



Centerline

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An Environmental News Quarterly, From the NC DOT Natural

Systems Unit

Centerline Viewpoint

By: V. C. Bruton, PhD.

Dr. Charles Bruton is the Assistant Manager for the Project Development and Environmental Analysis Branch. He is responsible for directing and managing the natural systems program for the Department, managing a staff of 40 employees.

As we enter a new century, what better time is there to create a new publication to inform and illuminate the mission of the Natural Systems staff of the North Carolina Department of Transportation (NCDOT). For several years we have received and admired publications of this type by other state DOT's. Now we take our bow.

The Natural Systems staff is proud to publish our first edition of "Centerline". As you would expect from our newsletter's name, our staff spends a great deal of time conducting field studies along potential corridors and centerlines.

The Natural Systems staff is comprised of a uniquely qualified corps of

RCW Habitat: A Proactive Approach to Mitigation

By: Hal Bain and Tim Savidge

As a requirement of the Endangered Species Act, it is the

professional biologists and engineers. We care about



V.C. Bruton

where our agency has come from in environmental related issues and feel proud of where we are headed. The staff understands that North Carolina is rapidly changing in its land-use and transportation needs and it is our responsibility to help shape the future.

We invite you, the reader, to take a look at the remarkable work we have accomplished across our State. In this our inaugural issue, and in future issues published quarterly, we will focus on mitigation efforts, special studies, policy and guidance and other important issues. We will take a look at past efforts and look ahead to where we want to go. I hope you will join us in our mission. See you next

issue.....

Wetland Road Signs Increase Public Awareness

By: Phil Harris, P.E.

The Natural Systems Unit is trying to increase the public's awareness of our efforts in the area of wetland mitigation and stream restoration. Road signs have been installed on the shoulder of road projects to identify wetland mitigation or stream sites.

The signs are royal blue with white lettering and the graphic design depicts cypress trees, hummocks, sawgrass and ducks. The sign is approximately 3 feet by 5 feet and is accompanied by a smaller sign, indicating the name of the site. These signs can be found in all three regions of the state. They are typically located on highly traveled and visible routes. We hope these signs will increase the public's awareness of NCDOT's mitigation efforts throughout the state and show the department's commitment to preserving the environment.



ongoing task of the North Carolina Department of Transportation (NCDOT) to insure that projects do not jeopardize the continued existence of a federally protected species. Once protected species are identified on a project it becomes the responsibility of NCDOT to consider avoidance and minimization alternatives. The process of identifying type and intensity of impacts to protected species can cause delays in project schedules. These delays can be the result of a need to develop new alternatives or modify existing designs. Project construction can impact federally protected species and may require some form of mitigation. It is often difficult to provide the necessary mitigation in a timely manner and maintain project schedules.

The federally endangered Red-cockaded woodpecker (RCW) (*Picoides borealis*) is one of 36 federally protected animal species listed for North Carolina. This species requires large contiguous old growth pine or pine dominated forested stands. Obviously, it is difficult to reproduce this type of habitat in a short period of time. The NCDOT has taken a proactive approach to solving RCW mitigation problems by purchasing a large tract of land through a joint agreement with the US Fish and Wildlife Service and The Conservation Fund.

The 9,732 acre tract, purchased by NCDOT, is known as the Palmetto Pear Tree Management Area. It is located in Tyrrell County, which is in the northeastern corner of North Carolina's coastal plain. The management area currently contains 18 active clusters of woodpeckers. Through proper management the RCW population has an extremely good chance for growth. The site will be able to serve as a mitigation bank in the event that credits are needed for future projects that result in impacts to this species, saving both time and money. The NCDOT has transferred ownership rights to a private nonprofit organization, The Conservation Fund. They will take over the management responsibilities for a period of at least five years. The NCDOT retains a conservation easement in perpetuity.

NCDOT Bio-Teams

By: V.C. Bruton, Ph.D., Asst. Manager

The NCDOT Natural Systems Unit reorganized its staff in November 1998. What previously had been four distinct groups were converted to four Bio-Teams. Each team consists of a unit head, lead technical specialist, a specialized rover, and other natural systems specialists. In addition, each unit was staffed with at least one enigneur. Each team has eight full time staff members.

The purpose of the re-organization was to create working teams made up of a variety of specialists. Just like an orchestra has a variety of instruments, each with its own particular sound needed to make the full music, the teams were created to "deal with all project issues" and take the project from "cradle to grave." All team members have been tasked and crossed trained to conduct natural systems surveys, process permits, work with mitigation plans and site implementation.

In the past, the Unit was divided into four sections. They included Natural Resources, Permitting, Mitigation Planning and Mitigation Implementation sections. Project assignments originating from a project engineer were forwarded to the Natural Systems Unit for study. The studies followed a sequential process of going from natural resources surveys to mitigation planning, permitting and mitigation implementation. This process was often slow, requiring a number of staff members to finish the study.

From staff feedback and management's viewpoint, the team concept is working well. Project studies stay in one team and all facets of the project are carried out by a well-orchestrated team effort. Permit lettings have occurred on a satisfactory schedule.



Left to Right: Hal Bain, Dave Schiller, Bruce Ellis and Gordon Cashin

Department's of Transportation's

Role in Protecting Roadside Populations of Rare Plants

By: Dale W. Suiter, Natural Systems Specialist

Plant and animal species that are in imminent danger of becoming extinct within the foreseeable future are listed by the U.S. Fish and Wildlife Service (USFWS) as federally threatened or endangered. Habitat degradation, environmental pollution, and the introduction of exotic species and direct exploitation often jeopardize the continued survival of these species. The Endangered Species Act of 1973 protects these species from actions that may harm or destroy them or their habitat.

In North Carolina, rare plant species such as Smooth Coneflower, Schweinitz's Sunflower, Michaux's Sumac, Rough-leaved Loosestrife and Cooley's Meadowrue often occur along roadsides and in power line rights of way. These species occur naturally in habitats that are maintained in an open condition by periodic fire. However, because of human intervention, natural fire is no longer a regular part of many of these plant communities. As a result, these species now frequently occur along roadsides and power lines that are regularly maintained by mowing which mimics fire maintained plant communities.



Smooth Coneflower



Michaux's Sumac



Schweinitz's Sunflower

Currently, the North Carolina Department of Transportation (NCDOT) protects 44 populations of rare plant species growing along public rights of way. Most of these species are listed by the USFWS as federally threatened or endangered, while others are listed as significantly rare in North Carolina by the North Carolina Natural Heritage Program (NCNHP). The NCDOT is working with the USFWS, the NCNHP and the North Carolina Plant Conservation Program, as well as Carolina Power and Light and Duke Energy Corporation to protect these roadside and power line corridor populations of rare species. Rare plant populations within public rights of way are marked with white-topped wooden stakes and signs indicating that the area is not to be mowed during the growing season (April 1 to October 31). Each site is managed according to its individual needs. Management strategies such as mowing during the dormant season, hand pruning and selective herbicide application are used to control invasive woody vegetation that historically would have been controlled by fire. Effective communication is crucial to the success of this program. Protecting these rare species involves the cooperation of various individuals, from environmental biologists and horticulturists to environmental engineers and roadside maintenance personnel.

NCDOT recognizes its responsibility to protect rare species in order to maintain natural diversity. In addition to their role as an integral part of the ecosystems where they live, many rare species have proven to be valuable to humans for their medicinal and agricultural uses. Some rare species also serve as environmental monitors, their rarity indicating other changes in the environment. It is important that we all do our part to protect North Carolina's unique natural heritage. Project Spotlight - The Wilmington Bypass

By: Gordon Cashin and Tim Bassett

Wilmington, North Carolina is a city with growing traffic demands. In an effort to meet these demands, the NCDOT plans to construct a bypass north of Wilmington to connect US 421 and US 17. Additional segments are still being studied to extend the bypass west and south of Wilmington. This project presents a special challenge to the NCDOT because the entire project could impact an estimated 433 acres of wetlands.

Construction of this project will require permits from the U.S. Army Corps of Engineers, U.S. Coast Guard, N.C. Division of Water Quality and the N.C. Division of Coastal Management. The NCDOT has made great efforts to comply with environmental regulations requiring avoidance, minimization, and mitigation for impacts to wetlands and other waters of the United States. The NCDOT realizes the importance of coordinating with the regulatory agencies in environmentally sensitive areas during the early stages of projects. This coordination, when carried into the design phase, often leads to further minimization of impacts, which results in less mitigation for impacts. Here is a partial list of NCDOT's efforts to avoid and minimize impacts to wetlands and streams on the first section of the Bypass north of Wilmington:

- **Avoidance:** The NCDOT will bridge the Northeast Cape Fear River and adjoining high quality wetlands. This results in permanent impacts to about 1.6 acres of wetlands. A shorter bridge and fill causeway would have permanently impacted about 13.6 acres of wetlands.
- **Avoidance:** The NCDOT shifted the alignment to avoid a bottomland hardwood forest wetland system that parallels the Bypass on its southeast side.
- **Minimization:** Used 3:1 and 4:1 fill slopes through wetlands.
- **Minimization:** Eliminated swamp forest wetland impacts at one site by reducing the proposed 4:1 fill slopes to 3.5:1.
- **Minimization:** Relocated all or portions of four streams along one section.
- **Minimization:** Configured the Wilmington Bypass/US 421 interchange within the northeast quadrant in order to minimize wetland impacts east of US 421.
- **Minimization:** Relocated a stream to minimize the number of ditches within wetlands.
- **Minimization:** Utilizing temporary work bridges to construct the Northeast Cape Fear River bridge rather than haul roads or top down construction as the method of construction access.
- **Minimization:** Proposed bridge footing sizes along the Northeast Cape Fear Bridge are smaller in the wetlands than in the river itself.
- **Minimization:** Reduced wetland impacts for one section by reducing median widths from 70 ft (21 m) to 46 ft (14 m).
- **Minimization:** Used the highest degree of curve and steepest slopes allowable along the loops of the Bypass/I-40 interchange.
- **Minimization:** The mainline of the Bypass along the I-40 interchange passes through uplands to the maximum extent possible, including a heavily logged area between NC 132 and I-40.
- **Minimization:** The design standards of one section corresponds to USACE's recommendations for avoiding impacts to side ditches.

The NCDOT has also developed a special stormwater collection system at the Northeast Cape Fear River Bridge to avoid discharging stormwater into the river and wetlands within 100 feet of the riverbanks, which are classified as a Primary Nursery Area. Stormwater in this area will be conveyed beyond the restricted area and discharged over several spans using down spouts attached to bents. This system is designed for overflow conditions to avoid water backing up onto the bridge deck as a result of blockage or intense rainfall.

Finding suitable mitigation for an estimated 433 acres of wetland impact is no small task. The NCDOT has hired a private firm, ECOBANK, to provide wetland mitigation for this project. This is the first "full-delivery" contract for wetland mitigation attempted by the NCDOT. ECOBANK currently is proceeding with restoration and enhancement activities at five sites. The NCDOT will assist ECOBANK in obtaining agency approval of these sites for the Wilmington Bypass project so that permits can be issued. The North Carolina Wetlands Restoration Program (NCWRP) has agreed to provide the project's off-site stream mitigation.

The Wilmington Bypass has required extensive coordination in order to address numerous environmental constraints and impacts to waters and wetlands. Environmental justice, endangered species and historic resources issues have also affected the project's alignment and will affect construction. This project represents NCDOT's efforts to develop projects in an environmentally sensitive manner.

ENVIRONMENTAL GREEN SHEETS:

The Environmental Commitment Process

By: V. C. Bruton, Ph.D., Assistant Manager

During the project development process the NCDOT must make a variety of environmental commitments, which are often required through law, permit requirements, or agreements with regulatory agencies or local governments. To ensure that these commitments are addressed, especially during design and construction, the department has developed an "environmental green sheet." This sheet is a comprehensive list of environmental commitments made for a specific project. A green colored sheet is used to provide staff with a quick and easy reference page, which lists all environmental commitments made during the project development, design and permitting stages. It is important for staff to be aware of the commitments made for

each project so the “environmental green sheet” is included in the planning and environmental document, the permit, and the project contract. Preliminary green sheets are also attached to the preliminary and final field inspection plans. This broad distribution to NCDOT staff, including the design units, field operations staff, the construction engineer, and the natural resource agencies, emphasizes the importance of following these commitments. Resource agency confidence in the department depends on it.

Below is an example of a NCDOT green sheet. We plan to follow-up on this new process and provide more information about its effectiveness in a future issue of the *Centerline*.

Mountain Bog Restoration Project

By: Gordon Cashin

The NCDOT is currently involved in undertaking a major wetland and stream restoration effort widely known in environmental circles as the Tulula Creek Wetland Restoration Project. The 222-acre site is in Graham County in the western portion of the state. This site formerly contained a swamp-bog complex considered significant by the N.C. Natural Heritage Program. Originally, the wetland complex covered about 100 acres, an unusually large wetland site for mountainous western North Carolina.

Developers began constructing a golf course on the site in 1986. They channelized Tulula Creek, constructed lateral drainage ditches, excavated ponds and filled other wetland areas. This work severely degraded natural wetland and stream functions on the site. The golf course project was abandoned due to problems with the 404 permit and financial difficulties.

At this same time, the NCDOT was in need of a wetland mitigation site in western North Carolina, and the Corps of Engineers recommended the Tulula Creek site. Finding suitable wetland restoration sites in the mountains, especially this size, makes this a rare opportunity. It is the first swamp forest-bog restoration complex attempted in North Carolina. The NCDOT purchased the site in 1994. Since that time, the NCDOT has worked cooperatively with the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, N.C. Wildlife Resources Commission, N.C. Division of Water Quality, and the University of North Carolina at Asheville (UNC-A) to investigate conditions on

the site and develop restoration plans.

Since data on mountain wetland communities is limited, the NCDOT and UNC-A assessed many environmental parameters on the site. These parameters included soils and vegetation mapping, hydrologic monitoring and modeling, and an extensive research on birds, amphibians, reptiles and mammals on the site. It was found that the site provides important habitat for many species of animals and plants. Portions of the site continue to be jurisdictional wetlands, but important hydrologic characteristics of this rare wetland type have been removed. This may be causing subtle changes in vegetation, and repeated amphibian breeding failures.

Based on the research conducted, a plan was developed to restore the site to a swamp forest-bog complex, including restoration of the stream channel. NCDOT began construction on the site in October 1999 and it should be completed by January 2001. When completed, the site will include over 9,000 feet of restored, meandering stream channel. The surrounding floodplain will include restored wetland areas recreated through grading and hydrologic restoration.

A lot of work has gone into the development of this site. Tulula Creek serves as a model for agency cooperation and the scientific data collected will be a valuable addition to the body of knowledge on mountain wetlands. The site is important to the NCDOT for wetland and stream mitigation credits, and as a learning experience.



PROJECT COMMITMENT

Bridge No. 123 on SR 2134 over
Randolph County
State Project No. 8.2571
Federal Project No. MABRZ
TIP Project No. B-322

Archaeological Excavations at the Eden House Site, Bertie County, North Carolina

By: Thomas Padgett, Archaeologist

Each quarter, we hope to feature an article pertinent to NCDOT environmental studies that comes from another Branch or Unit. Our first article highlights a study that received a FHWA Environmental Excellence Award in Archaeological Resources. Tom Padgett is the Unit Head for the Archaeological Unit.

Archaeological investigations were conducted as part of the Department of Transportation's environmental studies for US 17 in northeastern North Carolina. These excavations resulted in discovery of the site of a seventeenth-century settlement representing a previously little-known phase in the history of English colonization of America. The excavation began in 1996 and archaeologists recorded over 500 features and recovered artifacts dating from the mid 1600's, when English settlements were just getting started in North Carolina, to the mid 1700's, when plantation life was well underway in the colonies.

Coastal Carolina Research, Inc.,(CCR) out of Tarboro, North Carolina, was the hired by NCDOT to conduct the archaeological and historical studies. They began extensive historical research as the archaeological excavations were progressing. Scientific studies of charred seeds and animal bones provided more details on the regional environment in the late 1600s and the plants and animals used as food by the inhabitants. The results tell a story of life in the Albemarle Sound region in the late seventeenth century that is far more complete and revealing of the region's cultural diversity than the



information available through historic research alone.

Three phases of the first century of English colonial occupation were defined at the site, as well as a prehistoric Native American occupation. The prehistoric occupation showed the area had been used repeatedly from the Late Archaic (3000 - 1000 BC) to the Late Woodland period (800 AD to contact). The site was probably abandoned (an Indian "Old Field") when the first English settlers moved into the area from Virginia in the 1660's. The first settler on the property may have been a man named Saint Mount Wells, who obtained the land by patent from Sir William Berkley in 1663 but sold it to Lewis Sheppard in 1665. The site passed through several owners until Charles Eden, Royal Governor of N.C., purchased the land in 1718 to build his plantation, Eden House.

This first period of European settlement is marked by the construction (probably around 1680) of several buildings. A house built on posts set directly in the ground (called "earthfast" construction) served as the first dwelling. The archaeologists could identify and uncover the post holes that were dug to set the posts. Slightly later a more substantial house with plastered walls, glazed windows and a slate roof was built over a stone and brick cellar. The settlers built another "earthfast" structure that may have been a barn; they also put in a well and erected a series of fences or palisades around the houses for protection. The earthfast house, similar to early seventeenth century structures found in the Chesapeake region of Virginia and Maryland, is the first to be found on a colonial site in

North Carolina. Archaeologists recovered fragments of the decorative Dutch delft tiles that surrounded the hearth in that building, as well as many fragments of English and Dutch ceramics and glassware that helped to date the site.

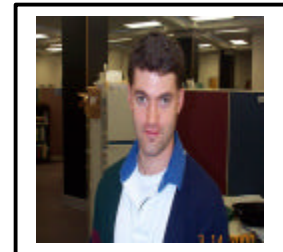
Later periods mark the renovation of the original structures around 1718 when the property was acquired by Governor Eden, and the period preceding site abandonment in the mid-eighteenth century. These later periods mark the use of the site as part of the larger plantation owned by Eden and his heirs. Most of the artifacts recovered date to these periods and include fine English and European stonewares and earthenwares, Chinese porcelain, tablewares, wine bottles, medicine vials, and household utensils. The occupants of the site at this time may have been slaves working on the plantation, although it is also possible that the larger structure was converted to use as an inn associated with the nearby ferry landing. During the later part of this period (1741-1752) the property was owned by Governor Gabriel Johnston, who was the fourth husband of Eden's stepdaughter, Penelope, who had acquired the plantation. By this time the original buildings were in disrepair and were torn down around 1752, when this part of the plantation was converted to farmland and traces of the early period of settlement were buried for almost 250 years.

Although the highway construction has now taken this portion of the site, plans are being made to preserve the main portion of the Eden House plantation. The public interpretation and exhibition of the site and the artifacts is continuing. The artifacts will be turned over to the Department of Cultural Resources for display in area museums and to be preserved as a research collection for future scholarly studies. The final report on the excavations is being readied for distribution on CD ROM, and a non-technical report is available on the Department of Transportation's site (<http://www.doh.internet dot.state.nc.us/preconstruct/pe/archaeology/edenhouse/default.html-ssi>).

The Employee Spotlight **By: Linda Hilton-Cain**

The Employee Spotlight will be a regularly featured section where an employee in the Natural Systems Section will be highlighted. We hope this feature will help readers become more familiar with the NCDOT staff.

Locke Milholland joined the department's Natural Systems Section in November 1999. Locke was born in Hickory, although he lived in the greater Atlanta area until he was about 10 years old. Then he moved to Statesville, North Carolina where he lived for about thirteen years. Locke attended North Carolina State University, the alma mater of his grandfather, John Locke Milholland, Jr. Locke received his Bachelors of Science degree in Natural Resources, Policy and Administration.



Shortly after graduation in May 1999, he accepted a one-year appointment with the NCDOT in the Project Development and Environmental Analysis Branch. Locke said that as a kid he dreamed of working for DOT, specifically working in road construction. Like most boys he wanted to operate the cement truck and other equipment.

One of Locke's key responsibilities is to work with NCDOT staff on articles for the Centerline. We look forward to working with Locke on future issues of this news quarterly.

Answers to Puzzle:

driebg rmsaste - b{r}idge str{e}ams
budli no lupdsna - build on uplan{d}s
ioosre tlnoorc - {e}ro{s}ion control
rwko ni het ryd - work {i}n the dry
cygaen oooiircdannt - a{g}ency coordination
tabiizsel knsba - stabilize ba{n}ks

redesign project plans

Spread the word - Please let us know of anyone you think would like to receive a copy of Centerline. If you would no longer like to receive Centerline, we will remove your name from the mailing list. Contact us by email at lhilton@dot.state.nc.us or by phone at 919-733-7844 ext. 200. We would like your comments on our newsletter.

CENTERLINE DETOURS

PERSPECTIVES:

Things to think about when working with other State and Federal agencies

- Even our best efforts are meaningless if they take place in a vacuum.*
- In the structure of organization for decision making, we must add communication.*
- Good communication has two basic qualities: it is honest, and there is a lot of it.*
- Lack of honesty builds distrust.*
- Honesty is the surest path toward the shared picture of reality.*

* The before mentioned thoughts were taken from Guidelines for Leading Your Congregation; Organizing the Work of Your Church. Abingdon Press, 1996.

Center for Transportation and the Environment (CTE)

National Conference – Best Practices in Wetland Mitigation and Stream Restoration

A national conference was held October 5, 1999 in conjunction with North Carolina State University, which showcased the most successful approaches for mitigating transportation project impacts on wetlands and streams. The discussions centered on future policy and technical issues related to site preservation, enhancement and restoration. Dr. Paul Garrett, senior ecologist for the Federal Highway Administration Headquarters was the moderator. Several case studies were presented as follows:

- “NCDOT Strategies Utilized for Wetland and Stream Mitigation” – Dr. Charles Bruton, NCDOT
- “Wetland Mitigation: The New Hampshire Route 101 Project” – Al Garlo, Normandeau Assoc.
- “Managing Roads to Restore Wetlands and Riparian Areas” – Russ LaFayette, US Forest Service
- “Stream Restoration Design” – Gary Davis, Washington DOT
- “Soil Bioengineering Restoration in the Watershed” – Robbin Sotir, Robbin B. Sotir & Assoc.
- “Thinking Beyond the Pavement” – Charles Adams, Maryland State Highway Admin.

If you would like additional information on this teleconference, **please contact Ms. Katie McDermott, CTE Technology Transfer Director, at 919-515-8034 or kpm@unity.ncsu.edu**.

Centerline Puzzle

What is the best way to minimize stream impacts? Unscramble the words to find the answer.

driebg rmsaste _{ } _ _ _ _ _ _ _ _ { } _ _ _ _
budli no lupdsna _ _ _ _ _ _ _ _ _ _ _ _ _ _ { } _ _
ioosnr tlnoorc { } _ _ { } _ _ _ _ _ _ _ _ _ _ _ _
rwko ni het ryd _ _ _ _ _ _ { } _ _ _ _ _ _ _ _
cygaen oooiircdannt _ { } _ _ _ _ _ _ _ _ _ _ _ _ _ _
tabiizsel knsba _ _ _ _ _ _ _ _ _ _ _ _ _ _ { } _ _

{ } { } { } { } { } { } { } { } project plans

(Answers on page 9)

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Our Mission Statement

Each of the teams in the Natural Systems Unit is responsible for natural resource investigations, obtaining environmental permits, developing wetland and stream mitigation plans, and implementing the construction of mitigation sites.

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