



**NORTH CAROLINA
NATURAL HERITAGE PROGRAM
2011 BIENNIAL REPORT**



**Office of Conservation, Planning, and Community Affairs
Department of Environment and Natural Resources
Raleigh, North Carolina
www.ncnhp.org**

REPORT ON ACTIVITIES OF 2009-10

As directed by the North Carolina Nature Preserves Act (GS 113A-164.1-.11), the North Carolina Natural Heritage Program (NC NHP) in the Department of Environment and Natural Resources, has prepared this report to summarize program activities occurring during calendar years 2009 and 2010.

NC NHP is the North Carolina component of a national network of natural heritage programs that reaches from Canada through the United States and into much of Latin America. Members of this network share a common methodology and a commitment to conserve rare species and significant natural areas. The 80 programs that comprise this network are affiliated through NatureServe, a private, nonprofit organization based in Arlington, Va. .

When established in 1976, NC NHP was housed in the Division of Parks and Recreation. Enabling legislation was enacted in 1985 as part of the Nature Preserves Act (113A-164.1-.11). In March 2003, Secretary Bill Ross moved NC NHP from the Division of Parks and Recreation to the Office of Conservation and Community Affairs to become part of that office's One North Carolina Naturally effort. A restructuring in 2008 placed NC NHP in the newly created Division of Natural Resource Planning and Conservation. As a result of legislative action in July 2010, the Division of Natural Resource Planning and Conservation was combined with the Office of Conservation and Community Affairs into the Office of Conservation, Planning, and Community Affairs, and was assigned to the Office of the Secretary of DENR. As part of this move, funding for 5.5 core program positions was moved from appropriations to the Natural Heritage Trust Fund (NHTF).

In its new administrative home, NC NHP continues working in partnership with a variety of state and federal agencies, private organizations, individuals and corporations to: 1) identify the most significant natural areas of North Carolina and 2) support the protection of these significant natural areas so that future generations can enjoy the full diversity of North Carolina's natural heritage.

Program activities of 2009 and 2010 are summarized in this report under the three major program areas of NC NHP: Inventory, Information Services and Conservation Planning and Protection.

INVENTORY

NC NHP inventory efforts are conducted for one of three primary purposes: as part of a comprehensive natural area inventory to identify the highest quality sites for conservation action; as part of a protection-focused inventory done on behalf of a partner such as N.C. Division of Parks and Recreation, The Nature Conservancy or any of several local land trusts; or as an inventory for a particular rare species or specific natural community.

2009-2010 Natural Area Inventories

A Natural Area Inventory is a systematic search for the best examples of natural communities and locations of rare species throughout a pre-defined location, typically a county. The identification of these “Significant Natural Heritage Areas” is a fundamental step in the effort to conserve our state's biodiversity. The conservation of these natural areas can greatly enhance the quality of life for the citizens of North Carolina.

Inventory reports map and describe the most important natural areas and their ecological significance. This information benefits a wide range of users, from individual landowners to various government agencies. County governments and municipalities use these inventories to help plan for growth and development in balance with the natural environment. State agencies and local land trusts rely on Natural Heritage data to make informed decisions about land and water use and site conservation. For example, Backbone Ridge, a site highlighted in the 2008 Caldwell County Inventory, was awarded a grant from the Natural Heritage Trust Fund in 2010 to begin a conservation project that will bring together the N.C. Wildlife Resources Commission, the N.C. Division of Forest Resources and the U.S. Forest Service to protect 755 acres through funding from the Natural Heritage Trust Fund, N.C. Clean Water Management Trust Fund, The Conservation Trust and the U.S. Forest Service. In 2010, the Natural Heritage Trust Fund also awarded funding for the N.C. Plant Conservation Program to protect the Nationally Significant Cedar Mountain Bog, a site highlighted in the 2008 Transylvania County Inventory.

NC Endangered Bog Rose, a species that will be protected at Cedar Mountain Bog Plant Conservation Preserve



Chestnut Oak Forest, an outstanding natural community that will be protected at Backbone Ridge



Funding for natural area inventories is provided in large part by the NHTF. Whenever possible, matching funds are secured from local governments or raised by a partner, such as a land trust. The commitment of the NHTF Board and the partner agencies to natural area inventories and to local conservation actions is greatly appreciated.

2009-2010 Rare Species and Natural Community Inventories

In addition to county-focused inventories, NC NHP inventories the distribution and habitats of rare species of our state and the remaining high quality or rare examples of natural communities. Many of these inventories are conducted in cooperation with the Wildlife Diversity Program of the N.C. Wildlife Resources Commission, the Plant Conservation Program of the Department of Agriculture and Consumer Services and the U.S. Fish and Wildlife Service. Other partners

include the N.C. Museum of Natural Sciences, the N.C. Native Plant Society and the N.C. Herpetological Association. Table I shows inventories conducted during 2009-2010.

Table I. Rare Species and Significant Natural Community Inventories

Target Element	Partner Agency	Principal Scientists
Atlantic Pigtoe, North Fork Little River	NC WRC	Sarah McRae
Bat species (mist netting), Graham County	NC WRC	Ed Schwartzman
Bog Turtle – Alleghany, Buncombe counties	NC WRC	James Padgett, Angie Rodgers
Bunched Arrowhead	US FWS, NC State University	Ed Schwartzman
Dune Bluecurls, Cape Hatteras National Seashore and Fort Fisher State Recreation Area	National Park Service	Misty Buchanan, Laura Gadd, and Suzanne Mason
Fish surveys, Cane, Broad, and Green rivers	NC WRC, NC DWQ	Sarah McRae, Angie Rodgers
Green Salamander, Chimney Rock State Park	NC DPR	James Padgett
Hellbender, New River State Park and South Fork Mills River	NC DPR, NC WRC	James Padgett, Ed Schwartzman
Heller's Blazing-star	Appalachian State University, NC DPR	James Padgett
Lilliput (mussel) species, Falls Lake	NC WRC and NC DPR	Sarah McRae
Longtail Salamander, Nantahala River	NC DPR, The Wildlife Society	Ed Schwartzman
Mole Salamander, Nantahala Woodland Pool	NC WRC	Ed Schwartzman
Mountain Chorus Frog, Cherokee County	NC WRC	Ed Schwartzman
Red-legged Salamander, Nantahala Mountains	NC WRC	Ed Schwartzman
River turtles, Hot Springs	NC WRC	Ed Schwartzman
Schweinitz's Sunflower, Moore County		Bruce Sorrie
Spotfin Chub, Little Tennessee River	NC WRC, US FWS	Angie Rodgers
Tar River Spiny mussel	NC WRC	Sarah McRae
Uwharrie area Seepage Bogs	USFS, NC WRC	Mike Schafale and Steve Hall
Vernal Pools, Sandhills Game Land	NC WRC	Bruce Sorrie

INFORMATION SERVICES

Compiling biological information from a wide variety of sources is a complex process. That process is crucial to developing the information needed for wise conservation and development planning, and to the environmental review function required by the national and the state environmental policy acts. Equally important is sharing that information with a wide variety of agencies, corporations and individuals.

North Carolina is fortunate to have a variety of outstanding naturalists working independently or as part of state and federal conservation agencies, in academia, as independent consultants or in

private conservation organizations. Working as part of this informal network of outstanding naturalists, NC NHP consolidates the information collected about rare species, high quality natural communities, and significant natural areas and makes it available for use in statewide and regional conservation initiatives. The information is also used to weigh the ecological significance of various sites, and to evaluate the likelihood and nature of ecological impacts. This information supports informed evaluations of the trade-offs associated with biological diversity and development projects before plans have been finalized. Finally, this information facilitates the establishment of priorities for the protection of North Carolina's most significant natural areas.

Table II provides an overview of the Natural Heritage database that contains the core of NC NHP information. This database summarizes information about the occurrences of rare species, significant natural communities, and significant natural heritage areas in North Carolina.

Table II. Summary of NC NHP Database

Database Components	Calendar Year	
	2009	2010
Number of Elements Tracked by NC NHP	1,688	1,665
Number of Records of Element Occurrences (EOs)	23,674	24,303
Vertebrate animals	4,955	4,868
Invertebrate animals	1,947	2,016
Vascular plants	10,117	10,328
Non-vascular plants	1,099	1,142
Natural communities	5,149	5,537
Special animal habitats/features	407	412
Number of Significant Natural Heritage Areas Identified	2,546	2,587
Number of Managed Natural Areas Mapped	1,348	1,489

Information Requests

During 2009 and 2010, NC NHP responded to an uncounted number of telephone inquiries and provided nearly 600 written responses to citizens, federal and state agencies, consulting firms, academic institutions, conservation organizations and city and county governments. Only 30 visitors came to the NC NHP offices to use information from the databases and files over the two-year period; this significant drop is a result of the increased use of the online information services that are now available. During 2009 and 2010, our online information database (accessible to the general public) provided nearly 21,000 reports for information summarized by county or by USGS quadrangle or through the Virtual Workroom. This Web-based information system has been well received, by both partner agencies and the public. This service is updated daily and allows users to get information directly from the BIOTICS database with minimal

training. This has reduced the workload for staff while allowing easier access to the most requested information.

Environmental Review

Another important and frequent use of NC NHP data is the review of the potential environmental impacts of major state or federal actions. NC NHP continues to assist with NCDENR environmental reviews, although this is not officially part of the clearinghouse process. Our database provides state and federal agencies with the most reliable source of information about potential impacts to rare species.

Publications

NC NHP produces four reference publications (listed below). These publications are used by staff of numerous federal and state agencies, including Fort Bragg, Camp Lejeune, N.C. Department of Transportation, N.C. Wildlife Resources Commission, N.C. Plant Conservation Program, as well as by environmental consultants, academicians and amateur naturalists. The publications are provided at cost upon request. In addition, NC NHP provides copies of these publications as digital files on the website (<http://www.ncnhp.org/>).

Natural Heritage Program reference publications:

- Natural Heritage Program List of the Rare Animal Species of North Carolina;
- Natural Heritage Program List of the Rare Plant Species of North Carolina; and
- Classification of the Natural Communities of North Carolina, Third Approximation;
- Priority List of Significant Natural Heritage Areas.

Copies of county natural area inventory reports or rare species accounts are also available upon request or online (<http://www.ncnhp.org/Pages/publications.html>). A list of all NC NHP reports in 2009 and 2010 are included in Appendix A.

CONSERVATION PLANNING AND NATURAL AREA PROTECTION

Conservation Planning Tool

The CPT identifies and prioritizes both the essential high quality natural resources and the crucial land gaps between ecosystems across the state. The methods used are both strategic and scientifically-based and provide a vision for a green infrastructure network of supporting ecosystems.

During the past biennium, significant progress has been made in integrating wildlife habitats into the Biodiversity/Wildlife Habitat layer of the CPT. Also, the Wildlife Resources Commission has integrated the CPT into its Green Growth Toolbox, which is shared with local governments and regional planning groups that want to address natural resources as part of their planning process. The CPT has also been shared with NC DOT Long Range Planning Staff and the Federal Highway Administration to inform their planning processes.

The CPT has been presented to more than 4,000 people across the state, to a range of audiences that include partners from federal, state and local agencies, as well as nonprofit conservation organizations. The accuracy and usefulness of the information provided in the tool has been

widely accepted and in many cases incorporated into local and regional planning efforts. This tool has proven to be very helpful in building collaborative partnerships and supporting proactive planning for compatible land uses.

In 2010, NHP completed its contract with the Federal Highways Administration to identify and evaluate large blocks of habitat still serving ecological functions at the landscape level (i.e., that have high landscape integrity). This project concentrated on mapping core areas for indicator guilds inhabiting upland and inter-basin habitats, complementing the work we previously did for the NC. Ecosystem Enhancement Program (EEP), which concentrated on mapping core areas in coastal marsh and interior riparian habitats. Maps completed under these two projects cover nearly the entire state, with only upland habitats in the Northern Mountains still to be finished. We expect to complete the entire state by the end of the current fiscal year. Data resulting from these projects have already been incorporated into the CPT. New data will continue to be added as developed.

In addition to mapping core areas based on existing knowledge, these projects have identified High Priority Inventory Areas (HPIAs), which represent potential core areas but for which there are too few data currently to make an evaluation of their significance. These HPIAs are intended to help guide the next round of NHP surveys, which will be aimed at the regional level rather than the county level. In 2009, a pilot project was conducted in the Sandhills ecoregion, under contract to the U.S. Fish and Wildlife Service. In 14 days of field work, 12 new core areas were identified, along with eight more that would likely qualify with just a small amount of additional field work. In 2010, a full-scale project was begun in the Uwharrie Mountains ecoregion. This project, funded by the Natural Heritage Trust Fund and done in conjunction with WRC, will span two full field seasons, with the final report to be completed in 2012. In 2010, 25 field days of work were completed, covering 19 sites (the majority of which were visited more than once). The data collected during these visits are still being compiled and evaluated. However, one noteworthy finding was that the Hillside Seepage Bog Guild is in danger of being eliminated from the region. On Oct 25-26, 2010, NC NHP sponsored a meeting in the field to discuss these issues and possible solutions, involving representatives of two federal agencies, four state agencies, two land trusts, landowners and interested citizens. Conservation action at the landscape level will require the involvement of multiple parties working together over several years. NC NHP hopes that this effort will serve as a model for the development of other conservation initiatives at this level.

Climate Change Ecosystem Assessment

As part of the DENR initiative to comprehensively address climate change in our state, the Natural Heritage Program evaluated the likely effects of climate change on North Carolina's ecosystems, habitats and species. This analysis was completed in late 2010 using available climate models to estimate regional changes in temperature and frequency of droughts, floods, wind damage, wildfires and sea level rise. This data was integrated with what we know about ongoing threats, particularly habitat loss and invasion of exotic species. Recognizing the interrelationship among these impacts, the analysis identifies the predicted climate change effects and describes possible (probable?) ecosystem responses. The analysis also recommends adaptation strategies that may offset or reduce the impacts of climate change, and thus help North Carolina's native species and ecosystems be as resilient as possible. The reports from this analysis are organized by 42 groups of ecosystems. Nested within each ecosystem Group are

natural communities and landscape/habitat indicator guilds, and within each of these habitat groups are individual species, including the majority of federal and state-listed species that occur in North Carolina and the majority of animals identified as priority species in the State's Wildlife Action Plan. The reports from the assessment can be viewed at [http://www.climatechange.nc.gov/pages/ClimateChange/CC Ecosystem Assessment.html](http://www.climatechange.nc.gov/pages/ClimateChange/CC_Ecosystem_Assessment.html).

We expect to continue to revise and make improvements to the assessment and to our recommended adaptation strategies as new climate data and new predictions about the effects of climate change become available, or as empirical evidence of the effects begin to accumulate. Additionally, we plan to use this analysis and work closely with the Wildlife Resources Commission as it revises the N.C. Wildlife Action Plan and incorporates climate change into the plan. We also continue to present this assessment to our conservation partners and will provide guidance as they incorporate climate adaptation strategies into their work.

2009-2010 Dedications and Registries

The NC NHP encourages conservation and stewardship of Significant Natural Heritage Areas through two programs that create Dedicated Nature Preserves and Registered Natural Heritage Areas. Dedicated Nature Preserves, owned by state agencies, local governments, or nonprofit conservation groups, are permanently protected through a legally binding agreement with DENR to manage the land for conservation of its natural heritage values. State-owned land can only be removed from dedication upon approval of the governor and Council of State. Owners of Registered Natural Heritage Areas have also signed a voluntary, though non-binding, agreement with DENR demonstrating their commitment to protecting the natural heritage values of their property. These landowners may also receive management recommendations to help ensure survival of the rare species or natural communities on their property.

During this biennium, NC NHP has worked with partner agencies, including the State Property Office, to dedicate more natural areas than ever before. In all, an additional 52,305 acres were designated as State Nature Preserves.

Twenty-eight new nature preserves, totaling 38,814 acres, were dedicated during this period. (see Table III.) We are especially pleased that Mecklenburg County chose to dedicate its McDowell Nature Preserve, making this the first county park to be dedicated. McDowell Nature Preserve contains excellent examples of rare natural communities, including Upland Depression Swamp Forest, as well as extensive examples of more common natural communities such as Dry-Mesic Oak—Hickory Forest and Mesic Mixed Hardwood Forest, many of which are mature and in very good condition. Also within McDowell Nature Preserve are two restoration areas, managed for open grassland vegetation. Prescribed fire is used on a regular basis at these two sites, and prairie grasses and forbs have been planted. Several rare plant species of Piedmont grasslands have been transplanted to the restoration areas, including Schweinitz's sunflower (*Helianthus schweinitzii*), Georgia aster (*Symphyotrichum georgianum*), and Carolina birdfoot-trefoil (*Lotus helleri*). We are very pleased to add this county site to the list of Dedicated Nature Preserves.

Table III. 2009-2010 Dedicated State Nature Preserves.

N.C. Museum of Natural Sciences	Blue Pond Preserve	
N.C. Plant Conservation Program	Melrose Mountain Preserve	
	Hebron Road Preserve	
	Eastwood Preserve	
	Eno River Diabase Sill Preserve	
	Big Pond Bay Preserve	
	Bat Fork Bog Preserve	
	Mineral Springs Barrens Preserve	
	Cedar Cliff Mountain Preserve	
	Dulany Bog Preserve	
	Hog Branch Ponds Preserve	
	White Oak Mountain Preserve	
	N.C. Wildlife Resources Commission	Bertie County Game Land
		Goose Creek Game Land
Johns River Game Land		
Pee Dee River Game Land		
Mitchell River Game Land		
Tillery Game Land		
Needmore Game Land		
Juniper Creek Game Land		
N.C. Division of Parks and Recreation	Lower Haw River State Natural Area	
	Mountain Bog State Natural Area	
	Elk Knob State Park	
	New River State Park	
N.C. Division of Forest Resources	Bladen Lakes State Forest	
N.C. Department of Cultural Resources	Roanoke Earthworks State Historic Site	
	Bunker Hill Covered Bridge State Historic Site	
Mecklenburg County	McDowell Nature Preserve	

Additions were made to 10 existing Dedicated State Nature Preserves. These are listed in Table IV. These additions added 13,491 acres.

Table IV. Amended Dedicated Nature Preserves.

N.C. Division of Parks and Recreation	Gorges State Park
	William B. Umstead State Park
N.C. Wildlife Resources Commission	Roanoke Island Marshes Game Land
	Stones Creek Game Land
	Suggs Mill Pond Game Land
	Roanoke River Wetlands Game Land
	South Mountains Game Land
N.C. Plant Conservation Program	Tater Hill Preserve
	Eastwood Preserve
	Boiling Spring Lakes

As of December 2010, 144 properties totaling 331,243 acres have been designated as Dedicated State Nature Preserves.

In part because of the focus on dedication, only one registry was completed in the last two years. The U.S. Fish & Wildlife Service added the 83-acre Pee Dee National Wildlife Refuge Longleaf Pine Forest to the Registry of Natural Heritage Areas. To date, 570,453 acres in 337 areas are designated as Registered Nature Heritage Areas.

Aquatic Ecosystem Protection

Threats to aquatic species, such as freshwater mussels, fishes, crayfishes, amphibians, snails and macroinvertebrates, continue to be of concern to the conservation community. NC NHP continues to house two full-time freshwater ecologists (one serving river basins west of, and including, the Yadkin River basin, and one serving basins east of the Yadkin River basin). These positions are funded through Aquatic Inventory grants from the NHTF, with matching funds provided by the N.C. Wildlife Resources Commission.

NHP continues to collaborate with partner agencies (N.C. Wildlife Resources Commission, N.C. Department of Transportation, N.C. Division of Water Quality, N.C. State University, and N.C. Museum of Natural Sciences) to survey for rare aquatic species across North Carolina. Survey results from various agencies are incorporated into the NHP database for distribution to conservation partners. In January 2010, NHP hosted the Southeast Atlantic Slope Mollusk Meeting in Raleigh. This meeting was attended by 60 professionals from Georgia, South Carolina, North Carolina, Tennessee and Virginia to coordinate efforts and discuss issues such as listing packages, propagation efforts and sampling protocols that affect species spanning the range of the Southeast Atlantic slope and under jurisdiction of multiple states.

Through the county inventory process, aquatic site descriptions and aquatic element occurrences are being updated and included in county inventory reports. NHP staff are working through several initiatives to incorporate natural heritage data into planning efforts, such as the Johnston County Natural Resource Initiative and the Linking Lands and Communities Project, which covers Madison, Buncombe, Henderson and Transylvania counties. Both initiatives are green infrastructure projects that use concepts behind DENR's Conservation Planning Tool to focus into more specific areas of the state and with greater detail. NHP staff have also provided input to interagency efforts such as the DENR Watershed Restoration Forum and a forum to designate ecological flows.

Information and leadership from NHP's Freshwater Program has been essential in building and contributing to conservation partnerships throughout the state, including the Chatham Conservation Partnership, Partners for the Little Tennessee, Little River (Neuse) conservation efforts, Greater Uwharrie Conservation Partnership and the North Toe Restoration Project.

NATURAL HERITAGE PROGRAM STAFF

NC NHP staff are recognized across the state for their ecological expertise and knowledge of conservation practices. Program staff are listed below; those marked with * are supported through grants or contracts.

Raleigh Staff (Permanent)

Laura Gadd, Natural Area Specialist (starting 3/10)
Misty Franklin Buchanan, Botanist (through 11/10) and
Inventory Manager (starting 12/10)
Kim Douglass, Conservation Planner*(through 11/09)
John Finnegan, Information Systems Manager*
Stephen Hall, Invertebrate Zoologist*
Harry LeGrand Jr., Zoologist*
Suzanne Mason, Environmental Biologist*
Sarah McRae, Aquatic Ecologist * (through 9/10)
Ann Prince, Protection Specialist (1/2 time)*
Judith Ratcliffe, Inventory Manager (through 2/10)* and
Aquatic Ecologist (starting 12/10)
Michael P. Schafale, Community Ecologist

Field Staff (Permanent)

Shawn Oakley, Inventory Specialist*
James Padgett, Inventory Specialist*
Edward Schwartzman, Inventory Specialist*
Bruce Sorrie, Inventory Specialist*
Angie Rodgers, Aquatic Ecologist*

Raleigh Staff (Temporary)

Brenda Wichmann, Botanical Data Assistant (through 2/10)
Jame Amoroso, Inventory Data Assistant*
Judith Ratcliffe, Aquatic Data Assistant* (3/10-11/10)
Keren Cepero-Perez, Data Entry Intern (beginning 6/10)*
Moni Bates, Inventory Assistant (beginning 9/10)*
Reed Rossell, Zoology Inventory Assistant*

Major Activities Planned for 2011 and 2012

- I. Publish Natural Area Inventories completed in 2010: Alleghany, Anson, Macon, Stanly counties; complete inventories in Caswell and Madison counties; continue inventories in Alexander, Cherokee, Graham, Mitchell, and Union counties.
- II. Improve the online interface of the One NC Naturally Conservation Planning Tool and increase awareness of the tool by local governments and partner agencies and organizations.
- III. Implement an improved process for rating the ecological significance of Significant Natural Heritage Areas.
- IV. Complete the revision of the classification of natural communities and convert the community portion of the database to the new classification.
- V. Update Element Occurrences and EO ranks for aquatic animal and plant species recently proposed for federal listing.
- VI. Contact owners of Registered Natural Heritage Areas to notify them of the relationship of their property to the Conservation Planning Tool.

APPENDIX A

**North Carolina Natural Heritage Program
Publications and Reports
2009 & 2010**

**NC NATURAL HERITAGE PROGRAM
PUBLICATIONS and CONTRACT REPORTS**

2009

Hall SP. 2009. Statewide assessment of conservation priorities at the landscape level. Upland and interbasin habitats, Northern Coastal Plain Region. Upubl. Rep. to Federal Highways Administration. Raleigh, NC: NC Natural Heritage Program.

Hall SP. 2009. Statewide assessment of conservation priorities at the landscape level. Upland and interbasin habitats, Eastern Piedmont Region. Upubl. Rep. to Federal Highways Administration. Raleigh, NC: NC Natural Heritage Program.

Hall SP. 2009. Statewide assessment of conservation priorities at the landscape level. Upland and interbasin habitats, Western Piedmont Region. Upubl. Rep. to Federal Highways Administration. Raleigh, NC: NC Natural Heritage Program.

LeGrand, H.E., Jr. 2009. An Inventory of the Significant Natural Areas of Robeson County, North Carolina. North Carolina Natural Heritage Program, Department of Environment and Natural Resources, Raleigh.

North Carolina Natural Heritage Program. 2009. 2009 NC Natural Heritage Program Biennial Protection Plan: List of Significant Natural Heritage Areas. North Carolina Natural Heritage Program, Office of Natural Resource Planning and Conservation, NCDENR, Raleigh, N.C.

Oakley, S.C. 2009. An inventory of the significant natural areas of Yancey County, North Carolina. N.C. Natural Heritage Program, Division of Natural Resources Planning and Conservation, DENR, Raleigh, NC.

Office of Conservation, Planning, and Community Affairs. 2009. Conservation Easement Program Annual Report to the Environmental Review Commission. NCDENR, Raleigh, NC.

Office of Conservation, Planning, and Community Affairs. 2009. North Carolina Million Acre Goal Annual Report to Governor of North Carolina and the Environmental Review Commission. NCDENR, Raleigh, NC.

Sorrie, B.A. and R.J. LeBlond. 2008. Noteworthy collections from the southeastern United States. J. Botanical Research Inst. Texas 2: 1353-1361.

Sorrie, B.A. 2008. Diversity, endemism, and phytogeography of North American coastal plain sedges. Pp 103-118 In: Naczi, R.F.C. and B.A. Ford, Eds., Sedges: Uses, Diversity, and Systematics of the Cyperaceae. Missouri Bot. Gard. Press, St. Louis.

Straub, S.C.K., B.A. Sorrie, and A.S. Weakley. 2009. *Amorpha confusa*, a new name for an old *Amorpha* (Fabaceae: Amorpheae). J. Bot. Res. Texas 3: 151-155.

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NC Natural Heritage Program Publications

2010

Buchanan, M. F. and J. T. Finnegan. 2010. 2010 Natural Heritage Program List of the Rare Plant Species of North Carolina. North Carolina Natural Heritage Program, Office of Conservation, Planning, and Community Affairs, NC DENR, Raleigh, NC.

Buchanan M, Gadd L, Hall SP, McRae S, Rodgers A, Schafale M. 2010. Estimated impacts of Global Climate Change on the ecosystems and species of conservation concern in North Carolina. Unpubl. Rep. to NC Dept. of Natural Resources. Raleigh, NC: NC Natural Heritage Program.

Hall SP. 2010. New core areas resulting from the Sandhills Landscape-Habitat Indicator Guild Survey. Upubl. Rep. to USFWS. Raleigh, NC: NC Natural Heritage Program.

LeGrand, H.E., Jr., J.T. Finnegan, S.E. McRae, and S.P. Hall. 2010. Natural Heritage Program List of the Rare Animal Species of North Carolina. North Carolina Natural Heritage Program, Department of Environment and Natural Resources, Raleigh.

Office of Conservation, Planning, and Community Affairs. 2010. Conservation Easement Program Annual Report to the Environmental Review Commission. NCDENR, Raleigh, NC.

Office of Conservation, Planning, and Community Affairs. 2010. North Carolina Million Acre Goal Annual Report to Governor of North Carolina and the Environmental Review Commission. NCDENR, Raleigh, NC.

Sorrie, B.A. 2010. A new variety of *Eutrochium purpureum* (Eupatorieae: Asteraceae). *Phytoneuron* 2010-43: 1-5. Published online.

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