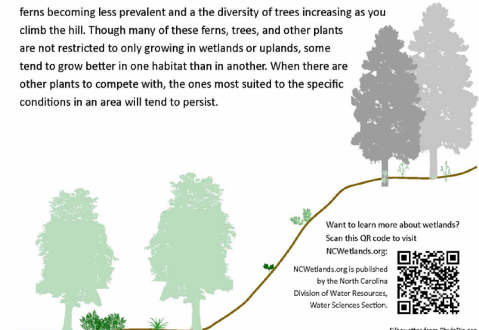
Prepared by S. Kylander with assistance from Chowan University Biology (2023)

Habitat transitions

As you climb this hill and cross over the road, you will be moving through a habitat transition, from wetland to upland.

Wetlands are areas that have sufficient water present for a long enough period of time to cause changes in the soil and flora and fauna that reflect those characteristics of the area. Wetlands are not always obviously wet, but the soil and vegetation reveal a wetland's presence even when water is not clearly present. The water-retaining property of wetlands is incredibly important, as they can help store and control the flow of water during storm events and can help filter excess nutrients out of water.

Uplands have soils and vegetation that are different from those in wetlands. Though the plants still require water, uplands do not retain water like wetlands and are drier areas. Many wetland plants require more water than is found in uplands, and many upland plants cannot survive in the more saturated wetland soils, though some plants can be found in either habitat. You will notice this as you pass through this transition, with the ferns becoming less prevalent and a diversity of trees increasing as you climb the hill. Though many of these ferns, trees, and other plants are not restricted to only growing in wetlands or uplands, some tend to grow better in one habitat than in another. When there are other plants to compete with, the ones most suited to the specific conditions in an area will tend to persist.



Want to learn more about wetlands?
Scan this QR code to visit
NCWetlands.org
NCWetlands.org is published
by the North Carolina
Division of Water Resources
Water Sciences Section

Shilhouettes from PhyloPic.org

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CHOWAN UNIVERSITY ACTIVITIES

- Water Quality Sampling
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[Link to monitoring station photos:](https://photos.app.goo.gl/DWDZcHFBy1omQaE79)

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Photos clockwise from top left: S. Kylander at 1 of 6 monitoring stations; Prothonotary Warbler house #6; measuring and tagging; sound recorder.