CHAPTER 4.

STATEWIDE CONSERVATION STRATEGIES

The following sections detail four important conservation issues across the state of North Carolina. As such, the conservation strategies necessary to address these issues should be considered within the context of a state-wide framework, but must also be sensitive to local or regional distinctions. Strong partnerships among agencies, organizations, academics, and industry will be critical to meeting these challenges.

A. Urban Wildlife Management Strategies

Challenges and Opportunities

The rapid urbanization of North Carolina creates many wildlife challenges and opportunities. Where humans and wildlife meet, there is potential for conflict, but also opportunity for sustaining compatible terrestrial and aquatic wildlife populations and increasing people's awareness of and appreciation for wildlife.

North Carolina's estimated population growth is 34,500 people annually with 14,500 acres developed in association with that increase (Costa and Petersen 2002). Some counties are growing faster than others, but regardless, effective planning and concentrated development should be encouraged across North Carolina to combat suburban sprawl and loss of wildlife habitat. Open spaces within the urban/suburban environment are crucial for populations of development-sensitive wildlife species; these areas may include fields, forests, and riparian corridors. Open spaces serve many purposes, such as filtering pollutants from the air and water, conserving water and soil, supplying habitat for pollinators and the plants that require them for reproduction, and furnishing adequate space and habitat for breeding, foraging, travel and cover for wildlife (Lerner and Poole 1999).

Even though urban and suburban areas often contain more generalist wildlife species and offer limited opportunities for land protection and management, wildlife conservation programs should not ignore these lands. Indeed, rapid development and urban/suburban sprawl spreading out and away from urban centers are resulting in significant impacts on natural resources across North Carolina. Watersheds and ecosystems that were once considered relatively unaffected by growth are starting to see the impacts of widespread development, resulting in reductions in habitat quality and quantity and negative effects on listed and sensitive species (e.g., Goose Creek in Mecklenburg County; M. Fowlkes, pers. comm.). For these reasons, it is becoming increasingly important that natural resource management agencies proactively work with local governments in urban and urbanizing areas (especially those with a high percentage of annual population growth expected) to ensure protection of the public's fish and wildlife resources and to minimize primary and secondary impacts from development.

As urban populations often seem disconnected from nature, these people may not always perceive that wildlife or habitat loss are critical threats that could impact them directly. However, the same environmental degradation that threatens wildlife populations can menace drinking water supply, air quality, or other factors of immediate interest to city dwellers. Drawing those connections for urbanites may create a new constituency for wildlife and habitat protection based on enlightened self interest. For example, the Statewide Comprehensive Outdoor Recreation Plan suggests a link between access to open space and the overall mental and physical health of nearby residents (NCDPR 2003). Children especially benefit from the exploration of their natural world as it increases their knowledge of environmental issues, appreciation of nature, and their potential willingness to participate in conservation actions as adults (Leedy and Adams 1984).

An urban wildlife program can serve to maximize biodiversity within urban areas, build critical public support for conservation efforts, and assist in guiding development pressures to help ensure the conservation of species and habitats in presently rural areas. By conserving and helping to

manage remnant tracts of wildlife habitat close to urban centers, we can provide convenient outdoor recreation and education opportunities and begin to address the alienation from nature experienced by many urban residents (Leedy and Adams 1984). Furthermore, some of the development pressure on the rural fringes of urban centers is from people who wish to "get back to nature" and who want to live in an area where outdoor recreation and wildlife viewing opportunities are easily accessible. Providing more natural public lands within urban areas will help to make cities more livable and may reduce the pressure to develop rural farms and woodlands.

It is encouraging to note that there is increasing cooperation between state agencies and local governments in North Carolina to encourage municipalities, citizens, and developers to become better stewards of our natural resources. For example, the Commission has been working with local municipalities in the greater Charlotte area to create ordinances that address environmental protection and endangered mussel protection in the Goose Creek watershed, and with various municipalities in Wake County to develop a Master Secondary and Cumulative Mitigation Plan for the county. In partnership with the NC Division of Parks and Recreation, the Commission published a guidance document related to mitigating secondary and cumulative impacts for wildlife resources (NCWRC 2002) and is currently working on a complementary document with the NC Department of Environment and Natural Resources, the US Fish & Wildlife Service, and the NC Department of Transportation to educate municipalities about secondary and cumulative impacts and the environmental review process ("Swimming with the Current," *in draft 2005*). Other initiatives across the state include the Mecklenburg County Surface Water Improvement and Management Ordinance (Mecklenburg County DEP 1999) and the Chatham County Compact Communities Ordinance (www.co.chatham.nc.us).

Following are some of the most important issues that should be addressed in strategic urban wildlife program planning, along with examples of some efforts that are addressing those needs.

Land Protection and Management

- *Assist local and state entities (including land trusts) in purchasing or acquiring easements on properties.* Habitat loss and conversion are widely cited as two of the most critical threats to fish and wildlife resources in North Carolina. The conservation of habitat through land conservation around urban centers is a critical priority. (For a more directed discussion of land conservation needs, see Chapter 4C).
- *Promote and coordinate with regional open space and land-use planning initiatives.* In the most urbanized areas across North Carolina, there may be little opportunity left to purchase substantial parcels of land. However, initiatives aimed at making the most compact use of existing urban centers (e.g., infilling and reuse of vacant lots) can still provide significant positive impacts to wildlife resources by reducing sprawl (Lerner and Poole 1999; NCWRC 2002). Some urban areas in North Carolina have already prioritized open space conservation, such as the Triangle GreenPrint Regional Open Space Assessment (NCDPR et al. 2002), the Voices and Choices of the Carolinas initiative in Mecklenburg County (2004), and the city of Cary Open Space and Historic Resources Plans (http://www.townofcary.org/depts/dsdept/P&Z/openspace/openspacehome.htm). At a statewide level, the One North Carolina *Naturally* program is providing a key 'umbrella' role to improve the efficacy of regional and local land-use planning efforts by streamlining communications, GIS and data resources, and coordination of efforts (NCDENR 2003).
  - *Assist in the development and management of greenways.* A greenway plan is being developed for North Carolina, and research at NC State University is helping to define how greenways can be improved for wildlife (Hess 2004). Preliminary findings suggest that greenways that are wide (100–300 meters), maintained in native vegetation, and adjacent to canopy cover provide the best wildlife habitat and corridors for dispersal (Hull 2003; Novotny 2003; Vidra 2004). In addition to their value as wildlife habitat, greenways generally create good "habitat for people" by diversifying the landscape (Adams and Dove 1993) and providing more scenic, alternative transportation routes (North Carolina Greenways Advisory Panel 1994). Developers and realtors are keenly aware of the selling power of a tranquil setting that is pedestrian-friendly (Arendt 2004, Leedy and Adams 1984). Encouraging the building of compact communities

surrounded by interconnecting greenways helps lower property taxes by concentrating the tax-supported infrastructure such as roads, schools, sewer lines, and 911 services (Lerner and Poole 1999). Concurrently, sewer lines and other areas already designated as required open spaces should be incorporated into a greenway system (North Carolina Greenways Advisory Panel 1994).

  - *Enhance the effective size of existing preserve or land-holdings by promoting habitat management on surrounding private lands.* When tracts abut private lands, there is opportunity to work with adjacent landowners to help them realize the benefits of their lands as buffers for the preserve and as an extension of the preserve itself. Landowners should be introduced to any available cost share programs (e.g., Farm Bill programs) and habitat improvement advice (e.g., Forest Stewardship Program, Forest Landbird Legacy Program) that fits their needs. (For more about private land management issues, see Chapter 4B).

- *Improve management for wildlife on existing public lands.* Many city and county parks in North Carolina have been developed with human recreation as the top priority, but opportunities also exist to improve habitat management and wildlife-related recreation and education on these public lands. This involves hiring staff who are knowledgeable about wildlife and habitat management and who are cognizant of managing the natural resources of the parks in addition to the recreational facilities (or having existing staff consult with certified wildlife biologists). Often, city parks and greenways are so manicured that they are devoid of the intermediate canopy layer as well as the shrub and herb layer, thereby reducing usage by wildlife species that may otherwise utilize the area (Hull 2003). In addition, wide trails may disrupt sensitive species or habitat are as by creating breaks in the forest cover. The Mecklenburg County Park and Recreation Department is a prime example of a parks system that has made natural resources management a priority by conserving habitat integrity and educating the public by offering guided hikes and programs about the environment. They can serve as a model for other parks and recreation programs that wish to better integrate natural resources management into traditional programming methods.
- *Protect and adequately buffer high priority habitats.* In urban and urbanizing areas, high priority areas include riparian forests, floodplains, isolated wetlands, and sites with known sensitive or listed species occurrences. Adequate buffering of these habitats is a critical need. In addition to protecting wildlife habitat, water quality is also preserved and downstream impacts are reduced when water sources are buffered. Buffering helps to maintain species diversity across the landscape, improving the survival of species for future generations. Buffering may include the purchase of a property, acquisition through a site easement, or involving the landowner(s) in dialogue about the management of a particular property or properties.
- *Prioritize stream restoration efforts in areas with sensitive species or significant aquatic resources (e.g., trout waters).* Restoration efforts must be directed towards the most critical areas, not just where it is easy to do. The Watershed Enhancement Program (within the Commission's Division of Inland Fisheries) is involved in restoration and priority site identification through coordination of mitigation needs with the Ecosystem Enhancement Program. The Clean Water Management Trust Fund is a major funding contributor to these efforts, as are mitigation banking dollars from NC Department of Transportation and US Army Corps of Engineers projects.
- *Expand technical guidance to developers to promote site design techniques that minimize impacts and maximize benefits to wildlife and habitat (e.g., urban development projects, roads, wastewater treatment plants, stormwater treatment sites, utility stream crossings).* One key technique is to create wildlife-friendly stormwater and wastewater wetlands. Most stormwater and wastewater impoundments have been developed primarily with water control in mind. If designed to serve wetland functions, these areas can substantially control stormwater runoff and pollution. These shallow retention ponds can be improved for wildlife by creating gently sloping sides, establishing appropriate native plants, creating coves and islands, and drawing down the water levels during the spring and fall migrations to benefit wading birds and shorebirds. Constructed wetlands provide opportunity to regain some of the natural functions of wetlands and offset some of the significant losses in wetland acreage (Adams and Dove 1993).

- *Improve citizen education on impacts from homes.* Wildlife agencies, nonprofit organizations, local governments and Home Owner Associations should be encouraged to promote the following: the use of non-phosphate detergents; the reduced use of fertilizers and herbicides/pesticides; washing vehicles away from waterways and storm drains to reduce phosphates entering the water; the proper disposal of oils, antifreeze, and other household products as well as pet waste and yard waste; the removal of invasive exotic plants; and indoor cats. For those citizens wanting to learn more on the impacts of their homes and yards on wildlife as well as how to create backyard oasis for species, the following organizations' programs may be of assistance: Audubon At Home, Cornell Lab of Ornithology Citizen Science Program, the North Carolina Wildlife Federation Backyard Habitat Program, the American Bird Conservancy's Cats Indoors! Campaign, and North Carolina Partners in Flight.

Policy and Land Use Planning

- *Work with local municipalities (commissions, planning boards, and other government entities) to promote ordinances that protect natural resources and improve water quality.*
  - *Stormwater management.* Increasing the effectiveness of ordinances on the 'front-end' (i.e., during initial planning of development projects) is a critical step to streamlining the 'back-end' (i.e., the environmental review process). If site improvements that are now made as a result of the environmental review process could instead be incorporated into the initial site design (through adherence to set ordinances), the environmental review process would be more efficient for both developers and reviewers. The Commission has produced a document with detailed recommendations related to cumulative and secondary impacts, which serves as a key resource on this topic (NCWRC 2002). A complimentary document currently in development is the result of a partnership between the Commission, the NC Department of Environment and Natural Resources, the US Fish & Wildlife Service, and the NC Department of Transportation to educate municipalities about secondary and cumulative impacts and the environmental review process ("Swimming with the Current," *in draft 2005*). Other sources of recommendations can be gleaned from the Environmental Protection Agency's Low Impact Development approaches (US EPA 2002).
  - *Lights out for sea turtles.* Light on beaches can deter nesting sea turtles or disorient hatchlings. The Commission's Faunal Diversity Program works with beach communities to get ordinances passed so lighting will not disturb nesting or hatchling sea turtles. A continued effort needs to be made to work with additional townships to further this endeavor.
- *Promoting "Smart growth."* Higher density development should be encouraged within existing urban boundaries and around existing infrastructure, and discouraged on urban fringes and in high diversity or ecologically sensitive areas. It is important to have large contiguous sections of land left intentionally as fields and forests available to wildlife. The use of low-impact development techniques should be promoted. An emphasis should be placed on long-range future planning rather than on trying to deal with current or imminent projects, except where critical resources are threatened. One group that is working to promote the idea of compact neighborhood design, multiple-use communities, and planned development is the North Carolina Smart Growth Alliance.
- *Work with homebuilders and developers to adopt voluntary conservation guidelines, including promoting the principles of "conservation design."* Many housing developments and golf courses can be designed in a way that minimizes disturbance to wildlife habitats and maximizes aesthetic and conservation values, without sacrificing economic gain. By clustering houses on only half of the buildable land and placing the rest in a conservation easement, developers can provide their homeowners with attractive open space while preserving wildlife habitat (Arendt 2004). Research has also shown that green space can encourage business. It is easier to attract and retain employees in areas characterized by a high-quality living environment. This equates to areas with green space for recreating and relaxing. Two such companies that cited greenways as a deciding factor in their move to North Carolina include Reichold Chemical Company (Research Triangle Park, NC) and Caterpillar Inc. (Morganton, NC) (Lerner and Poole 1999).

Nuisance Wildlife Control

Wildlife conservation in urban areas necessarily relates to managing human/wildlife interactions. Though most nuisance wildlife issues may not relate directly to a conservation concern (e.g., a listed species or an endangered habitat), our efforts to solve nuisance wildlife problems are critical to improving the perception of urban wildlife issues in general.

Nuisance wildlife problems can occur when wildlife are attracted to human dwellings for food or shelter, when wildlife populations are enhanced by the presence of humans, and when wildlife is displaced by human development. Wildlife species that can be compatible with human development include some bats, foxes, raccoons, opossums, squirrels, deer, pigeons, starlings, house sparrows, Canada geese and chimney swifts, among others. Many wildlife damage problems can be addressed by changing the perceptions and expectations of homeowners with regards to living with wildlife.

- *Promote proactive measures for residents to head off wildlife conflicts before they occur.* Many animal damage problems can be blocked with simple measures and prior planning. Planning around nuisance wildlife should start at the very first stages of creating a development or a new house, and should be continued by individual homeowners and homeowners associations.
- *Improve coordination of animal damage response efforts.* Presently the Commission, NC State University Cooperative Extension Service, the US Department of Agriculture Wildlife Services, and county and local wildlife control officers all play a role in responding to wildlife damage problems. Continued coordination and improved sharing of resources among these entities will make response efforts more effective. One advancement on existing coordination could be the creation of a central wildlife damage hotline.
- *Promote and distribute wildlife nuisance guidelines.* The Commission has developed nuisance wildlife recommendations and guidelines on some issues (e.g., resident geese, black bear). Nuisance guidelines developed by the US Department of Agriculture (APHIS 1994) are another key source of information used by Commission outreach specialists for wildlife damage related inquiries.
- *Make sure that certified damage control agents are educated on appropriate control techniques, especially for sensitive species.* Currently, the training to become an approved Wildlife Damage Control Agent involves several phases. First, a daylong course must be completed that covers rules, laws, health issues, and how to handle animals in a humane fashion. Second, the applicant must pass a written test given by the NC State University Cooperative Extension Service. Lastly, successful applicants must renew their certification every three years. Records of activities must be maintained and reported quarterly (Bromley et al. 2005). Potential reevaluation of the methods used for the removal of sensitive or tracked species (such as bats and some snakes) may be necessary to ensure the most appropriate handling of these sensitive species.

Public Education

The primary goal of education and outreach in urban and suburban areas is to increase awareness of and appreciation for wildlife-related issues in the urban landscape and to inspire people to take action towards protecting their local environment. (For more about education, outreach, and recreation prioirities, see Chapter 4D).

- *Expand delivery of wildlife-related programs and field trips to key audiences (e.g., schools, civic groups, watershed associations, planning boards).* The goal of these programs (as above) should be to increase awareness of and appreciation for local wildlife species and habitats and to create a connection between urban publics and nature. These local connections can be emphasized by promoting to the audience an awareness of where they live in their watershed and how their actions affect the world around them.
- *Target developers, local government staff, and elected officials.* Developers are impacting the land now. Educating them on ways to minimize impacts (e.g., impervious surface effects on stormwater drainage) and working to adjust regulations to provide more benefit to water quality and wildlife needs to occur immediately. Home Owner Association backing may be able to assist

in strengthening the cause. The newly created Urban Wildlife Program within the Commission's Faunal Diversity Program is striving to bring wildlife expertise to planning and zoning boards since they designate lands for development and protection. This pilot project seeks to create a new niche that links local governments to wildlife professionals for increased communication and cooperation, ultimately decreasing the potential for costly disagreements on land usage patterns before they arise. Another education tool is the draft *(as of 2005*) "Swimming with the Current" document, a partnership between the Commission, the NC Department of Environment and Natural Resources, the US Fish & Wildlife Service, and the NC Department of Transportation to educate municipalities about secondary and cumulative impacts and the environmental review process.

- *Constituency building.* Supporting and encouraging public comment to local officials or commissioners to voice their opinions on natural resources issues will create a more informed and sympathetic electorate and representatives. Partnerships with strong advocacy groups like North Carolina Audubon, the NC Coastal Federation, and the NC Wildlife Federation will strengthen constituency building efforts.
- *Promote schoolyard habitat programs.* The NC Museum of Natural Sciences is one entity that currently has such a program. It is called Using the Outdoors to Teach Experimental Science and includes lesson plans and classroom presentations where students plan, establish, maintain, and collect data on a bird and butterfly garden on the school grounds. Other opportunities to establish similar schoolyard programs should be encouraged and supported by natural resource agencies and organizations in North Carolina.
- *Establish demonstration areas for backyard wildlife habitat improvements.* Residents who develop backyard habitat areas can be recognized and rewarded, such as through the NC Wildlife Federation's Backyard Habitat Program. Demonstration areas on private company lands are also appropriate to mention. The Wildlife Federation's Wildlife and Industry Together (WAIT) program helps industrial grounds convert from manicured spaces to native habitat. If the proposed plan is approved and followed through, a site may receive certification and a sign advertising their involvement in the program. WAIT certified sites in North Carolina include IBM, Research Triangle Foundation, and the North Carolina Museum of Art. Other participants include the Environmental Protection Agency, Craig Davis Properties, and GlaxoSmithKline. Additionally, the NC Division of Forest Resources Urban and Community Forestry Grant Program funded the development of a wildlife-friendly landscape demonstration at the Turner House on the campus of NC State University.
- *Encourage landscaping design that creates plant community structure and native plant diversity beneficial to wildlife.* Promoting the use of native plants in landscaping, publicizing native plant nurseries, partnering with UNC Botanical Garden and North Carolina Exotic Pest Plant Council, and distributing NC State University Cooperative Extension Service backyard wildlife publication series are some examples of how to accomplish this goal. Integration of urban wildlife management ideas into Horticultural Sciences, Landscape Architecture, Forestry, Zoology, Natural Resources and other appropriate college curricula may also increases professional awareness of urban wildlife issues and to help generate additional public interest in urban wildlife.
- *Master Gardener and Master Wildlifer Programs.* The NC State University Cooperative Extension Service offers short courses on plant identification, propagation, and maintenance as well as wildlife identification, ecology, and habitat protection/creation. These programs should be encouraged to continue and expand as they help educate citizens on our natural resources.
- *Cornell Lab of Ornithology Citizen Science Programs*. The Cornell Lab of Ornithology offers many opportunities for citizens to use their skills and dedication related to birds to assist scientists in studying bird populations and distribution as well as reproductive and disease patterns.

- *American Bird Conservancy's Cats Indoors! Campaign.* The target of this campaign is to encourage people to keep their pet cats inside to help minimize impacts to wildlife. Cats are exotic predators in the environment and efficient killers. Even well-fed cats will kill small mammals, insects, birds, amphibians, and reptiles, some of which may be species of conservation concern. Cats are estimated to kill millions of wildlife species a year and are having a direct impact on certain populations.

Wildlife-related Recreation

The 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation reports that fishing, hunting, and wildlife-watching expenditures have increased over a ten year interval in North Carolina (1991–2001); approximately 2.2 million people participated in wildlife-watching in the state in 2001 (USFWS and US Census Bureau 2003). Recreational enthusiasts are a large constituency that must be appreciated and provided with opportunities to recreate. This population also represents an opportunity for wildlife agencies to increase public appreciation for and awareness of wildlife and their habitat requirements.

- *Establish and promote Watchable Wildlife sites.*
- *(See public education section above)*

Data Collection

- *Involve the public through volunteer and citizen science opportunities.* Citizen science projects help to involve the public in a hands-on way and create a sense of ownership and accomplishment among participants.
  - The Cornell Lab of Ornithology coordinates several bird-related citizen science projects such as Project FeederWatch, the Great Backyard Bird Count, House Finch Disease Survey, Urban Bird Studies, PigeonWatch, the Birdhouse Network, Birds in Forested Landscapes, House Finch Nest Survey, and Golden-winged Warbler Atlas Project.
  - *Watershed and stream monitoring and cleanup.* Continued expansion of citizen water quality monitoring, watershed education, and cleanup efforts will be important in North Carolina. Extensive citizen water quality monitoring already occurs in the northeastern part of the state, begun through an initiative of the Pamlico-Tar River Foundation and coordinated through the Albemarle-Pamlico National Estuary Program (http://www.ecu.edu/icmr/cmn/). In the western portion of the state, numerous watershed groups participate in water quality monitoring through the Southern Appalachian Volunteer Environmental Monitoring project coordinated by Southern Appalachian Man and the Biosphere (http://www.samab.org/). These efforts do a great deal to connect local citizens to the importance of their local watersheds and water quality resources and human impacts on those resources.
- *Evaluate the utility/effectiveness of greenways/wildlife corridors.* Current research at NC State University is exploring this topic to answer the questions: What purpose do greenways serve for wildlife? Are existing greenways serving this purpose? How could greenways be improved to benefit wildlife and habitat?
- *Improve the quality of property or site evaluations.* There is a need to improve the quality of habitat assessments currently being conducted by private consultants, land trust volunteers, and others related to site evaluations for development, wetlands mitigation, or land purchases. Establishing something akin to a series of "rapid habitat assessment teams"—a network of experts in various taxa groups that could evaluate a property when biological information is needed to inform a development or land acquisition project (e.g., identification and delineation of streams and wetlands, biological surveys and inventories)—might facilitate better evaluations.
- *Urban residents polling.* Human dimensions survey information should be collected on urban resident attitudes toward wildlife and open space and steps they are willing to take or have their governments take to preserve open space. Also, the perceived needs and desires of the public for urban wildlife programs should be evaluated.

Management of Artificial Structures

- *Identify key structures where wildlife can be safely managed and enhanced.* While some species coexist with humans and even prosper in their presence, others need additional assistance as their habitat is altered. Some species have become reliant on our structures for their continued survival and are thus impacted by changes to those structures (e.g., chimney swift use of smokestacks and chimneys, purple martin colonies reliance on manmade gourds and houses). Activities to benefit wildlife species using urban structures include preserving old chimneys for chimney swifts; identifying structures used by peregrine falcons for nesting and foraging and protecting these from disturbance; identifying, enhancing and protecting structures used for bat roosts; and promoting bird boxes of various sizes and shapes for eastern bluebirds, American kestrels, wood ducks, purple martins, and other cavity nesters.

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B. Private Lands Habitat Management Strategies

Private lands comprise approximately 90% of land holdings in North Carolina (North Carolina Gap Analysis Project data) (Figure 4B.1). It is therefore especially important to effectively engage private landowners in the management and conservation of fish and wildlife species and their associated habitats and communities. We're faced with the challenge of building more effective partnerships with private landowners and lands managers that minimize government imposed regulations, red-tape, and restrictions. Without conservation efforts on private lands and programs benefiting private landowners, our state's wildlife resources will face difficult times in the coming years.

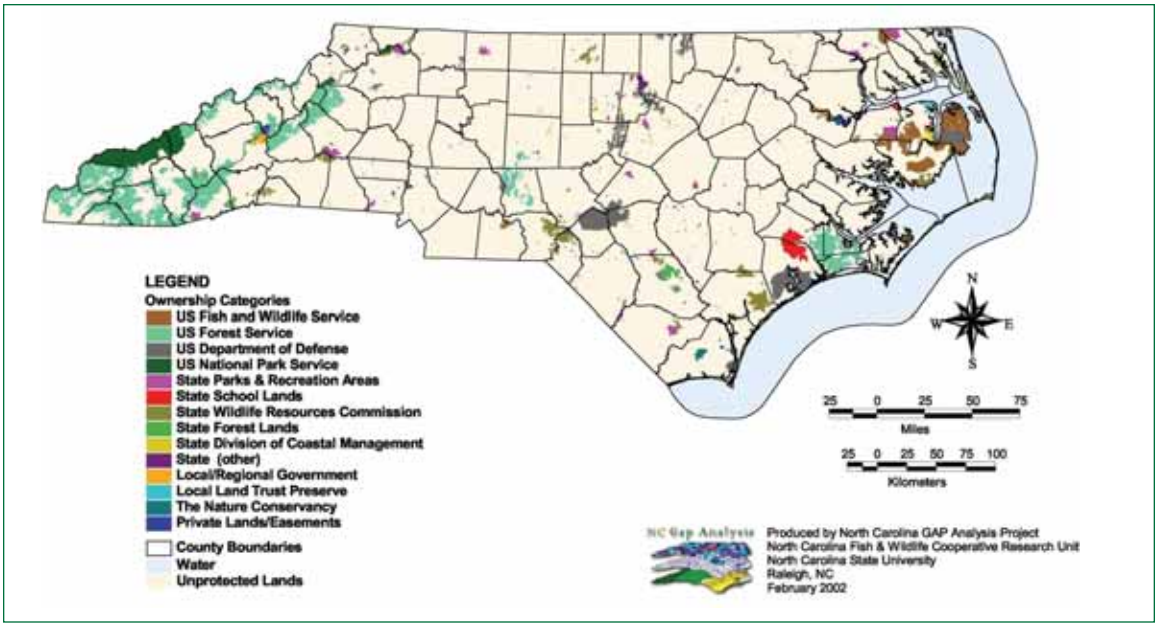

Figure 4B.1. North Carolina stewardship map by ownership, 2002 (source: NC GAP).

Private Lands Programs

State and federal agencies in North Carolina have long recognized the need to work effectively with private landowners and have responded by developing numerous private lands programs to address a variety of needs:

Partners for Fish and Wildlife – This is a voluntary program of the US Fish & Wildlife Service, designed to provide technical and financial assistance to landowners who want to restore and enhance fish and wildlife habitats on their property. All projects must benefit federal trust resources, which include migratory birds, threatened and endangered species, and anadromous or migratory fish.

Forest Landbird Legacy Program – This is a voluntary, multi-agency conservation program for private non-industrial forest landowners in all parts of North Carolina who want to manage mature forest habitat to benefit forest landbirds (especially those priority species identified by Partners in Flight). The Forest Landbird Legacy Program is a partnership between the US Fish & Wildlife Service, the Commission, and the Natural Resources Conservation Service.

Safe Harbor Program – Safe Harbor Agreements are voluntary arrangements between the US Fish & Wildlife Service and cooperating non-Federal landowners. The Program benefits endangered and threatened species while giving private landowners assurances from additional restrictions. To become a Safe Harbor Forest, the landowner works with the US Fish & Wildlife Service to determine a set number of the endangered or threatened species that will be maintained on the

property as habitat is improved. In exchange for this voluntary cooperation, the landowner is assured that no future restrictions on land use will be imposed.

Landowner Incentive Program – This federal program is usually administered by state fish and wildlife agencies. In 2004, there was $30 million available for states and tribes. The program's purpose is to support on-the-ground projects that enhance, protect, or restore habitats that benefit at-risk species on private lands. The state agency provides technical assistance to interested landowners, and evaluates and ranks proposals. The agency then submits the state's application package to the US Fish & Wildlife Service to compete with other states for a portion of the federal funding. High priority projects benefit multiple at-risk species, have permanent benefits, and involve multiple project partners.

Farm Bill Conservation Programs – In North Carolina, the Natural Resources Conservation Service and the Farm Services Agency administer Farm Bill programs, each of whom provide financial and technical assistance to landowners for particular natural resource needs.

- Conservation Reserve Program
- Conservation Security Program
- Environmental Quality Incentives Program
- Farm and Ranch Land Protection Program
- Grassland Reserve Program
- Wetland Reserve Program
- Wildlife Habitat Incentives Program

From a wildlife habitat perspective, the value of Farm Bill programs varies depending on individual implementation and management regimes. Two programs that are particularly beneficial to wildlife include the Wetland Reserve Program and the Wildlife Habitat Incentives Program. Still, all Farm Bill programs have the potential to help private landowners accomplish wildlife conservation goals.

Conservation Reserve Enhancement Program – The Conservation Reserve Enhancement Program is a joint effort of the North Carolina Division of Soil and Water Conservation, the NC Clean Water Management Trust Fund, the Ecosystem Enhancement Program, and the US Department of Agriculture to address water quality problems of the Neuse, Tar-Pamlico and Chowan river basins as well as the Jordan Lake watershed area. It is a voluntary program that seeks to protect land along watercourses that is currently in agricultural production. The objectives of the program include: installing 100,000 acres of forested riparian buffers, grassed filter strips and wetlands; reducing the impacts of sediment and nutrients within the targeted area; and providing substantial ecological benefits for many wildlife species that are declining in part as a result of habitat loss. Program funding combines Federal Conservation Reserve Program funding with State funding from the Clean Water Management Trust Fund, Agriculture Cost Share Program, and North Carolina Wetlands Restoration Program.

Agriculture Cost Share Program – Financial incentives to address agriculture's contribution to nonpoint source water pollution in North Carolina are provided through the Agriculture Cost Share Program. This program is administered by the NC Division of Soil and Water Conservation in the Department of Environment and Natural Resources. The Cost Share program was authorized in 1983 as a pilot program in 16 counties to address nonpoint source problems in the nutrient sensitive waters of Jordan Lake, Falls Lake, and the Chowan River. Due to the program's success, it has been extended to all 96 Soil and Water Conservation Districts (Districts) that includes all 100 counties. Participating farmers receive 75% of predetermined average costs of installed best management practices (BMPs) with the remaining 25% paid by farmers directly or through in-kind contributions. The program also provides local Districts with matching funds (50:50) to hire personnel to plan and install the needed BMPs.

Forest Legacy Program – The Forest Legacy Program was created by Congress in the 1990 Farm Bill. Administered by the NC Division of Forest Resources, its purpose is to help landowners, state and local governments, and private land trusts identify and protect environmentally important forest lands that are threatened by present and future conversion to non-forest uses. The most important part of Forest Legacy is the private landowner who wants to conserve the special values of their land

for future generations. Owners can do this in trust with the State government and receive a fair price for the commitment. Willing owners who are accepted into the program can sell the right to develop the land to the state government, who will pay for these rights at full fair market value. The owner keeps any remaining property rights and usually continues to live on and work/manage the property. Property taxes are paid by the owner on any retained rights as determined by local assessors.

Forest Stewardship Program – The Forest Stewardship Program, funded by the NC Division of Forest Resources and administered by the Division of Forest Resources and the NC Wildlife Resources Commission, is a cooperative effort to help owners realize the objective of managing their forests for the benefits they desire. The program is voluntary, and participants receive recognition for achievements in promoting total forest resource management. Landowners receive technical assistance in developing a stewardship management plan. The forest stewardship plan is based on the landowner's objectives, and activities are scheduled to enhance the forest for wildlife, soil and water quality, timber production, recreational opportunities, and natural beauty.

Forest Land Enhancement Program – Though not currently active, the Forest Land Enhancement Program provided cost-shared forest management improvements that are still needed in North Carolina. The program replaced two previous conservation incentives programs: the Stewardship Incentive Program and the Forestry Incentives Program. State forestry agencies could use Forest Land Enhancement Program funds to provide assistance to Non-industrial Private Forest owners to achieve a broad array of forest management objectives.

Forest Development Program – The Forest Development Program, administered by the NC Division of Forest Resources, is a continuing effort designed to encourage private landowners to reforest after harvest and to place their idle and under-productive forest land into full timber production. Forest industry contributes the majority of the funding for this program through a special assessment paid on all timber harvested in North Carolina. To qualify for a cost-sharing reimbursement, an applicant must own land suitable for growing commercial timber. A forest management plan approved by a representative of the Division of Forest Resources is required.

Cooperative Upland habitat Restoration and Enhancement Program (CURE) – The CURE program is designed to increase early successional habitats and improve associated wildlife (including small game and songbird) populations on private land in North Carolina. The CURE Program aims to create enough early successional habitat on private land cooperatives (>5000 acres) to have a measurable impact on local wildlife populations. Through the CURE program, the Commission offers guidance, labor and financial assistance to qualified landowners who sign five-year contracts with the Commission. During the first phase, one cooperative was established within each of three focal areas in the state which represent the best mix of conditions for early-successional habitat development. This initial phase of the pilot program will end in 2006. A program review is currently underway, the results of which will guide the direction of the next phase.

Successful private lands management ultimately involves effective partnerships forged among private landowners and land managers, organizations and agencies (e.g., the Commission, NC Division of Forest Resources, US Fish & Wildlife Service), non-governmental organizations (e.g., the American Farmland Trust, Quail Unlimited, The Nature Conservancy), private industry, County Commissioners, Soil and Water Conservation Districts, and county planning and zoning boards.

Note: For another useful source of information about private lands programming, tools and examples from across the nation, contact Defenders of Wildlife (www.defenders.org) for a final working paper entitled Voluntary Conservation Tools and Programs (Hummon and Cochran 2005).

Challenges and Opportunities

A number of issues make private lands management and conservation a constant challenge, including population growth (and subsequent development), loss of habitat, and economic tradeoffs. Rapid population growth and associated development throughout the southeast continues to result in a net loss of wildlife habitat. From 1950-1990, the population of North Carolina grew by 63% (US Census Bureau 2000). The loss of habitat to "clean farming" practices and some types of intensive forest management continues to be a significant obstacle in private-lands habitat management. Specific challenges include a lack of field borders and brushy field edges, larger fields unbroken by usable habitat, relatively low use of no-till farming practices, significant declines in bottomland hardwood forests and wetlands, loss of pocosin/Carolina bay habitats, and management practices that reduce habitat diversity in forest stands (such as chemical application to control ground cover vegetation). Forest conversion has also created large patches of monotypic forested habitat that does not meet the diverse needs of some wildlife species. The Forest Service estimates that forest acreage in North Carolina has fallen by one million acres (5.6%) since 1990, primarily due to development (Brown 2004).

Driven by technological advances and economic and social pressures, land management practices on private lands have changed dramatically over the past 60 years. Combating future habitat loss is an uphill battle considering future population growth projections. In a 10 year period alone (1990–2000), North Carolina experienced a 21% increase in human population size, and growth is projected to increase by the same amount over the next 25 years (US Census Bureau 2000). Without sufficient incentives, landowners often perceive wildlife as an unaffordable cost, even a liability (Higbe 1981, Noonan and Zagata 1982). Wildlife conservation on private lands must be economically viable in order to reverse negative trends in species and habitat losses. This challenge involves successfully engaging land use planners, developers, zoning boards, and homebuilders associations, in addition to traditional landowners and other traditional stakeholders.

Following are some of the most important issues, and recommendations, to be addressed in strategic private lands planning:

Incentives and Economics

- *Tax structure.* Currently, the tax structures present a disincentive for private landowners to manage wildlife habitat on a large scale (Cobb et al. 2002). Land use evaluations for county tax purposes provide lower tax rates for forestry, agriculture, and horticulture, but not for wildlife habitat management. Tax assessment amendments are needed.
- *Market solutions.* Private landowners are working to meet an economic bottom line. In order to make wildlife a 'part of the equation' we must promote market-based solutions that are economically viable.

Management Issues

- *Land management.* A great deal of land in North Carolina is passively managed because landowners cannot justify the expense of more active land management (e.g., thinning forest stands, maintaining field borders). We must work to encourage and assist landowners in active land management to maintain working lands (e.g., "no till" agriculture, establishment of field borders, restoration of native warm season grasses, prescribed burning).
- *Prescribed burning.* Prescribed burning presents the largest management issue. Historical and continuing fire suppression has created a need for agencies and other large scale land managers to initiate active fire management to mimic native community conditions. Current legislation allows landowners to prescribe burn with reduced liability on 60 acres or less. A Certified Prescribed Burner must be used on burn blocks larger than 60 acres. Certified Prescribed Burners experience difficulty in finding liability insurance to operate. These legal and liability issues are an enormous constraint and will require political action and support to mitigate.

- *Best management practices.* Currently, forestry BMPs are focused exclusively on water quality concerns. Poor water quality, however, also poses a significant threat to aquatic habitat. We must work to ensure that BMPs are robust enough to protect aquatic habitat in addition to water quality, demonstrate to landowners how such related efforts can be beneficial (to natural resources and them as owners), and encourage adoption of BMPs by linking with eligibility in other landowner assistance programs and by promoting comprehensive natural resource planning.
- *Forest management.* To diversify forest practices and reduce the outright conversion of forested habitats through intensive silviculture, we must promote markets, incentives, and technical assistance for alternative management styles for interested landowners.
- *Long-term planning.* Much manpower of natural resource agencies is tied up in reactive management (taking care of problems) instead of proactive planning (looking for opportunities). As our population grows, the number of problems increases and continues to pull manpower away from proactive efforts. We must work to increase the resources (staffing and funding) needed to enable proactive approaches to programs aimed at facilitating and expanding wildlife conservation on private lands (i.e., private lands conservation programming).

Outreach and Awareness/Technical Assistance

- *Technical guidance.* Technical guidance is a limiting factor, both in the amount of initial guidance available and in the ability to subsequently follow up on management efforts. Federal funding provides money to initiate technical guidance, but resources are scant to monitor existing projects. There is a significant need for increased and targeted outreach and technical guidance to private landowners to help them understand the different types of assistance and management practices available, to get participant sign-up, to provide initial and ongoing management guidance, and to encourage participation by other key landowners. There is also need for more interagency cooperation to better serve the needs of landowners with multiple or varying objectives (e.g., for landowners wishing to manage their property for wildlife, wildlife biologists should be on hand to provide advise, in addition to foresters or agricultural extension agents).
- *Local leadership.* We are limited in our ability to reach key private landowners. We must develop effective strategies for reaching key landowners who are influential in their communities and are likely to influence other landowners. We must continue to work with key groups who interact with private landowners (e.g., NC Division of Forest Resources, Natural Resources Conservation Service, US Fish & Wildlife Service, Farm Service Agency, Soil and Water Conservation Districts, Cooperative Extension, and local land trusts) to increase awareness and interest programs to benefit species and habitats on private lands.
- *Long-term support.* Many land protection efforts limit their focus to the initial acquisition or easement protection, without a long-term plan for conservation restoration, management, monitoring, or land stewardship. We must highlight and support opportunities for ongoing land management and restoration efforts on protected lands by coordinating protection and management assistance programs, and stewardship funding.
- *Local governments.* Some agency efforts to work with county governments and local zoning boards to promote land protection have been poorly received. Some officials perceive that the ideas of economic development/progress and wildlife habitat conservation are in direct conflict. We must find ways to reduce the perceived conflicts and reach common ground on issues of development, ordinances, zoning regulations, etc. through progressive partnerships that focus on common goals and objectives. We must do a better job of demonstrating how conservation activity can be a boon to local economies as opposed to an obstacle.

Participation in Conservation Programs

- *Program simplicity.* Every year private land conservation programs gain additional support, but also increase in complexity. Each year there are more programs, more choices, and more agencies and organizations involved in private lands issues. This translates to confusion among landowners in terms of what programs they qualify for and who administers such programs. And from a

programming standpoint, it makes it more and more difficult to come up with simple, clear, straightforward solutions. Private land programs need to be more streamlined, better coordinated, and more effectively presented to the public.

- *Program coordination.* The coordination role for private-lands programming has never been stable; different agencies oversee different programs. Key agencies and organizations involved in private lands programming in North Carolina should strive for better program coordination, with the goal of providing clear and consistent leadership on programming options to landowners.
- *Local leadership*. 'Centralized' leadership does little to gain the trust of local landowners, as it removes the groups they trust from decision-making and priority setting. While striving for clearer and more straightforward programming (to reduce confusion over program requirements, etc.) we must grow the level of responsibility and authority of local organizations (e.g., county commissioners, Soil and Water Conservation Districts) to implement state-sanctioned programs and strategies at the local level, with heavy input from landowners, to maintain and nurture their trust.

Corporate Landowners

- *Incentives.* Currently, there are no existing large-scale incentive programs designed to improve wildlife stewardship by corporate landowners. But there are incentives that could be available to pay for training contract burners or legislative action to reduce liability, which could do as much as a direct habitat management incentive. We must continue to develop and offer incentives for corporate landowners in order to affect positive on-the-ground impacts on the considerable corporate landholdings in the state.
- *Prescribed burning.* Burning on private and corporate timber lands has drastically declined over the past 20 years, in part due to changes in silvicultural practices, lack of internal resources/trained private contractors, smoke management issues, and potential liability. We must increase the number and availability of private contractors to conduct burning on private and corporate lands.
- *Large land holders.* Timber Investment Management Organizations (TIMO) are now the largest group of timberland owners in the South. Some TIMOs employ their own foresters and property managers, others use consulting foresters. Timber investments are usually managed in one of two ways: separate accounts (where investors purchase timberland with the intent to manage it for returns over an indefinite term), and close-ended accounts (in which multiple investors purchase timberland for a set period, e.g., 10–15 years, and then sell). In order to influence TIMO land management to include considerations for wildlife and habitats, we must work with TIMO employed land managers (or the appropriate contracting organizations) to influence TIMO land management practices. We must also seek ways to integrate a conservation ethic into the decision making process of the parent financial organizations. Especially in the case of close-ended holdings, land conservation agencies and organizations must also explore acquisition opportunities for those TIMO lands that are up for sale. Such acquisitions will be a challenge because TIMO profits are directly related to the sale price.

Research

- *Size and scale impacts.* We do not fully understand all the effects of different management scales and patch size on species composition. We need to encourage large-scale monitoring and research (e.g., timber company lands) vs. smaller tracts, to evaluate differences in species composition/management impacts (e.g., how large is large enough to support long-term viable populations of species of concern?). We must also move beyond presence/absence studies on private lands and assess species productivity to better understand the conservation needs of species of concern.
- *Monitoring and evaluation.* We need to evaluate the effectiveness of programs focused on species and habitats in order to justify programs and articulate the benefits of funding such programs. Before and after population evaluations on small scale projects are challenging, but are necessary to show benefit to the species for which we are undertaking the project.

Priority Focus Areas

- *Small land holdings.* The vast majority of forest and agricultural landowners in North Carolina own less than 50 acres (NASS 2002, Butler and Leatherberry 2004). While there is efficiency to be gained in targeting large landowners, we must also facilitate options for neighboring landowners to work together in order to conserve larger, contiguous tracts of land under multiple ownerships and thereby affect landscape-scale wildlife and habitat conservation.
- *Setting priorities.* Currently, many natural resource agencies that work with private landowners take opportunities as they come; we wait for landowners to call us. If we could expand our prioritization of areas in the state in which to focus our programming efforts, and if we had the resources to support land protection specialists, we could actively seek out landowners. We must identify priority areas in which to engage in private lands programming to increase our effectiveness and our odds of being successful. (For more about land conservation priorities, see Chapter 4C).
  - The Commission's CURE Program focal areas in the upper Coastal Plain and western Piedmont of North Carolina are a logical place to continue work for early successional habitat restoration and management (Howell et al. 2002).
  - Other key lands in which to focus private lands initiatives include floodplain zones, land adjacent to existing conservation holdings, corporate lands (e.g., timber company lands, TIMOs), and Tobacco Settlement buyout lands.
- *Proactive efforts.* Land conservation often becomes a higher priority for a community once significant development has occurred and open space has been lost. However within these areas, opportunities for large-scale, unfragmented land conservation have been lost and land prices can become prohibitively high. There is need to focus private land conservation in areas where land values aren't prohibitive, but those same areas are often where local leaders are trying to draw in industry to improve economic development. We must develop strategies to focus land conservation in affordable areas and we must make a legitimate connection between economic viability and private land conservation.

Coordination and Communication

- *Professional organizations.* We must continue to work with professional organizations to improve training opportunities for and expand contacts and communication with private landowners (e.g., Association of Consulting Foresters).
- *Partnerships.* Agencies, professional societies (e.g., North Carolina Chapter of The Wildlife Society), organizations, and universities concerned with natural resource protection should seek partnership opportunities in order to facilitate publication development and dissemination, to identify shared goals and objectives, and to reduce redundant efforts.

Forestry Summit and Working Lands Summit Recommendations

Recognizing the importance of both forestry and agricultural resources in perpetuating private lands conservation in North Carolina, in 2004 the One North Carolina Naturally Program helped sponsor two Forestry Summits (led by the NC Division of Forest Resources) and the Summit on Working Lands Conservation (led by the NC Association of Soil and Water Conservation Districts). The Summit on Working Lands Conservation resulted in a working lands conservation plan *(draft in progress as of spring 2005)*. The recommendations put forth in those summits addressed the following issues:

Forestry Summit Issues

- Urbanization
- Increased Risk of Wildfire
- Natural Disasters
- Forest Health
- The Next Generation: Reaching Tomorrow's Forest Landowners Effectively
- Necessity of Present Use-Value Taxation & the Right to Practice Forestry
- Value of Professional Forestry Assistance and Forestry Associations
- Growth of the NC Forest Development Program and other Cost Share
- Sustainability of Forest Industry Markets and Wood/Fiber Product Research
- Working Lands Opportunities with Conservation Easements and Trust Funds

Working Lands Summit Issues

- Private Lands; Public Benefits
- Balancing State Policies and Priorities in Conservation
- Local Leadership and Partnerships
- Existing Tools
- New Tools
- Limited Resource and Beginning Farmers and Landowners
- Working Lands Conservation Funding

As the issues and recommendations addressed within each of these efforts reinforce many of the same needs addressed above, we support implementation of the Forest and Working Lands summit recommendations. We direct readers to Appendix J to view the recommendations and summary reports for both summits.

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C. Land Conservation Strategies

Land conservation planning, land protection, and land acquisition are conservation tools employed by numerous agencies and organizations in North Carolina, with varying degrees of focus. Land conservation for the benefit of wildlife is a primary goal of the NC Wildlife Resources Commission. The Commission uses many tools to achieve this goal, including wildlife and forest management, fee simple land acquisition, easement acquisition, stream restoration, technical guidance to private landowners, and regulatory actions. As related to the Plan, the Commission's primary objective for land conservation is to achieve species, habitat and ecosystem conservation. Yet this objective is just one of several land conservation objectives held by the Commission and other agencies and organizations in the state, who are also primary land conservation partners. Other objectives include the provision of public recreation opportunities, open space, water quality protection, and military activity buffers, just to name a few[1]. Land acquisition is a major tool used by the Commission to achieve these objectives.

As one of the most expensive conservation tools, land acquisition is largely driven by the availability of funding opportunities, as well as local land markets and owner interest in selling. Public agencies and organizations, therefore, often work in cooperation to acquire and then manage lands that become available for purchase. Numerous funds are available in North Carolina to support particular types of land conservation; successful acquisition is a matter of matching site priorities with the appropriate trust fund donor. Key funding sources in North Carolina include the:

- **Clean Water Management Trust Fund** – This fund supports projects to enhance or restore degraded waters, protect unpolluted waters, and/or contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits.
- **Land and Water Conservation Fund** – This federal fund supports acquisition and development of public outdoor recreation areas and facilities. The program is intended to create and maintain a nationwide legacy of high quality recreation areas and facilities.
- **Natural Heritage Trust Fund** – This fund provides grants to state agencies to support the acquisition of the most significant natural and cultural lands of our state and to support the inventory of natural areas.
- **Parks and Recreation Trust Fund** – This fund primarily supports state and local parks and recreation projects (e.g., recreational trails, greenways, community centers).
- **North Carolina Farmland Preservation Trust** – This fund supports the preservation of active farmland on prime soils in the state, and depends on annual appropriations by the General Assembly.

The Ecosystem Enhancement Program, developed through a 2003 Memorandum of Agreement between the NC Department of Environment and Natural Resources, the NC Department of Transportation, and the US Army Corps of Engineers, also has huge potential to dictate future land acquisitions in North Carolina through a watershed approach to compensatory mitigation from unavoidable impacts to stream and wetlands associated with highway development projects. Private land trusts, local and state government agencies and other groups also contribute significantly to land protection through fee simple acquisition and conservation easements.

Since the creation of these trust funds, the Commission has purchased more approximately 162,000 acres in acquisitions, in large party by working cooperatively with non-profit land trusts. The Commission will continue to use land acquisition to help meet our conservation objectives and will continue to work cooperatively with non-profit land trusts and other agencies and organizations to do so.

[1]The discussion that follows has primary bearing on land conservation activities aimed at the conservation and protection of species, habitats, and ecosystems in North Carolina.

> *Note:* A look at land management practices on private lands is an essential part of a complete discussion about land conservation issues in North Carolina. For a more directed discussion of private lands issues, see Chapter 4B, Private Lands Habitat Management Strategies.

Agencies and organizations involved in land protection and acquisition often focus and prioritize their efforts by applying criteria that help them identify important land acquisition areas. These criteria may include Natural Heritage Program element occurrence data, water quality data, important wildlife corridor areas, important wildlife habitat areas, key aquatic sites, degree of habitat connectivity, and proximity to existing protected lands. These types of analyses help agencies and organizations be more efficient at buying or protecting land. Not only can these analyses indicate where land acquisition should be focused, but they can also provide documentation to make projects more competitive for grants.

Land Conservation Partners

Partnerships are a critical aspect of land acquisition and conservation efforts across North Carolina. The following section highlights the land conservation principles, strategies, and priorities of a number of key land acquisition partners in North Carolina.

The NC Wildlife Resources Commission purchases and manages land in three classifications: Game Lands, wildlife conservation areas, and other recreational sites. Game Lands are managed for a variety of species and thus require a variety of land management techniques. Wildlife conservation areas and other recreational sites are managed on a site specific basis, according to the intended use and function of the site. Land acquisition increased dramatically with the creation of the Natural Heritage Trust Fund and Clean Water Management Trust Fund. Commission staff use these funds to protect natural areas and water quality and to add land to the Game Land program managed by the Division of Wildlife Management. In an effort to manage and plan for the increased acquisition program, the Division created a Land Acquisition Committee. The Committee initially contained staff from the Land Management Section of the Division of Wildlife Management but membership was later extended to include staff from the Research and Surveys and Nongame Sections. The expanded Committee developed a list of acquisition priority criteria that allowed for the creation of land acquisition focus areas (Figure 4C.1). The Committee actively searches for land acquisition opportunities in these focus areas (but will also consider quality tracts that do not fall in a focus area). In 2005, the Committee will expand, once again, to include Division of Inland Fisheries staff working with aquatic nongame, stream restoration, and fisheries management. New funding opportunities for stream restoration and easement acquisition will require an agency approach to land acquisition and the newly expanded Committee should answer the challenge.

The Land Acquisition Committee meets periodically to discuss land acquisition projects and to plan for funding cycles. Priorities of the Committee necessarily reflect the mission of the agency. Their objectives include the expansion and connection of existing Game Lands; the provision of public hunting and fishing opportunities; the protection of wildlife migration corridors and connectivity of priority habitats; and the protection and restoration of aquatic habitats.

Opportunity, a factor that by definition is not easily anticipated, also plays a significant role in Commission acquisitions and cannot be eliminated from the decision-making process. An available site that may not currently support a known Heritage-tracked species or a key habitat type still has the potential of such in the future (through surveys, inventories, restoration efforts). Other aspects of opportunity include landowner interest in selling, funding streams, and project negotiations for mitigation sites.

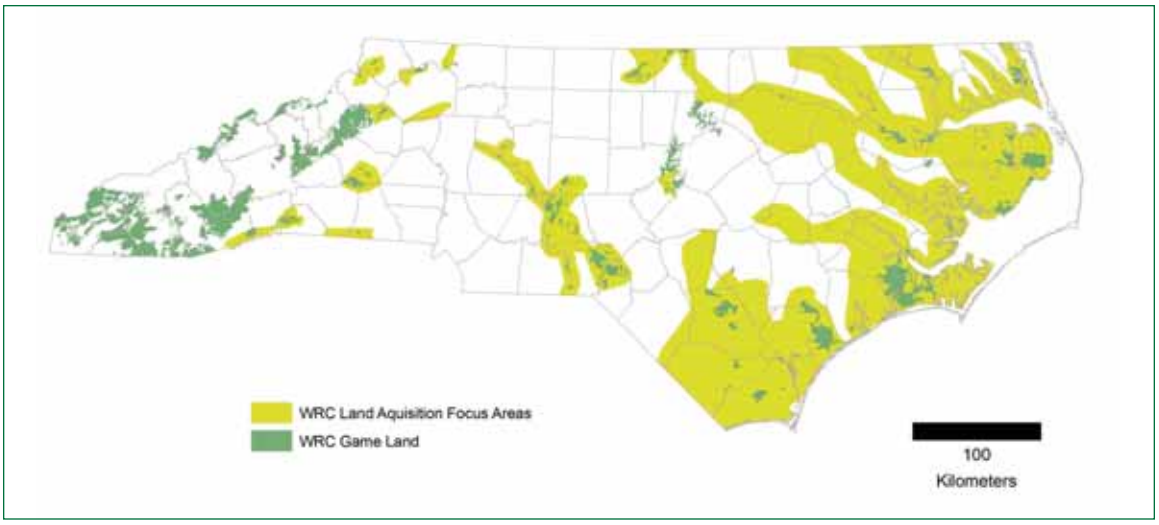

Figure 4C.1. Commission Game Lands and future focus areas, 2001

The NC Natural Heritage Program collects and manages information on rare plant and animal populations and significant natural communities across the state. Using this information, the NC Natural Heritage Program has identified more than 2,000 natural areas of national, state and regional significance in North Carolina, termed Significant Natural Heritage Areas (NCNHP 2005) (Figure 4C.2). A natural area's significance may be due to the presence of rare species, rare or high quality natural communities, or other important ecological features. While 500 of these natural areas have been protected (as of 2005), the majority of the sites remain unprotected and additional important natural areas are being identified each year. An important new component of this effort has been a comprehensive assessment of aquatic habitats and the identification of Aquatic Significant Natural Heritage Areas (utilizing data from the Commission and other partners). Conservation of these areas will protect the state's rare aquatic fauna. The NC Natural Heritage Program has also recently completed (as of 2005) a conservation assessment for the North Carolina Coastal Plain, focusing on both the quality of habitats at particular locations, and the integrity of their connections to other such habitats across broad areas of the landscape, in an effort to inform biodiversity inventory and conservation efforts.

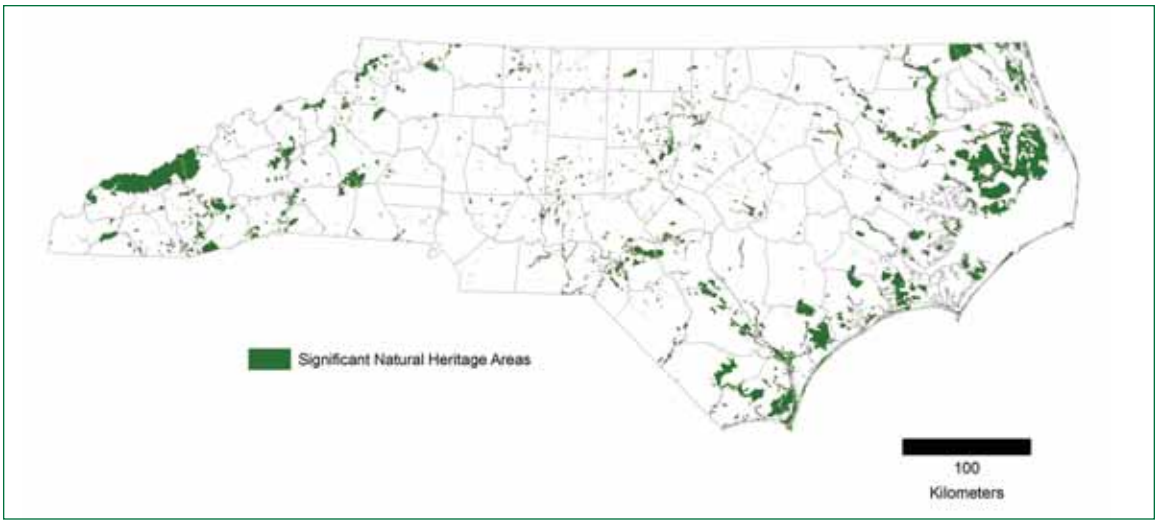

Figure 4C.2. Significant Natural Heritage Areas in North Carolina, 2005.

The Nature Conservancy works to protect biological diversity and functional landscapes through land conservation. Toward that end, their efforts to set ecoregional site conservation priorities represent some of the most directed work in this arena (Groves et al. 2003). The process relies heavily on Natural Heritage Program data and expert feedback. Within the three ecoregions that overlap North Carolina's borders (the Southern Blue Ridge, Piedmont, and Mid-Atlantic Coastal Plain), The Nature Conservancy (TNC) has identified a total of 464 sites in the state that, if protected, would likely ensure the survival of the three ecoregion's native plants, animals, natural community types, and critical ecological processes (TNC and SAFC 2000, TNC and NatureServe 2001, M. Bucher, pers. comm. 2004). TNC has also conducted a freshwater biodiversity assessment of the southeastern United States (Smith et al. 2002). That effort helped to identify critical areas for freshwater biodiversity conservation in the region, among them approximately 70 priority sites in North Carolina (Figure 4C.3).

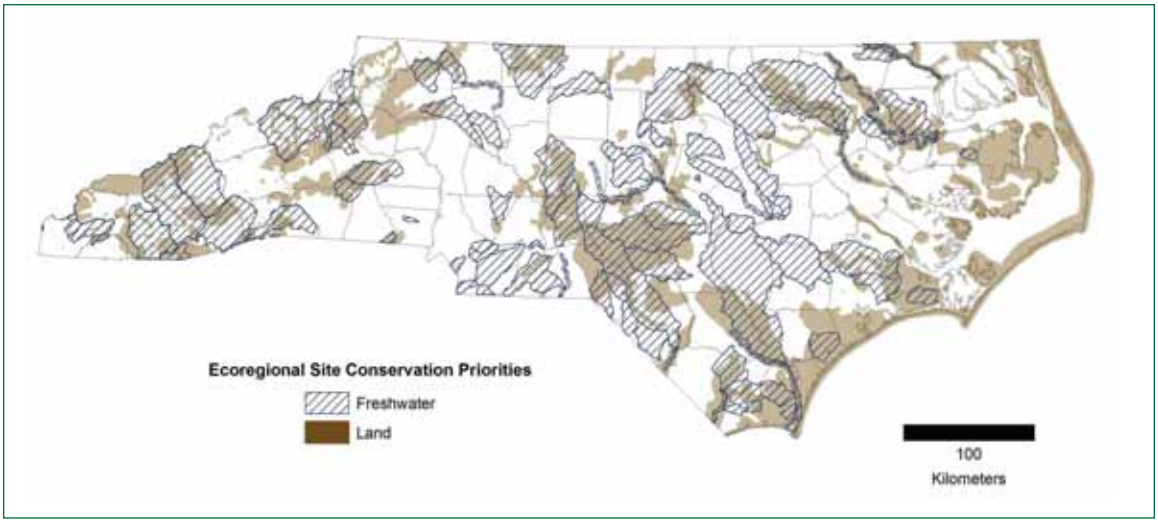

Figure 4C.3. Priority conservation areas of The Nature Conservancy in North Carolina, 2005.

The 24 land trusts that operate in the state also contribute significantly to land conservation, both through outright land acquisition and through conservation easements with landowners. The umbrella organization representing all of the individual land trusts in North Carolina is the Conservation Trust for North Carolina (CTNC). It acts as a "hub" for information exchange, coordination, public policy representation, and financial assistance. CTNC works cooperatively with private, local and regional land trusts across the state to help landowners protect natural resources through voluntary conservation methods. According to CTNC, the cumulative total of land protected by North Carolina's private land trusts is 161,900 acres in 820 places as of 2003 (72,510 of those acres are protected by conservation easement). 2004 figures (which were not available before the completion of the Plan) are expected to increase this figure significantly.

The One North Carolina *Naturally* Initiative promotes and coordinates the long-term conservation of North Carolina's land and water resources. The Office of Conservation and Community Affairs (within the NC Department of Environment and Natural Resources) manages the program by leading the development and implementation of a comprehensive statewide conservation plan involving government agencies, private organizations, landowners and the public. This voluntary program pursues the conservation of significant natural areas, working farms and forests, and our coastal estuarine system. One NC *Naturally* also provides support for development of regional open space plans, providing assistance through regional meetings and resource materials. One NC *Naturally's* regional planning process provides an effective forum for decision-making about conservation in our communities. By first working with local and regional groups to address the specific needs of each region, the state can move in an overall direction that does not conflict with goals of any particular region. Currently, 92 counties across North Carolina are involved in 14 local and regional open space planning efforts. Local and regional open space planning efforts provide

invaluable new information to add to the statewide conservation plan. Data from each of these regional plans is incorporated into the web-based NC Conservation Land Map Viewer (http://www.onencnaturally.org/mapviewer/) where the data is continually updated. This online decision support tool can provide key information vital to successful planning efforts.

Many other state agencies (e.g., NC Division of Water Quality, NC Division of Parks and Recreation), organizations (e.g., NC Audubon), and initiatives (e.g., Triangle Greenprint, Voices and Choices of the Central Carolinas) also set their own land conservation targets, in many cases using information generated through the aforementioned efforts. While, again, it should be noted that there are many potential objectives related to land conservation efforts (species and habitat protection being just one), all of the groups above contribute significantly towards efforts to conserve and protect land in North Carolina.

Conservation Opportunity Areas in North Carolina

The Commission, the NC Natural Heritage Program, and The Nature Conservancy have long been partners in land conservation and protection efforts in North Carolina to meet the shared objectives of species and habitat conservation. To date these partnerships have been largely *ad hoc*. Yet with new initiatives on the horizon in North Carolina aimed at increasing the level of funding available for land conservation in the state (e.g., Land for Tomorrow Coalition), these groups view the development of the Plan as an opportunity to be more systematic and comprehensive in identifying shared land conservation priorities. So, as part of our Plan development process, we assembled these land conservation players to compare the processes each group uses to set land conservation priorities. Our goals were to, for each group's set of priority sites, identify key habitat types and threat levels associated with each site, and using that information, identify shared land acquisition priorities that the three groups could cooperatively work towards. Though we were unable to finalize those efforts within the timeframe of the initial Plan development process, we will continue discussions among these groups to work towards this goal in the near future[2].

Relative to Commission priorities, the areas shown in Figure 4C.1 and the habitat priority types listed in Box 1 must be considered among other land conservation objectives of the agency. These priorities can be complementary to one another, but are not always necessarily synonymous. Again, land acquisition committee objectives include:

- Expand and connect existing Game Lands and Wildlife Conservation Areas
- Provide public hunting, fishing, and wildlife observation opportunities
- Provide wildlife migration corridors and connectivity of priority habitats

In addition, the Commission's Division of Inland Fisheries plans to complete a watershed prioritization analysis in 2005 at the 14-digit hydrologic unit level to identify land conservation priorities. This project will integrate information from our partners (as described previously) with the objective of protecting and enhancing water dependent fauna.

Box 1: Priority Habitat Types

The following habitat types were identified as being especially key for land acquisition by Commission biologists involved in the Plan development process, due to a combination of factors (species assemblages supported by those habitats, threats/risks to the habitat, and/or uniqueness or rarity of the habitat type):

- Beaches and estuarine islands
- Coastal wetlands
- Maritime forest
- Longleaf pine forest
- Small wetland communities
- Mountain bogs
- Piedmont early successional habitat
- Floodplain forest
- High elevation habitats
- Caves/mines
- Rock outcrops
- Streams and key aquatic habitats (*see maps in Chapter 5B*)
- Strategic parcels (e.g., large unfragmented tracts, tracts in close proximity to existing holdings)

[2] Efforts to expand involvement by other potential land conservation partners in the state (e.g., the Department of Defense, the US Fish & Wildlife Service) should also be considered.

Conservation Planning Concepts and Case Studies

The discussions above lend assistance to prioritization among sites and focus areas in North Carolina (which may range in size from small isolated tracts to multi-county regions). Within a particular site or focus area (e.g., among individual tracts of land), there are some key conservation planning concepts to consider in order to reach the maximum potential of a site and to fulfill the priorities of all partners, such as core areas, buffers, corridors, and managed areas. So we now explore in detail two land conservation efforts underway in the state, case studies that represent successful land conservation partnerships accomplished at the local or regional scale, which serve as examples of how to affect meaningful conservation on the ground.

CASE STUDY 1. North Carolina Sandhills Conservation Partnership

The North Carolina Sandhills region is approximately one million acres in extent, covering all or parts of eight counties. It is best known for being the home of the longleaf pine ecosystem, an ecosystem known for its incredible species diversity. The North Carolina Sandhills also contain the second largest concentration of the endangered red-cockaded woodpecker in existence. However, over the years, the longleaf pine ecosystem in the North Carolina Sandhills has been diminishing due to rapid changes in land use patterns. Fragmentation, loss and lack of management of longleaf pine habitat caused a significant reduction in the number of red-cockaded woodpecker groups in the North Carolina Sandhills. Loss of longleaf pine habitat has occurred to such an extent that this habitat type has been identified as a globally threatened status by The Nature Conservancy.

Competing land uses include military training on Fort Bragg and Camp Mackall, horse farms, residential and commercial development and golf course construction. Traditional private forested lands are being converted at a rapid rate leaving a fragmented mosaic of land use patterns surrounding and separating two distinct aggregations of public lands; approximately 170,000 acres in the Fort Bragg/Weymouth Woods/McCain complex and the approximately 65,000 acres in the Sandhills Game Land/Camp Mackall complex. Since the late 1970's these public lands have fast become the last bastions of managed longleaf pine habitat and associate natural species diversity in the North Carolina Sandhills.

To attempt to turn the tide of this habitat loss on private lands, in 1995 the US Fish & Wildlife Service and the US Army collaborated to open a new US Fish & Wildlife Service project office in the heart of the Sandhills with staff dedicated to one mission, reach out to private landowners to encourage them to restore, manage and protect longleaf pine habitat on their property. Today, through the NC Sandhills Safe Harbor Program, the US Fish & Wildlife Service is working with over 91 landowners on 48,000 acres of land to provide longleaf pine habitat that supports 56 groups of red-cockaded woodpeckers.

In 1995, the Army Environmental Center and Fort Bragg also entered into a cooperative agreement with The Nature Conservancy, establishing the Private Lands Initiative. The primary purpose of the Private Lands Initiative is to purchase fee simple ownership of or perpetual easements on key conservation lands specifically to permanently protect and manage longleaf pine habitat for red-cockaded woodpeckers. Under the cooperative agreement, The Nature Conservancy holds title and management responsibility for any lands purchased under the Private Lands Initiative or has the option of transferring ownership to another partner such as the NC Wildlife Resources Commission or the NC Division of Parks and Recreation.

In order to sustain the longleaf pine ecosystem and recover the North Carolina Sandhills population of red-cockaded woodpeckers, both public and private lands need to be managed in concert. A collaborative process to integrate private and public land management concerns and objectives was needed to provide a vehicle to focus the efforts of a variety of stakeholder groups. Thus was born the North Carolina Sandhills Conservation Partnership (NCSCP) (Figure 4C.4). The mission of the NCSCP is:

> *To coordinate the development and implementation of conservation strategies for the red-cockaded woodpecker (Picoides borealis), other native biota, longleaf pine and other ecosystems in the Sandhills of North Carolina.*

The NCSCP was formed in 2000 with the specific intent to facilitate collaboration between various federal, state and non-profit conservation groups for the purpose of conserving the vanishing longleaf pine ecosystem and recovering the endangered red-cockaded woodpecker in the North Carolina Sandhills (see USFWS 2003 for recovery plan). The current Steering Committee members represent the US Fish & Wildlife Service, US Army at Fort Bragg, US Army Environmental Center, NC Wildlife Resources Commission, NC Division of Parks and Recreation, The Nature Conservancy, Sandhills Area Land Trust and the Sandhills Ecological Institute. The NCSCP continues to seek input from over 18 stakeholder organizations as it continues to develop a landscape-level strategic conservation plan for the Sandhills. County and municipal viewpoints about conservation issues have been provided through the Fort Bragg/Pope Air Force Base Regional Land Use Commission.

This group was revitalized for the sole purpose of providing community based input into the partnership's planning process.

The NCSCP has six active stakeholder working groups that are charged with developing selected sections of a Sandhills Conservation Plan. These sections include a reserve design, communications plan, and strategies for land protection, red-cockaded woodpecker recovery, and natural resource management. The development and implementation of the Sandhills Conservation Plan is supported by the GIS working group which has since evolved into the Sandhills GIS Association. This association is tasked with developing strategies to share, store and disseminate data to benefit the NCSCP mission, other regional initiatives and individual stakeholders. A Sandhills GIS Coordinator position, regional database and server have been created to support the NCSCP and its mission.

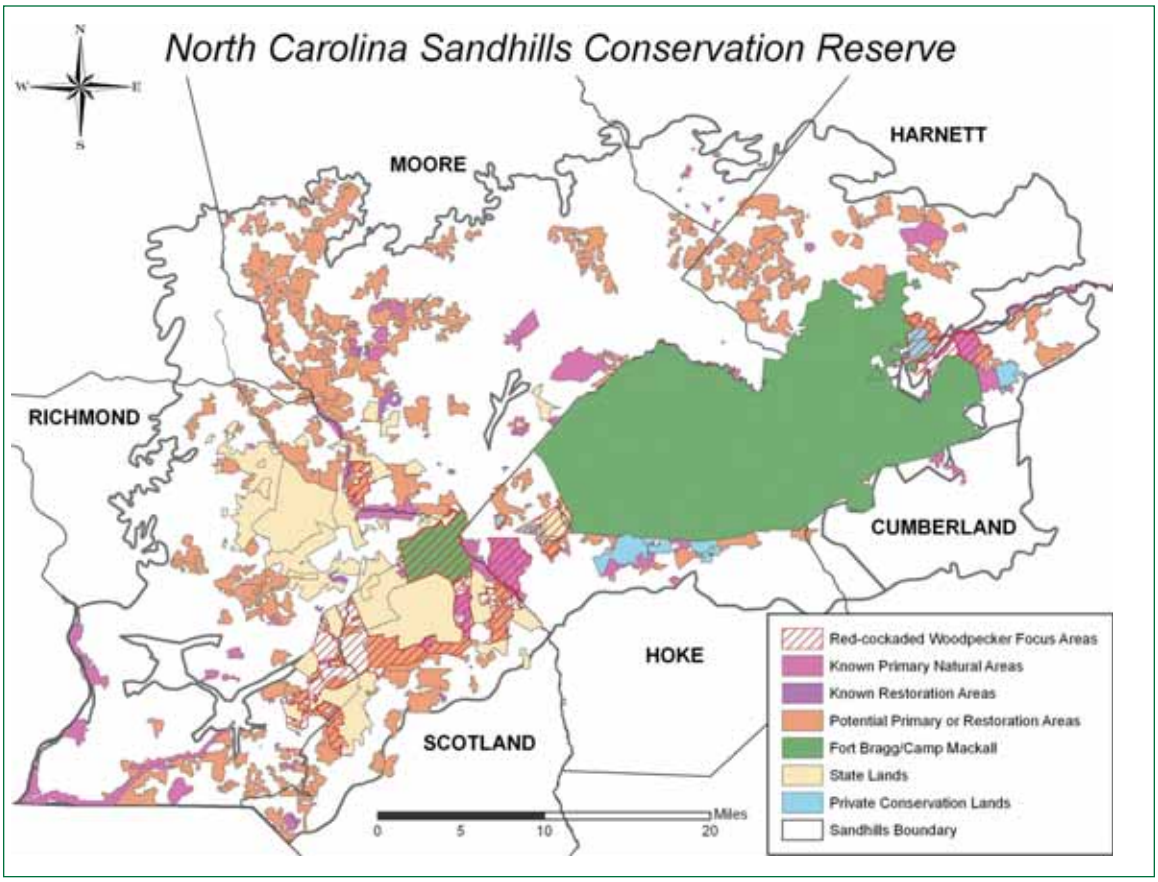

Figure 4C.4. North Carolina Sandhills Conservation Reserve.

The final Sandhills Conservation Plan will include: a reserve design identifying and ranking those areas of the Sandhills that are critical for red-cockaded woodpecker recovery and to sustain other identified conservation targets; a landscape-scale resource management strategy emphasizing collaborative methods to "seamlessly" manage longleaf pine communities across ownership boundaries; land protection strategies and options necessary to acquire in-perpetuity protection of lands identified in the reserve design; a communications plan to ensure continued coordination among stakeholders and support of the general public; a GIS model to assist in designing the Sandhills conservation reserve, implement management recommendations and to monitor success of the various strategic components of the plan.

Reserve Design

The intent of the reserve design is to identify areas of the Sandhills landscape requiring some level of conservation protection and management based on 1) the presence or predicted presence of important federal or state species and natural communities and/or 2) other resources. The reserve design working group based its initial draft 2002 reserve design (Schafale 2002) on aerial photo interpretation, data from the North Carolina Natural Heritage database, data collected during county-wide natural community inventories, and field surveys of specific properties enrolled under the Sandhills Safe Harbor program. Specifically, this information included element of occurrence data for federally-listed species, state listed rare species and natural community types. Spatial data (e.g., land cover, soils and hydrology) was used in combination with biological descriptors, such as species habitat requirements, to identify and rank possible conservation targets within the Sandhills reserve using a GIS.

The interim reserve design identifies parts of the landscape that have biological or spatial significance in their own right, or are important because they provide habitat corridors between or buffer adjacent existing core natural resource lands, such as those found on the Sandhills Game Lands and Fort Bragg. Corridors in general address the needs of species to disperse or move between larger natural areas that are spatially fragmented. Lands within corridors can also provide all or part of the habitat required by a given species or guild of species. Buffering critical core natural resource areas with lands that have some type of compatible land use is also critical to ensuring the long-term ecological health of the core lands.

The interim reserve design also includes priority focus areas identified in the Sandhills red-cockaded woodpecker recovery strategy as critical to restoring the demographic and genetic viability necessary to recover the Sandhills red-cockaded woodpecker population. The result is an initial portfolio of existing and potentially high or medium quality longleaf pine habitat that is either intact or potentially restorable. Further field data collection is needed to assess the accuracy of the modeling process used to predict the location of these longleaf pine communities on the Sandhills landscape. Once the list of conservation targets based on Natural Heritage data species is finalized, other data will be added to the GIS analysis for use in ranking the protection priority of the acquisition targets. These data include ownership information, land use, spatial relevance of target parcels to proposed corridor or buffer areas, proximity to existing public conservation lands, and threat level. The goal of using both biological and non-biological information is to find balance between ecosystem and single species management objectives as well as other major concerns of the stakeholders, such as encroachment of incompatible development adjacent to public lands. The reserve design will be continuously updated and refined as new information becomes available.

The final Sandhills reserve design will focus on protecting specific portions of the landscape necessary to sustain key conservation targets at the species, community and ecosystem levels. The 2002 interim reserve design incorporates:

- Core public lands that vary in primary land use but all of which are actively managed to promote conservation of longleaf pine habitat and associated natural communities;
- Properties owned and managed by conservation organizations such as The Nature Conservancy and the Sandhills Area Land Trust;
- Known Significant Natural Heritage Areas designated by the North Carolina Natural Heritage Program;
- Predicted areas of high, medium and low value longleaf pine habitat and, specific focus areas identified by the Red-cockaded Woodpecker Working Group as requiring protection in order to achieve recovery of the Sandhills red-cockaded woodpecker populations.

In 2004, a *Site Conservation Plan for the North Carolina Sandhills* (Nelson 2004) was completed using The Nature Conservancy's 5-S process (see Groves et al. 2003). This plan seeks to establish baselines for the current health status of the selected targets in the areas of size, condition and landscape context. It lists specific conservation targets, potential threats to the health of these conservation targets, strategies to abate these threats and general measures of success. It is intended to be used as a guide for additional GIS analyses that will update and expand the 2002 interim reserve design to include additional targets beyond longleaf pine habitat and red-cockaded woodpeckers.

NCSCP Success Highlights

- The NC Department of Agriculture, the NC Division of Parks and Recreation, the NC Wildlife Resources Commission and The Nature Conservancy have agreed to manage their lands to promote recovery of the Sandhills population of red-cockaded woodpeckers. Originally, only Fort Bragg had the responsibility to mange at the recovery level. This is a significant contribution to the Sandhills recovery effort.
- Since 2000, fee simple ownership or conservation easements have been purchased on 8,227 acres of new lands which are now under in-perpetuity protection and management.
- In 2001, four of the partners, the US Fish & Wildlife Service, Army Environmental Center, The Nature Conservancy and the Sandhills Area Land Trust co-located in a new Conservation Center of the Sandhills, a "store front" office accessible to the public. The ability to communicate in-person on a daily basis has proven invaluable in leveraging individual organization's contacts and resources and has resulted in a much more efficient approach to acquiring conservation protection of key lands in the Sandhills.
- The Sandhills Regional Database was established in 2004. New regional datasets have been created and are available to participating stakeholders.

The NCSCP model has been exported to other areas of the state. One example is the Onslow Bight Conservation Forum (following case study). It has also contributed to the establishment of a much larger endeavor called the Sustainable Sandhills Initiative. Sustainable Sandhills is a cooperative venture involving numerous stakeholders from the Sandhills region of North Carolina. It promotes consensus, cooperation, shared visions and collaborative actions. Sustainable Sandhills is a model for regional sustainability planning that preserves natural resources and enhances economic development, improving the quality of life in the region for current and future generations. To learn more about the NCSCP effort contact Pete Campbell (pete_campbell@fws.gov) and see Nelson (2004).

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CASE STUDY 2. North Carolina Onslow Bight Conservation Forum

The Onslow Bight Landscape area of eastern North Carolina contains a unique landform of barrier islands, marshes, riverine wetlands, pocosins, longleaf pine savannas and many other coastal ecosystems (Figure 4C.5). The area supports nationally significant occurrences of animal and plant communities, several of which are endemic to the region. The rural character of the area, coupled with the flora and fauna and supporting geophysical characteristics, have created a natural environment with abundant opportunities to enjoy fishing, hunting, camping, hiking, canoeing, and other resource-based outdoor recreational opportunities. Many residents, permanent and seasonal, have chosen the area because of the many amenities afforded by the natural environment. The Onslow Bight landscape area also includes two military installations, Marine Corps Base Camp Lejeune and Marine Corps Air Station Cherry Point.

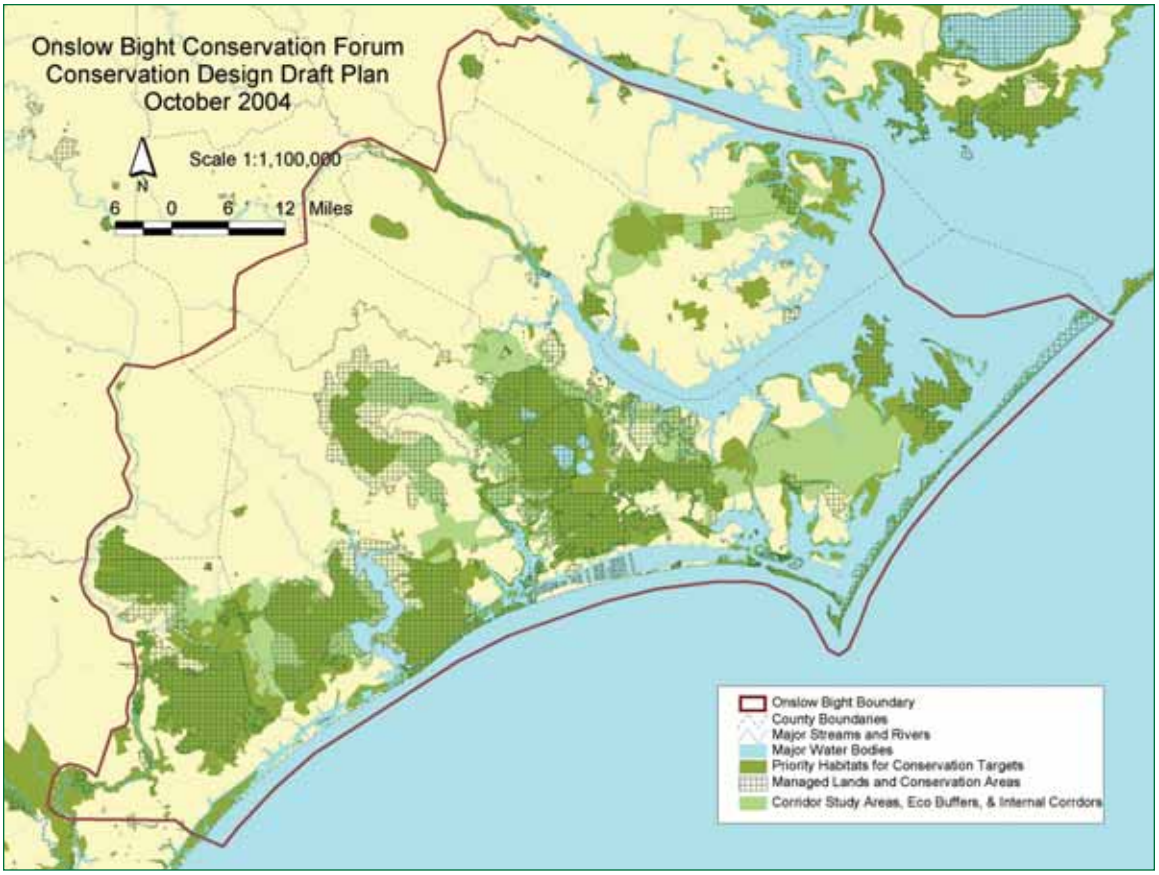

Figure 4C.5. Onslow Bight region, North Carolina, 2004.

However, rapid population growth is fueling urbanization, changing the area's rural character, threatening its natural resources, and encroaching on key military installations and their activities. For the last several years Camp Lejeune has been focused on the development of a buffer of compatible land use surrounding its military ranges. Seeing the success that Fort Bragg has had in the Sandhills region with a landscape-scale collaborative conservation effort (*see previous case study*), Camp Lejeune joined a forum of regional land managers and conservation organizations, the North Carolina Onslow Bight Conservation Forum, to enhance cooperation and communication regarding regional conservation issues within the Onslow Bight landscape. The participants in the forum include: The Nature Conservancy, NC Department of Environment and Natural Resources, NC Department of Transportation, NC Wildlife Resources Commission, the NC Coastal Land Trust, representatives of the Marine Corps (both Cherry Point and Camp Lejeune), the US Fish & Wildlife Service, the US Forest Service, the Natural Resources Conservation Service, the North Carolina Coastal Federation, and others. The mission of the North Carolina Onslow Bight Conservation Forum (NCOBCF) is:

To provide for open discussion among the participants concerning the long-term conservation and enhancement of biological diversity and ecosystem sustainability throughout the Onslow Bight landscape compatible with the land use, conservation and management objectives of the participating organizations and agencies.

The Onslow Bight Conservation Design Plan (2004) is the first iteration of this conservation vision. The plan defines conservation targets, sets forth conservation priorities within the landscape, and articulates certain actions that NCOBCF members may take individually or in mutual cooperation to work towards the vision. This plan will evolve as conservation work by members and other organizations proceeds and as additional data and information are acquired. The Conservation Design Plan presents acquisition/protection strategies as well as management and action strategies.

The Onslow Bight landscape includes many large areas managed for various purposes including conservation, as well as numerous smaller conservation sites and unprotected Significant Natural Heritage Areas (SNHA) designated by the NC Natural Heritage Program. The larger managed areas are Holly Shelter Game Land, Angola Bay Game Land, Camp Lejeune Marine Corps Base, Croatan National Forest, Hofmann Forest, Cherry Point Marine Corps Air Station, Cedar Island National Wildlife Refuge, North River Farms, Cape Lookout National Seashore and Goose Creek Game Land.

Conservation targets at the species, community and ecosystem level were set for the Onslow Bight landscape in order to be explicit about what features of biodiversity the initiative is trying to conserve and where. Conservation of terrestrial, wetland and aquatic targets within the Onslow Bight landscape will require conservation-minded management on lands determined to be critical to the long-term protection of the targets. These target areas include lands currently managed by public agencies and conservation non-profits, and lands requiring acquisition from, or formal management agreements with, willing landowners. Long-term conservation will also require identifying and abating threats to the ecological functions of these lands and to implementing necessary management activities. In order to accurately describe conservation strategies, different types of land (and waters) are defined as follows:

- *Core Areas* – Contain conservation targets having biological significance; contain SNHAs, pristine and intervening habitat; serve primary needs of the targets; land containing habitat in good natural condition or mixed with highly restorable habitat.
- *Managed Area* – Land under management by a single public or non-profit entity; management goals may be quite varied throughout the area and conservation may be a secondary goal or limited to certain sites within the managed area; core areas, corridors and buffers may exist within managed areas and may overlap onto land outside.
- *Isolated Sites* – Small sites not extensive in area nor clustered with other sites that contain important habitat for conservation targets. The isolated sites may not have landscape function that sites in core areas or corridors have, but are still important.
- *Corridor Study Areas* – Generally large areas that have been mapped by the Onslow Bight Conservation Design subcommittee that connect core areas for the purpose of defining where to focus conservation strategies; broad corridors may contain core areas and may exist inside and out of managed areas.
- *Functional Corridors* – Land connecting core areas that contains habitat suitable for the specified conservation targets and is managed for the same; ecologically functional such that species may move through; may require restoration. Functional corridors generally exist or should be established within the mapped broad corridor study areas.
- *Buffer* – Land typically alongside core areas and functional corridors that serves to protect these areas from outside threats; may contain lower quality or non-restorable habitat; land use and management within buffers intended to prevent activities that may result in management changes or restrictions on adjoining core areas and corridors, or degrade conservation targets (e.g., smoke buffers that preclude development)

The **Core Areas** are places with known site-specific significant resources, such as habitat for rare species or high quality or rare natural communities. They are usually in good ecological condition but may be somewhat degraded or in need of restoration even though significant resources are still present. These are the areas most worthy of preservation and natural area management as core areas of a reserve system. They are the areas that are the most threatened in the sense that they have the most to lose ecologically. Core areas that currently exist within managed areas should be managed for the conservation targets and, if possible expanded in area. Action should also be taken to create functional corridors between core areas within a managed area or between adjoining managed areas. As noted above, ecosystems are not closed systems, and areas outside of core areas may be utilized for foraging and movement. These ecosystem functions should be considered, for conservation of at-risk species, as well as for general wildlife and plant life, since they are interconnected.

The NCOBCF designated 10 **Conservation Corridor Study Areas**, intended to be the best locations where functional corridors can be developed that connect major core areas. Designing the corridor study areas primarily involved the assessment of landscape conditions based on 1998 infrared photography. The corridor study areas include some areas that are currently not suitable for restoration, such as non-timber croplands and rural residential development along roads. Further conservation planning will be required in most of these broad corridors to determine a more precise functional corridor. As its primary goal such planning must seek suitable habitat that would allow easy movement of the corridor's conservation targets. Such habitat may need to be continuous between core areas or might be discontinuous such as "stepping stones" of habitat appropriate for the movement of such species as the red-cockaded woodpecker.

They also designated **Managed Areas Ecological Buffers**, which identify certain areas within one-half mile of the management boundaries of Camp Lejeune and Croatan National Forest. They may overlap with corridor study areas but are different in purpose. These buffers contain two types of natural or managed forest lands, 1) those with reasonable restoration potential and 2) those which offer a smoke buffer to the managed areas.

The following conservation strategies are priorities to protect the conservation targets of the Onslow Bight landscape (each strategy is developed in detail in OBCDC 2004):

- Acquisition of land from willing landowners
- Management of core areas and functional corridors
- Working with private landowners
- Enhance conservation habitat within pine plantations at targeted sites
- Incorporate wildlife planning into road project design
- Engage in regional and local planning
- Cooperate in research
- Develop measures of conservation success
- Develop an outreach/education strategy

The Onslow Bight effort represents a successful example of how on-the-ground conservation can be achieved through partnership. Existing Coastal Plain assessments (e.g., Hall et al. 1999) paired with ongoing landscape analyses being conducted in the Coastal Plain region (Hall 2004) will provide additional assessments that will be incorporated in the NCOBCF conservation design plan as they are available. To learn more about the NCOBCF effort and for detailed objectives to meet the above strategies, contact Fred Annand with The Nature Conservancy (fannand@tnc.org).

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Conclusions

Agencies and organizations across North Carolina have demonstrated that by reducing redundancy of effort, increasing communication and coordination among partners, and by working together towards shared goals (even if for different objectives), land conservation initiatives can meet with great success. Efforts to perpetuate regional and cooperative approaches to land conservation paint a brighter future for North Carolina than any single entity could have brought about on their own. Still, long-term success may require a continued commitment by agencies and organizations (in terms of management/maintenance efforts and expenses) to carry land conservation projects beyond the initial 'acquisition' phase. Increased funding for land conservation-related activities is a necessary piece of the "success" equation.

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D. Education, Outreach and Recreation Strategies

Introduction

Education, outreach, and recreation needs often take a back-burner to more imminent needs associated with species and habitat protection in an atmosphere of limited funding, personnel and resources. Indeed, when forced to take a 'triage/reactive' approach to conservation, these types of activities often appear more expendable. Yet there is a critical link to be made between education/outreach/recreation initiatives and positive impacts on conservation problems.

Education, outreach, and recreation initiatives are important components of successful wildlife conservation because they provide a way to connect natural resource agencies and organizations to the broader conservation community. This community includes both the urban public and private landowners, user groups (e.g., birders, hikers, paddlers, sportsmen and women), as well as local governments, corporations, and other natural resource stakeholders. State fish and wildlife agencies have a mandate to manage shared public wildlife resources for this constituency. And although the promotion of projects for outdoor enthusiasts, such as birding or canoe trails, may not directly result in species de-listing or reverse habitat loss trends, these types of efforts are indeed creating strong supporters for broader agency goals.

Effective conservation can only be an integral feature of human society when it is a priority for most of its citizens. Here in North Carolina, as with many states across the country, as our population centers become increasingly urban, there appears to be a growing disconnect between people and the outdoors, nature, and wildlife, which can lead to misconceptions, distrust, and fear. Education, outreach, and recreation opportunities are tools to engage citizens in conservation and move closer to our fifth Plan goal—*Support educational efforts to improve understanding of our wildlife resources among the general public and conservation stakeholders*. The task is great; we must seek to improve understanding, interest and knowledge about wildlife species and their habitats, identify threats to wildlife and habitats, understand human impacts on wildlife and habitats, and increase conservation funding in general.

Both the process and content of conservation education and outreach influence its effectiveness. It is important that the goals and purpose of the Plan and progress implementing the Plan be well articulated to the public. Successful conservation will require close coordination between those implementing the conservation strategies and those providing outreach communication and educational opportunities to the greater citizenry. The Commission must keep the public informed about what they're doing, and why, to maintain and gain support among the public about the purpose and reason behind conservation and management activities. Public constituents play a key role in influencing legislators, who in turn affect policy and funding decisions. We need strong public support to increase further conservation funding.

At the national level, the International Association of Fish & Wildlife Agencies (IAFWA) has recently identified conservation education as a national priority by committing to develop a national strategic plan for conservation education. The following guidelines were developed by participants at the IAFWA Summit on Conservation Education, December 2004:

- A national perspective is needed to guide development of an effective conservation education.
- A definition of conservation education in the context of agency missions and goals is needed.
- Conservation education is mission critical, and support at all levels of the agencies, among partners, and key decision-makers is vital.
- Funding for conservation education is paramount to agencies and must be significant and stable. Additional, long-term funding sources will be identified as part of the strategic plan.
- The full potential of conservation education in state/provincial fish and wildlife agencies can only be realized through strong partnership support and collaboration.
- Conservation education must be responsive to, integrated with and/or correlated to all applicable professional and learning standards based on sound educational theory.

A draft National Conservation Education Plan was considered at the organization's March 2005 Business Meeting.

Key Partners

North Carolina Office of Environmental Education – The Office of Environmental Education, within the NC Department of Environment and Natural Resources, serves a coordinating role among schools, colleges, state and federal agencies, citizens groups, and the business/industrial community in promoting environmental education and natural resource stewardship in North Carolina. As a guardian of the North Carolina Environmental Education Plan, the Office looks to the plan's 14 objectives to guide its efforts:

- In-service professional development
- Pre-service teacher education
- Higher education
- Clearinghouse
- Curriculum correlation
- Model library collections
- North Carolina environmental data
- Measures and evaluation
- Environmental education centers
- Government agencies
- Funding
- Partnerships
- The media
- Adult education.

The Office of Environmental Education runs the Environmental Education Certification Program for North Carolina. The Office also provides teacher guides, state curriculum guides, guides to environmental education centers around the state, and adult education programming.

North Carolina Division of Parks and Recreation – The NC Division of Parks and Recreation offers educational opportunities for educators, groups and classes, and park visitors. Nearly every state park has a specially designed educational program based on the park's primary features or themes. The programs, called Environmental Education Learning Experiences (EELE), include a workshop for educators and a binder full of information and student activities. EELE's are specially designed educational programs correlated to the North Carolina competency-based curriculum in science, social studies, mathematics and English/language arts. Each program includes pre-visit, on-site and post-visit student activities that have measurable objectives, background information, vocabulary, references and step-by-step activity instructions.

North Carolina Wildlife Resources Commission, Division of Conservation Education – The Commission's Division of Conservation Education works to increase the public's knowledge of North Carolina's wildlife and the habitats they depend upon. They provide publications and programs through which the general public and educators can learn about wildlife, natural history and outdoor skills. The Division also runs three wildlife education centers around the state, and provides additional educator training, distance learning opportunities, and in-service training opportunities. The Division houses the agency communication department, the Public Information and Outreach program, publishes *Wildlife in North Carolina* magazine, and under Special Publications, 40 books, newsletter, posters, booklets, pamphlets, and reports annually.

The three education centers, the Pisgah Center for Wildlife Education (mountain region), Centennial Campus Center for Wildlife Education (central region), and the Outer Banks Center for Wildlife Education (eastern region), each provide regionally-tailored on-site programming for audiences who visit the facilities.

The Division of Conservation Education focuses education training opportunities on professional educators and civic groups, who in turn carry what they learn to larger audiences. There is one Education Specialist per region focused on providing educator training, distance learning opportunities, and in-service training opportunities. The programs they offer include:

Project WILD – Project WILD is an interdisciplinary, comprehensive curriculum program designed for adults who work in both formal and informal education settings to integrate components of wildlife education into all major subject areas in grades K-12 and in college. The materials can also be used with youth groups. Project WILD (and Aquatic WILD) activity guides contain numerous activities that focus on terrestrial and aquatic wildlife and ecosystems. The newest updates to the Project WILD curriculum adhere to 'No Child Left Behind' educational standards. WILD Education Site workshops are an extension of Project WILD that provide participants with a guide to designing and setting up outdoor classrooms that integrate teaching and wildlife habitat.

Advanced Project WILD – Advanced Project WILD workshops are focused on a specific topic to allow participants a more in-depth look at the subject matter (e.g., bats, songbirds, black bears, wetland wildlife). These workshops often utilize existing education materials or programs developed by conservation organizations or programs (e.g., Bat Conservation International, Shorebird Sister Schools Program, Partners in Flight, Partners in Amphibian and Reptile Conservation).

CATCH – CATCH is an interdisciplinary program that provides opportunities for adults to teach youth ages 8–15 about aquatic environments through learning activities, educational materials, aquatic field trips and fishing experiences in a school or youth group setting. CATCH emphasizes conservation habits, outdoor ethics, fish and aquatic species information, water safety tips, and practical fishing skills.

Division staff train teachers and youth group leaders to present the programs above in their schools or organizations.

Other educational opportunities that the Division offers include:

Outdoor Skill Experiences – Outdoor skill experiences are hands-on, participatory training that increase a person's ability to enjoy and experience wildlife resources (e.g., orienteering, fly fishing, cooking game).

Becoming an Outdoors Woman – Becoming an Outdoors Woman program workshops are designed to provide opportunities for women to learn skills that enhance and encourage participation in hunting, angling and other outdoor activities. Beyond Becoming and Outdoors Woman workshops are advanced sessions that give participants the opportunity to expand their knowledge and skills on a more focused topic.

Youth Hunts – Youth hunts are organized to provide quality hunting opportunities for youth ages 12–15 who are beginning hunters to have a real advantage in taking their own first deer or other species in a controlled and managed area. These hunts include a special educational orientation and scout day prior to the day of the hunt.

In order to further the goals of the Plan, the Commission's three Centers for Wildlife Education and their outreach education specialists will implement the following three objectives. These objectives will guide the design, development and presentation of the agency's educational and interpretive programs, publications, workshops and exhibits:

1. Identify and emphasize connections among natural features, selected wildlife species and conservation activities of the Commission.

   Example: Advanced WILD Geology Workshops that present the geology of the Appalachian Mountains and discuss how that ancient geological formation has influenced speciation, such as the many endemic salamander species found in North Carolina and the Commission's role in protecting those species and their habitats.

2. Emphasize the conservation of aquatic resources.

   Example: Exhibits displaying "What is Your Ecological Address" will present the major river basins of North Carolina and important interconnections between humans and other species that inhabit aquatic areas.

3. Emphasize the importance of professional management in the conservation of natural resources.

   Example: Project WILD Science and Civics: Present workshops for high school teachers, such as wildlife management practices for sustaining longleaf pine ecosystems and their inhabitants (e.g., red-cockaded woodpeckers).

The Commission published magazine, *Wildlife in North Carolina*, is an important outlet for information dissemination about fish and wildlife conservation projects and initiatives across the state. *Wildlife in North Carolina* will include Habitats of Concern as one the categories in its 2005 Wildlife in North Carolina photo competition. Entries in this category will feature one of the key habitats identified within the Plan. This highly visible effort will support educational efforts to

improve understanding of our wildlife resources among the general public and conservation stakeholders, and encourage readers and contributors to conserve and enhance habitats and the communities they support.

The Public Information and Outreach Section of the Division of Conservation Education works with other Commission educators, biologists, administrative staff, engineers, and enforcement officers to disseminate information to a range of publics about Commission activities. The information is relayed through media advisories, fact sheets, press releases, news-feature articles, op-ed pieces, television and phone interviews, "media day" events, the Commission's web site and the Commission's wildlife advisories hotline. The outreach section's future communications work will include substantial information dissemination about the Commission's role in developing and implementing the Plan. Specific ideas include a regular schedule of nongame news releases, an annual "Nongame and Habitat Conservation Media Day," and an annual feature related to a Plan implementation project in *Wildlife in North Carolina*.

The Special Publications editor creates or edits and produces one million copies of print publications annually for sale or distribution to sportsmen, educators, youth, and the general public.

There are also numerous other entities involved in education, outreach, and recreation programming in North Carolina, including local governments, federal agencies, and non-profit organizations. The Mecklenburg County Parks and Recreation Department and the Town of Cary Parks, Recreation and Cultural Resources Department are two examples of active parks and recreation programs in the state, offering visitors and educators a wide variety of programming opportunities. The National Parks Service and the US Fish & Wildlife Service (National Wildlife Refuge system) are key federal partners, both of whom offer visitors educational opportunities tailored to the park or refuge they are visiting.

Important Issues and Concerns

Education and outreach needs specific to particular species groups or habitats that were addressed within the appropriate habitat or river basin section of the Plan can be summarized as follows:

Coastal management issues – Humans have great influence and impact on our coastal beaches, dunes and estuarine habitats. Improved public education is critical to reducing human-induced threats about the impacts of, for example:

- Commercial and recreational activities such as boating and fishing (e.g., collisions, ghost line impacts, by-catch concerns) on coastal wildlife such as diamondback terrapins, sea turtles, marine mammals.
- Tourist related impacts like beach lighting and beach management practices (e.g., fencing, dredging, beach renourishment) on beach nesting sea turtles and birds.

Prescribed fire – The importance of continued use and reintroduction of prescribed fire as a habitat management tool was emphasized across multiple habitats. Support for prescribed fire practices will require effective education and outreach to the communities and private landowners affected by this management practice.

Sensitive sites – As much as management or acquisition activities, education about human impacts on sensitive sites such as isolated wetlands, bogs, caves and mines, and rock outcrops will be critical for the continued protection of these sites.

Broader operational-based education and recreation concerns established in the North Carolina Wildlife Diversity Plan (NCWRC 1999) include:

Conservation Education

- Inadequate production and distribution of wildlife education materials.
- Current wildlife education programs not able to meet public's growing needs.
- Inadequate funding sources for programs and materials aimed at conservation education.
- Insufficient number of nature centers devoted to the state's nongame wildlife.

Recreation

- Birding and Watchable Wildlife are not supported in proportion to their recreational, educational and economic value.
- State managed trail systems are inadequate in serving the needs of recreational users.
- The potential for campgrounds and picnic areas to serve as wildlife educational facilities is not being utilized.
- As recreation activities increase, wildlife/human interaction and associated risk to both groups will also rise.
- Inadequate funding sources for recreational opportunities and programs.

Still other education-related issues are identified in existing conservation planning documents, for example:

> *North American Bat Conservation Partnership Strategic Plan* – "Throughout North America, sensational and inaccurate presentation of public health issues involving bats has created an exaggerated fear of these ecologically important species. The resulting unwarranted public perception presents an especially serious threat to bat survival. Although general public awareness of the values of bats has increased over the past two decades, ignorance remains an important impediment to bat conservation. Medical professionals, government agencies, private industry, and educators often lack materials necessary to educate the public about how to safely share their communities with bats" (http://www.batcon.org/nabcp/newsite/index.html).

Broad Strategies

The following information was taken from the North Carolina Wildlife Diversity Plan (NCWRC 1999) and provides a broad overview of the needs and direction of conservation education and recreation for the Commission. Since 1999, substantial progress has been made towards meeting some of the program priorities below (e.g., the Commission now has a wildlife nature center in each region of the state). Still, others have not been fully realized to-date. Where possible, the program priorities identified below should now be addressed within the context of other priorities identified within the Plan.

Conservation Education Priorities

Wildlife Nature Centers

- Develop Commission-owned wildlife nature centers in each physiographic region and support projects at existing centers.
- Develop materials and traveling displays for use across the state at schools, universities, science museums and aquariums to increase awareness of wildlife concerns.

Wildlife Education Programs

- Improve the Commission's capabilities to provide instructor training in Project Wild & CATCH and coordinate support for other state environmental education programs.
- Develop and improve guides for construction/development of outdoor classrooms.
- Develop demonstration projects for wildlife education programs.

Wildlife Educational Materials

- Develop and distribute wildlife educational materials to the public school systems.
- Develop public informational materials on wildlife species, management programs, and habitat conservation.

Wildlife Education Grants

- Encourage development of educational materials and programs on fish and wildlife through an annual Wildlife Education Grants program.

Recreation Priorities

Watchable Wildlife

- Promote the North Carolina Watchable Wildlife Viewing Program through development of highway map guides and informational materials for significant public sites.
- Develop guides, informational materials, and workshops on wildlife photography.
- Develop structures and stations for fish and wildlife viewing and photography.
- Encourage commercial guided trips through development of training programs and informational materials.

Paddling

- Develop and maintain canoe, kayak, and whitewater paddling access points.
- Develop and maintain marked canoe trails along major streams and rivers.
- Encourage commercial guided trips through development of wildlife training programs and informational materials.

Hiking

- Support and assist with maintenance to the State Trails and Rails to Trails systems.
- Develop and maintain hiking trails on state-owned game lands.

Camping

- Develop and maintain hiking trails and viewing sites associated with state-maintained camp grounds, picnicking areas, and visitor centers.
- Develop wildlife-related displays and educational materials at state-owned campgrounds, picnicking areas, and visitor centers.
- Produce wildlife-related educational programs at state-owned campgrounds, picnicking areas, and visitor centers.

Birding

- Develop and maintain Coastal, Piedmont, and Mountain Birding Trails development projects.
- Assist with the organization, promotion, and operation of local Birding Festivals.
- Develop Birding Guides to North Carolina species and Birding Lists for significant public-owned properties.

Diving

- Develop guides and materials for recreational diving.

Wildlife Recreation Grants

- Encourage development of fish and wildlife-related recreation programs through an annual Wildlife Recreation Grants program to promote nature tourism and wildlife viewing.

Specific Needs and Recommendations

An abundance of education, outreach, and recreation programs already exist. Therefore, any conservation communication activities related to Plan implementation should involve the development and fostering of partnerships in order to incorporate targeted conservation topics into existing programs, and if need be, develop new targeted projects. Emphasis should be on local programs where individuals have the opportunity to have personal experiences that may foster greater appreciation and concern for local conservation issues.

Conservation Education

- Supply additional funding to support more regional education staff to conduct Project WILD training.
- Works towards better coordination among biologists and educators to develop effective education and outreach materials for endangered/rare species.
- Work towards better coordination among biologists and educators to develop and implement Advanced Project WILD workshops that highlight high priority species, species groups, and habitats.
- Promote and expand inter-divisional projects/publications to improve efficiency and effectiveness at reaching shared goals.
- Look to existing education/outreach goals, priorities and ideas listed in existing conservation plans, for example:
  - North American Bat Conservation Partnership Strategic plan (http://www.batcon.org/nabcp/newsite/index.html)
  - The North American Waterbird Conservation Plan (Kushlan et al. 2002)
  - Southeastern Coastal Plains-Caribbean Regional Shorebird Plan (Hunter et al. 2000)
  - NC Partners in Flight Bird Conservation Plan (Johns et al. 2005)
- Work towards improved communication among Commission divisions so that field activities are translated to appropriate education/outreach materials.

Outreach

- Continue to use the local news media to highlight 'success stories' and bring a local connection to broader conservation issues.
- Improve understanding among Commission divisions of the critical role that outreach plays in the implementation of Commission projects; in order to maximize education potential, outreach cannot not be an afterthought, but rather an integral component of project planning.
- Work with Outreach staff, Special Publications Editor, and Commission magazine staff during Plan implementation to translate the conservation priorities of the Plan (in terms of priority species and habitats) into effective education and outreach tools (e.g., magazine articles, press releases, op-ed pieces, television and phone interviews, "media day" events, videos, and publications).

Recreation

- Fully support and promote the North Carolina Bird Trail initiative now underway, a partnership between the Commission, North Carolina Audubon, North Carolina Sea Grant, and North Carolina Cooperative Extension (www.ncbirdingtrail.org).

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