

INTRODUCTION

Why does a rural county like Chatham need a survey of its natural areas and wildlife habitats? If you were to look out from the old Pittsboro firetower in virtually any direction, you would see a verdant landscape still dominated by small farms and extensive woods. Although settled in the mid-18th Century, over 73% of the county is now wooded, an actual increase in forest acreage from what remained at the beginning of this century. Another large fraction, 22%, is currently in pasture or under cultivation. No major cities occur in Chatham County, and its population, estimated at 38,759 in 1990¹, is less than half of either of its two northern neighbors, Orange and Durham Counties, which together possess less total surface area than Chatham's 709 square miles.

Amid the green vistas and pastoral scenery, however, there are also signs of change. The most jarring of these, at least visually and emotionally, is the massive cooling tower and plume of steam looming above the Shearon Harris Nuclear Powerplant. Although this facility sits just across the border in Wake County, the powerlines radiating from it across the county and the warning sirens scattered throughout southeastern part of Chatham clearly symbolize the county's involvement in regional urbanization.

Less conspicuous, but at least as significant, are the demographic changes that have occurred in the county over the past twenty years. Between 1970 and 1980, the farm population in Chatham dropped from 4,370 to 2,529, a loss of 42%, and by 1980 the net annual migration for the entire county was a minus 121. Although the tide has now turned and the county is rapidly growing -- in 1990 the net annual migration was a positive 490² -- this expansion in population does not represent a resurgence of the farming communities that once prevailed in Chatham. Rather, most of the growth has taken place in new communities tied more to Chapel Hill and the Research Triangle than to the traditional settlements of Chatham. No less symbolic than the Shearon Harris Plant is the Ferrington Community, a planned urban development founded less than 20 years ago, which when finished will possess a larger population than Pittsboro, founded in 1787.

Among the first resources the county will lose in the urbanizing process are open space and wildlife habitat. As recently as ten years ago, Chatham was well-known for the large tracts of roadless wilderness that covered much of the county. These tracts, however, are already half gone. The vast bottomlands along the New Hope River are now all but drowned beneath Jordan Lake, and uplands that were once too rocky and dry to farm are now being opened up for development, primarily bedroom communities for the Triangle. The Big Woods, once one of the wildest tracts in the region, is now pierced by new roads and large

¹ Statistical Abstract of North Carolina Counties, 1991. State Data Center, Management and Information Services, Office of State Budget and Management.

² Ibid.

tracts have been carved out for new subdivisions. At night the formerly dark skylines of Edwards Ridge, Terrells Mountain, Collins Mountain, and Boothe Hill now all glitter with electric lights.

While the pace of these changes is accelerating, loss of natural habitats is nothing new to the county. Indeed, it is impossible to find any woodland in Chatham that resembles the forests present in pre-colonial days. Trees older than 150 years are restricted to the vicinity of public buildings or old homesites, and many of the forests in the county are not even composed of the species that once predominated in this region. Instead of a diverse mixture of oaks, hickories, and other hardwoods, 37% of the county's woodlands are now dominated by loblolly pines, including 10% in managed pine plantations³. Even the hardwood forests, free-flowing streams, and other "natural" habitats that remain in the county are crowded with exotic species such as Japanese honeysuckle, Russian olive, brown-headed cowbirds, and Asiatic clams. There is virtually no place within the county where human influences cannot be easily observed.

Although still green, the county has lost many of its species as a result of these past and current transformations of its forests and other natural habitats. Carolina parakeets, passenger pigeons, ivory-billed woodpeckers, wolves, and mountain lions, all of which may once have occurred in the county, were gone by the end of the 19th Century. Many more species will vanish before the end of the 20th. The last black bears that resided in the Triangle Region were driven out when the New Hope bottomlands were cleared. Red-cockaded woodpeckers which once nested in several places in the county have vanished within the last decade. Bachman's sparrows and shrikes are barely hanging on in Chatham County, with perhaps fewer than five nesting pairs remaining. Two species of mussels have been completely eliminated from the Rocky River in just 20 years since a survey first documented their occurrence in the upper Cape Fear Basin⁴, and the Cape Fear shiner has retreated from a 11 mile reach of the Rocky⁵ down to its last stronghold on earth -- there is nowhere else for it to go.

³ Sheffield, R.M. and Knight, H.A. 1986. North Carolina's Forests. US Forest Service, Southeastern Forest Experiment Station, Resource Bull. SE-88.

⁴ Shelley, R. 1987. Unionid mussels from the upper Cape Fear River Basin, with a comparison of the faunas of the Neuse, Tar, and Cape Fear drainages (Bivalvia: Unionacea). *Brimleyana* 13:67-90. John Alderman (pers. comm.) supplied information concerning the probable extirpation from the Rocky of Fusconaia masoni and Toxolasma pullus.

⁵ Pottern, G. 1990. Water quality and fish communities in the Rocky River, with special consideration of the endangered Cape Fear Shiner. Application for Siler City Wastewater Treatment Plant Upgrade, Appendix C3. Only one Cape Fear Shiner was found at the NC 902 bridge and nowhere else along the 11 mile reach upstream to US 64.

A few years ago, the loss of a few obscure mussels, herbs, or fish would have been more-or-less acceptable to the majority of people as the price of economic progress. This kind of argument, however, is heard less and less often now. This change in attitude partly reflects our growing uneasiness about global problems of acid rain, loss of the ozone layer, the greenhouse effect, and the worldwide devastation of biological diversity. When we observe kills of mussels and fish in the Rocky River caused by water pollution, or decimation of the county's Cooper's hawk population by DDT poisoning, these problems are clearly brought to home.

Beyond the concerns raised by the demise of these ultimate miner's canaries, there is also a growing appreciation of the natural features of our landscape for their own sake. As anything becomes scarce, we give it increasing value. Just as we treasure beautiful old churches and other historic structures as part of our cultural heritage, we increasingly give the same sort of respect to the natural features of our environment, our natural heritage. This includes not only our greatest scenic splendors, protected in our national and state parks, but also such local jewels as the White Pines Natural Area, the Rocky River, and the Jordan Lake Eagle roost. Evidence of this growing interest in local natural areas is the proliferation over the past twenty years of groups such as the New Hope Audubon Society, the Haw River Assembly, the Friends of the Rocky River, and the Triangle Land Conservancy, all of which have taken an active role in preserving the natural heritage of Chatham County.

This inventory of the county's natural areas and wildlife habitats is a direct outgrowth of all these concerns. A first step in conserving our natural heritage is to acquire information on the location and viability of the natural areas, rare species, and major wildlife reservoirs of the region. Among Chatham's neighbors, Durham, Orange, Wake and Moore Counties have already completed this process. The resulting surveys are now being used for conservation and land-use planning by county and municipal governments, by private conservation groups such as the Triangle Land Conservancy, and by individual landowners who wish to preserve some of the natural values of their properties.

In 1988, Chatham County provided funds for a similar survey. Two biologists, Stephen Hall (a zoologist) and Marjorie Boyer (a botanist), were subsequently contracted through the Triangle Land Conservancy to conduct the inventory. Field work was initiated in the Fall of 1988 and mostly completed by 1989; a few new sites were identified in 1990. All field work and the preparation of the final report has been supervised by the North Carolina Natural Heritage Program, an agency within the North Carolina Department of Environment, Health, and Natural Resources that has the responsibility for monitoring the state's rare organisms and ecosystems and coordinating efforts to preserve important areas of natural habitat throughout North Carolina.

The primary goal of this inventory was to identify the most significant natural areas in Chatham County. Forty sites are described in this report. They range in importance from the nationally significant Bald Eagle Roost on Jordan Lake and the aquatic habitats of the

Rocky River to sites that are mainly of local interest, primarily as wildlife habitat. Twenty-three sites contain one or more elements listed by the North Carolina Natural Heritage Program, while an additional eight contain species or communities that are rare within the eastern Piedmont. These sites also encompass a wide variety of biogeographic settings. Several communities are composed of essentially northern or montane species while others possess strong Coastal Plain affinities. Twelve of the sites are strictly terrestrial, while the remaining 28 contain significant aquatic habitats and associated wetlands.

Few of these forty sites have any sort of protection. Only a small amount of public lands exists in Chatham County, almost all located around Jordan Lake and owned by the U.S. Army Corps of Engineers. Four of these sites have been registered as State Natural Areas by the Corps and special protection measures are also in place for the area surrounding the bald eagle roost and nesting sites on the New Hope Peninsula. Two privately owned tracts are also given protection as natural areas: the White Pines Natural Area, owned by the Triangle Land Conservancy, and the Donnelly Hardpan Bog, owned by The Nature Conservancy. The tract of Duke Forest lands located along the banks of the Haw River also has some degree of protection as a natural area.

Given that the majority of the county's most significant natural areas occur on privately-owned, relatively unprotected sites, the conservation of Chatham's natural heritage will be no easy task. This inventory is only a first step. The information it provides is intended to provide guidance for land-use planning decisions by the County as well as the protection and acquisition projects of the Triangle Land Conservancy and other local preservation organizations. It should also be of use to individual landowners who wish to develop stewardship plans for their own property.

We also hope that the general public can learn from this report just how few, how fragile, and thus how precious are these last remaining natural areas. We strongly encourage anyone interested in conserving the county's and region's natural heritage to get further involved and contact the Triangle Land Conservancy, North Carolina Nature Conservancy, the Natural Heritage Program, or other local conservation organizations.

SURVEY METHODS

The methods employed in this survey follow guidelines established for county inventories by the North Carolina Natural Heritage Program. This agency, in the Division of Parks and Recreation within the Department of Environment, Health, and Natural Resources, maintains North Carolina's primary database for rare, threatened and endangered species. In addition to keeping track of populations of rare plants and animals, it also inventories rare ecosystems, identifies significant natural areas, and works with other state agencies, private organizations, and individual landowners to protect these important elements of our natural heritage.

While the staff of the Natural Heritage Program conducts species and ecosystem inventories as part of their regular monitoring efforts, the Program also encourages and coordinates county inventories arranged through cooperative agreements with county governments and private conservation organizations. Staff members of the Natural Heritage Program act as supervisors for these projects and integrate the resulting data into a scientific framework that can be used to support conservation efforts throughout the state.

Currently 13 county inventories have been completed through this kind of interaction, and four others are in progress. Inventories for Durham, Wake and Orange County are the primary models for the current inventory. The Orange County inventory was especially useful since it included a strong animal component in addition to the standard surveys for rare plants and vegetational communities.

COMPILATION OF EXISTING INFORMATION

A first step in any county survey is a review of existing information regarding species occurrences, types of natural communities expected in the region, likely sites for inventory efforts, and so on. For this report, we consulted several standard sources. We began with the Natural Heritage database, which provides information on the known locations of rare species and ecosystems.

For a more general list of the plants recorded in Chatham and neighboring counties, we relied primarily on the *Manual of the Vascular Flora of the Carolinas*, by Radford, Ahles, and Bell (1964). More recent information was obtained from the research herbaria at the University of North Carolina and Duke University. For general animal records, The State Museum of Natural History served the same role as the herbaria, particularly for vertebrates and insects. Additional information on insect occurrences was obtained from the Insect Collection at NC State University, and information on freshwater mussels was supplied by John Alderman, Central District Biologist for the Non-game and Endangered Wildlife Program of the North Carolina Wildlife Resources Commission.

Other important sources of information for Chatham County in particular included the Inventory of Jordan Lake Natural Areas conducted by Julie Moore for the Army Corps of Engineers. Four of the sites identified in that report have now been registered as State

Natural Areas and are also included in the present survey. An excellent compilation of the birds of the county was obtained from Barbara Roth of the New Hope Audubon Society, which has conducted annual spring and Christmas counts in the Jordan Lake area since 1977. Jim Keighton, also of New Hope Audubon, supplied us with an impressive list of all the animal species, birds and otherwise, that have been observed at the Eagle Observation Platform since its construction in 1988. Other sources of valuable information were the landowners at whose invitation we visited a number of the sites included in this report.

SITE RECONNAISSANCE

No matter how much information is already available on a county's flora and fauna, there is no substitute for an actual ground survey. Information on the occurrence of rare species needs to be constantly updated, since populations that were present just a few years ago are all too often vanished today (more rarely do they show any increase in distribution or abundance). The vast majority of the state, moreover, has never been investigated and the potential for rare species occurring within most counties is simply unknown

This was certainly the case for Chatham County. In comparison with Orange, Durham, and Wake Counties, each with a large research university, Chatham has often been overlooked in biological inventories. Previous to the current study, only 38 records existed for Chatham in the Natural Heritage Program database, many of which were based on old literature citations and not checked for decades. As a result of this study, eleven occurrences were added to the database and two deleted, no evidence having been found to confirm the continued existence of their populations in Chatham County.

In selecting new sites for investigation, the authors initially relied on USGS topographic maps and aerial photographs. Landforms are often a good indication of the possible presence of an interesting community type; steep, north-facing slopes, upland depressions, and wide bottomlands, for instance, are all prime candidates for exploration. These sources also indicate whether the area is forested, although this information is often unreliable after even just one year since the map or photo has been printed.

Other maps that are usually employed in selecting sites are soil and geological maps, which in many counties are done to the same scale as the USGS topos. These sources are particularly valuable for predicting the occurrence of rare plant species, several of which require specific substrates. Unfortunately, a detailed soil or geological survey had not been done for Chatham County at the time of this inventory, although a soil survey is now near completion. In the absence of county surveys, regional maps produced for the Triangle J Council of Government supplied some of this valuable information.

Fifty-five sites were originally selected for reconnaissance based on previously recorded occurrences of rare species, on the presence of interesting topographic features indicated by maps or photos, or at the invitation of landowners. The initial visits to these sites served primarily to determine whether any significant natural values remained on the site or whether

they had been recently cut, developed, or otherwise disturbed. Fifteen were dropped from further consideration following this inspection.

In eleven cases where the sites remained in consideration, these initial visits were the only ones made. In the case of the several large upland tracts, the vegetation was found to be a patchwork of pine-stands and young hardwoods and unlikely to contain any rare species or communities. These sites were included in the inventory after confirmation that they were still mostly roadless, undeveloped, and sufficiently large to possess high value to the region's wildlife. The other category of sites receiving single visits were all small and isolated, allowing a quick inventory of their important features.

The remaining 29 sites required one or more subsequent surveys to document their biological features. These include areas that either held high potential for containing rare species not found during the first trip or that were sufficiently mature, large, and diverse to merit a more detailed community analysis.

VEGETATION SURVEYS

An analysis of the vascular plants provides the standard information used to classify nearly all terrestrial natural areas. This reflects the importance of plants as primary producers and the fact that the species composition and structural characteristics of the vegetation are of great importance in shaping the animal, fungal, protozoan and bacterial components of the community. Features of the vegetation also strongly reflect various aspects of the physical environment, particularly moisture, temperature, and soils.

In describing the vegetation of the sites, we relied on primarily on qualitative methods, listing the species and identifying the dominant members present in four main strata of the vegetation: the canopy, subcanopy, shrub layer, and ground cover. Additional estimates of the maturity of the forest were obtained by measuring the diameters of the dominant tree species.

Although we did not sample the sites quantitatively for density, coverage, or frequency of occurrence, the qualitative information we gathered was sufficient to categorize the communities according to a scheme developed by the Natural Heritage Program and presented in a **Classification of the Natural Communities of North Carolina; Third Approximation** (Schafale and Weakley, 1990)⁶. This system, which was developed specifically to facilitate natural areas inventories, categorizes as well as assigns significance ranks to communities based on geological setting as well as the qualitative features of the vegetation. Of particular importance are soil and rock characteristics, overall species composition, dominant species, and the presence of key indicator species.

⁶ Available from the NC Natural Heritage Program.

ANIMAL SURVEYS

Although vegetation analyses are essential for the description of any natural area -- most previous surveys conducted in the state have been essentially inventories of plant communities -- it is now realized that they may not accurately reflect the importance of a site to the region's fauna. The old idea that if you protect important tracts of vegetation you will also be protecting the animals is now considered an oversimplification, if not completely untrue.

The habitat requirements of animals are usually far more complex than those of plants, even for animals that are strongly associated with particular plant species or communities. Animals typically need more space: unlike plants, individual animals must move around in order to find food, water, mates, and other resources. Many animals also require several different habitats to complete their life cycles.

Moreover, a large number of animals are territorial: they actively exclude other individuals from using a particular area. For this reason, as well as their larger needs for space generally, animals, particularly vertebrates, often exist in far smaller numbers than plants within a given community. They are thus more vulnerable to local extinction. Whereas a population of rare plants can often persist in small numbers in an extremely limited area for years, if not decades, the same is rarely true for animals.

Furthermore, animals are sensitive to a far wider array of disturbances than are plants. A new house or road built in the middle of an otherwise undisturbed forest will usually have little effect on the plant community, at least away from the immediate edge of the disturbance, but the effects on the fauna may be profound. Consider the effects of dogs, children, lawnmowers, and vehicles on box turtle populations. Those that escape capture or outright destruction may become so stressed that they abandon the area, often moving many miles and crossing many roads before they settle into a new home range. The same is true for even warier species such as bobcats and wild turkey, as well as many species of songbirds that can successfully nest only in the interior of forests.

Another reason for surveying animals directly, rather than inferring their presence based on habitat features, is that some communities are better described in terms of their fauna than their flora. This is particularly true for many aquatic ecosystems, especially lotic habitats (flowing water). In these ecosystems the animals may be much more conspicuous than the plants and may play a significant role in shaping the biotic landscape. They may also be better indicators of environmental factors. Freshwater mussels, for example, are particularly sensitive monitors of water quality.

Accordingly, faunal surveys are given nearly as much emphasis in this inventory as vegetational analyses. Because animal surveys usually involve greater effort than plant inventories, and because each group of animals typically requires its own specialized sampling techniques, only a few animal taxa were surveyed routinely. Breeding

birds were given the most attention among terrestrial groups, partly due to the ease with which they can be censused (by song surveys), and also because their diversity and abundance are good indicators of habitat quality, especially in forest habitats. Many warblers, for instance, are found only in intact forest interior habitats; high warbler diversity is usually found only in rich, mature, and undisturbed stands of hardwoods.

Mammals, reptiles, and amphibians were noted whenever observed, as were butterflies, land snails, and a few other selected invertebrate groups. For aquatic habitats, freshwater mussels and dragonflies were given the most attention, again because they can be sampled easily, because they are important components of their ecosystems, and because they serve as good indicators of habitat quality.

DOCUMENTATION OF THREATS

In addition to describing the natural features of the sites, we also documented any potential threats to their biological integrity. These included new roads and houses, or indications, such as survey flagging, that development or logging may be about to take place. We also noted any signs of recent grazing, timbering, trash dumping, or use by off-road vehicles. For aquatic habitats, we looked for evidence of sedimentation, channel alteration, and the proximity to point and non-point sources of pollution, including golf courses and large lawns, agricultural fields, pine plantations, package treatment plants, and major wastewater facilities.

We also recorded any species of exotic plants and animals encountered. Of particular importance were Japanese honeysuckle, Russian olive, privet, and bamboo grass (Microstegium). Among the most significant exotic animals indicating habitat deterioration are brown-headed cowbirds (native to the prairies of North America but not the eastern deciduous forests), and the Asiatic clam (Corbicula).

DETERMINATION OF BOUNDARIES

For each site, we defined a set of boundaries that encompassed the essential features of the natural area. For the most part, these boundaries were determined by the limits of the biotic communities, not by property ownership, although in some cases roads, fields, or housing developments were obvious limiting factors. The boundaries of small to medium sites were determined during the course of the site visits. For larger sites, particularly the extensive wildlife areas, we relied primarily on USGS topos and aerial photos. Most sites required a combination of these approaches.

In all cases, the primary boundaries of a site were drawn to include the most significant elements of the community. Secondary boundaries were also determined for most sites. Secondary boundaries typically enclose buffer areas needed for the protection of the primary area. The communities contained between the primary and secondary boundaries are usually less significant than those of the primary area, and in some cases have been highly altered by

timbering, grazing or other agricultural uses. They may also contain dwellings, roads, or powerlines. Most of these secondary areas, however, have the potential to be restored to a fully natural state.