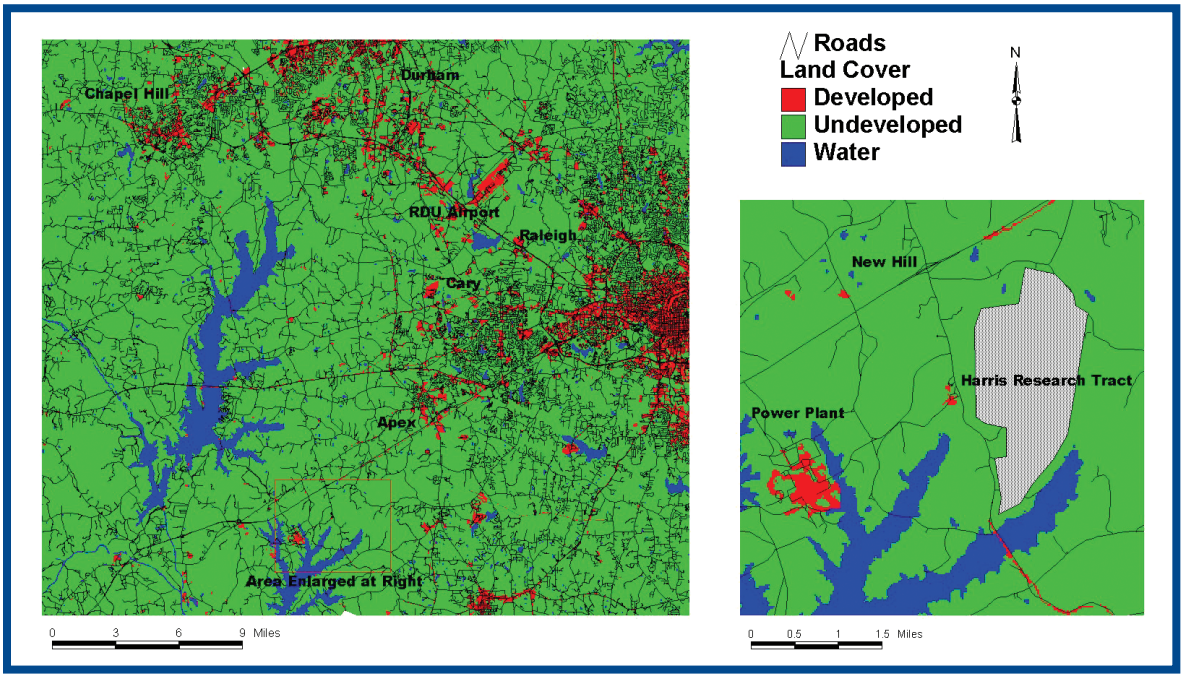
MULTIPLE BENEFITS of Large, Undeveloped Tracts in Urbanized Landscapes

A North Carolina Example



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ABSTRACT

In North Carolina's Research Triangle region, development pressures threaten open space. Expanding municipalities and suburban sprawl have isolated public lands as private landowners subdivide or sell to developers. Large holdings owned by a private corporation and amassed to buffer a nuclear power facility and its reservoir remain intact. These holdings provide unexpected public benefits and foster conservation of a rare plant community type revealed through interdisciplinary research. The landowner's support for research and restoration underscore the important role private corporations can play in achieving community conservation goals.

Keywords: conservation; land use

Above: Figure 1. **The Research Triangle and surrounding towns sprawl in response to a strong economy.**

Few places in North America developed faster in the past two decades than the Research Triangle region of North Carolina. With high-tech enterprises advancing the "new economy," Raleigh, Durham, Chapel Hill, and surrounding towns all expanded tremendously. Population in Cary, for example, has grown from approximately 4,000 in the late 1970s to 95,000 today. Continuing pressure on farm and forest lands drives increasing concern to preserve open space,

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Extracting pitch from longleaf pines supplied a nearby turpentine distillery and left relic stumps still evident in the 1980s.

while housing and service demands outstrip planning at all levels of government, raise land prices, and carve the landscape into subdivision-size pieces.

Formal and informal assessments and planning initiatives in the Triangle have produced mixed results. Organizations like the Triangle Land Conservancy and the local chapter of the Sierra Club (1988) have challenged politicians to address issues spawned by suburban sprawl. In 2000, scientists, resource administrators, conservation activists, and knowledgeable citizens convened to identify regional preservation targets and priorities. Assessment of the region's green infrastructure (Hess et al. 2000) identified few bright spots and suggested urgencies for action. Consensus about priorities, however, does not necessarily generate substantive action on the ground. Having only limited funds available to support competing conservation interests has limited the impact of planning in the region. Small conservation parcels can be acquired at high cost but large tracts in the region remain at risk.

Within this scenario, serendipitous actions along the Research Triangle's southern perimeter created one of the region's largest contiguous open spaces *(fig. 1)*. Land acquired and subsequently managed to buffer the Shearon Harris Nuclear Power Plant comprises nearly 11,000 acres of productive forest. Unheralded and largely ignored, these lands have emerged as a pivotal component providing open space to the Triangle's south. The Harris lands illustrate a role private utilities can play in conserving species and protecting against urban sprawl. Investigations on one parcel, the Harris Research Tract, provide a focal point for examining the conservation saga playing out in the Triangle's suburbanizing landscape.

A Rare Forest Type Discovered

The Harris Research Tract lies in Buckhorn Township in Wake County, North Carolina. Its 1,267 acres range in elevation from 245 to 361 feet above mean sea level. Drained by tributaries of the Cape Fear River, specifically White Oak and Little White Oak Creeks, the topography consists of broad, gently sloping ridges divided by a relatively dense pattern of ephemeral and perennial streams. The land lies along the transitional zone where the Atlantic coastal plain and Piedmont plateau meet. Soils have higher clay content than sandier sites south and east, but the sand component is high enough to drain well.

As on most of the land around it, existing forest stands on the tract range from pine (both natural and plantation) to natural hardwood. Today, the tract mainly supports naturally regenerated hardwood-pine mixtures. Loblolly pine *(Pinus taeda)* dominates the pines, but shortleaf *(P. echinata)*, Virginia *(P. virginiana)*, and longleaf pine *(P. palustris)* all occur within stands of natural origin. Of these pines, longleaf prompts the greatest curiosity, for its presence and condition here in the mixed forest beg historical explanation. Moreover, significant rarity of Piedmont transitional longleaf sites in North Carolina (Schafale and Weakley 1990; Schafale 1994) draws attention to the mere existence of Piedmont stands containing residual longleaf populations. Clearing for cultivation and pasturage across the Piedmont during the 18th and 19th centuries eliminated most Piedmont longleaf pines.

Yet late in the 19th century, Ashe and Pinchot (1897) noted the extent of the Piedmont longleaf type in North Carolina. Composition of these inland longleaf pine forests varied widely (Wahlenberg 1946), including hardwoods, loblolly pine, and sometimes shortleaf pine. As a community type, the Piedmont longleaf pine forest entered classification of North Carolina's natural communities in Schafale and Weakley's *Third Approximation* (1990).

But, despite Ashe and Pinchot's early notice, transitional stand and plant community characteristics of the Piedmont longleaf community in North Carolina remained poorly documented (Schafale and Weakley 1990; NCNHP 1993; Schafale 1994).

The lack of information results from the modern dearth of such sites. Selection cutting practices in areas retained in timber might allow longleaf to regenerate, but its survival always meant competing with more aggressive pines and early succession hardwoods (Christenson 1989; Cooper 1989). Fire suppression in the 20th century further reduced chances that longleaf could compete on medium- to high-fertility sites, as longleaf pine needs fire to reproduce. Thus, decline in longleaf acreage where forests were converted to cropland and pasture was even more precipitous in the transitional zone than was the longleaf decline across the South as a whole (Walker and Wiant 1966). Still, on the Harris Research Tract, evidence of past dominance by longleaf pine and reminders of its utility remained into the 1980s.

Table 1. Archetypal Piedmont longleaf transitional community.

Dominant canopy	
Red maple	*Acer rubrum*
Sweetgum	*Liquidambar styraciflua*
Shortleaf pine	*Pinus echinata*
Longleaf pine	*Pinus palustris*
Loblolly pine	*Pinus taeda*
White oak	*Quercus alba*
Southern red oak	*Quercus falcata*
Northern red oak	*Quercus rubrum*
Post oak	*Quercus stellata*
Understory species	
Flowering dogwood	*Cornus florida*
Persimmon	*Diospyros virginiana*
Blackgum	*Nyssa sylvatica*
Sourwood	*Oxydendron arboreum*
Sassafras	*Sassafras albidum*
Highbush blueberry	*Vaccinium corymbosum*
Herbaceous layer	
Huckleberry	*Gaylussacia frondosa*
Muscadine grape	*Vitis rotundifolia*
Other species	
Serviceberry	*Amelanchier arboreum*
Red chokeberry	*Aronia arbutifolia*
Mockernut hickory	*Carya alba*
Pignut hickory	*Carya glabra*
Slender spikegrass	*Chasmanthium laxum*
Spotted wintergreen	*Chimaphila maculata*
Strawberry bush	*Euonymous americana*
False jessamine	*Gelssaium sempervirens*
Heartleaf	*Hexastylus arifolia*
American holly	*Ilex opaca*
Yellow poplar	*Liriodendron tulipifera*
Fetterbush	*Lyonia mariana*
Black cherry	*Prunus serotina*
Willow oak	*Quercus phellos*
Winged sumac	*Rhus copolina*
Glaucous greenbrier	*Smilax glauca*
Common greenbrier	*Smilax rotundifolia*
Sweetleaf	*Symplocus tinctoria*
Low huckleberry	*Vaccinium pallidum*

SOURCE: Parker (1998).

Research Begins

How did a discernible, albeit suppressed, population of longleaf pine persist on the Harris lands? Could a remnant of the Piedmont transitional type beget a plant community to restore ecosystem values lost through time and practices injurious to plant community integrity? These questions prompted research into land use and environmental history of the subject tract and surrounding lands. The research drew attention to unique attributes of interest to the conservation community in the Triangle. It also enhanced the rationale for abetting efforts by the land's corporate landowner to maintain viable uses of its property.

Identifying and documenting the Piedmont transitional longleaf community on the tract developed from work in two stages. Bode (1997) conducted ethnographic and documentary research to determine land-use factors creating existing environmental conditions. Following Bode's work, Parker (1998) used the North Carolina Vegetation Survey protocol (NCVS) developed by Peet et al. (1998) to characterize the Piedmont transitional longleaf community as it existed and to provide guidance for a restoration effort.

Tracing land deeds and title transfers, Bode (1997) contacted and interviewed past landowners to determine the extent of past agrarian land use and relate it to local social, economic, and transportation developments. His record of site use, ownership, and extractive activity documented farming intensity, extent of lumbering, and incidence of turpentining. The chronological framework Bode developed pointed to areas on the Harris tract where historic land use might have precluded longleaf community presence, or where dramatic alterations in community structure would be expected. Bode's data were also instrumental later for interpreting results of Parker's vegetation inventory.

Vegetation and environmental data collected during the summer of 1997 came from 56 plots located across the tract in a stratified random approach (Parker 1998). Parker based plot locations on stand type mapping and inventory work done by North Carolina State University forestry students. His vegetation inventory laid groundwork for ranking potential sites to be returned to a semblance of transitional

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Two experimental plantings of Michaux's sumac, a federally listed endangered species in Wake County, have been established within the longleaf restoration area.

longleaf forest. The inventory revealed an almost even split between herbaceous species associated with either the Piedmont or the coastal plain (Parker 1998). That mix of regional species from two physiographic provinces underscored the site's status as a transitional community. Further data analyses confirmed the hypothesis that a longleaf community could be identified within the advanced successional forest which had overtaken it. Thus, Parker proposed an archetypal longleaf transitional community *(table 1)* because no undisturbed reference site existed, either in the vicinity or in scant published literature.

In 2000, a restoration harvest eliminated hardwood and other pine competition from among residual longleaf trees. During spring 2001, in the newly opened conditions created, we transplanted an experimental population of the endangered plant Michaux's sumac *(Rhus michauxii)*. Then, in May 2001, we burned half of the restoration site. Already, one growing season later, notable changes in the herbaceous plant component suggest that Parker's archetype based on an inventory of residual plants after years of fire suppression and canopy closure captures only part of the actual diversity this site will eventually support. Monitoring Parker's plots and adding additional plots will track site development. Only further monitoring and analysis will render a judgment about long-term viability and complexity of the Piedmont longleaf community here. But the impact of fire remains unmistakable.

Bringing Back a Fire Regime

Restoring a fire regime to perpetuate desirable ecosystem traits requires relatively large tracts, which the Harris lands provide. Even so, introducing burning into this landscape accentuates potential conflicts arising from nearby land-use differences. Hazard-reduction fires implemented on approximately half of the Harris Research Tract in 1998 drew complaints from local communities when smoke annoyed residents downwind. Numerous telephone calls to Carolina Power and Light and formal protests from two nearby towns resulted in an immediate company ban on burning. The episode highlighted the need to educate neighbors concerning land management goals and fire's role in safeguarding ecological values in southern pine ecosystems.

To build support for burning, Parker (1998) noted the need to emphasize natural heritage and historical dimensions of the surrounding landscape and to link neighboring communities to such sites. The historical remoteness of the Harris lands from urban centers of the current Research Triangle has been lost. However, what remains intact is the aesthetic and biological heritage of agrarian and rural inhabitants using resources with an eye toward conservation. Today's remnant longleaf community is itself an artifact of a particular land-use history.

Tract History

The New Hill area (now the site of the Harris tract) was first settled in the late 1700s, largely as a result of land grants being awarded to military veterans of the Revolutionary War (Belvin and Riggs 1983). By 1832, New Hill had its first post office and at mid-century sat astride the intersection of stagecoach roads connecting Durham to Fayetteville and Raleigh with points south. In the late 1880s the area experienced a boom period, and in 1905 a new depot was built for the Seaboard Airline Railroad. At that time, in New Hill a large cider mill operated on the corner opposite a turpentine distillery, one of the last producing distilleries in North Carolina. Turpentining on the Harris Research Tract and surrounding lands would have supplied this distillery. As late as the 1980s, cat-faced trees and lighterwood stumps could still be found in the area now being restored to longleaf. In surrounding areas many lighterwood stumps had been extracted for chemicals and munitions.

Carolina Power and Light (now Progress Energy) announced plans in 1971 to build a nuclear facility that became the Shearon Harris Nuclear Power Plant, and construction of the facility began in 1978. The proposal to build the plant became controversial, and the plant's construction proceeded under intense public scrutiny. Environmental assessment for licensing and operating the facility required extensive field studies and resulted in voluminous documentation (Carolina Power and Light Company 1982). Several mitigation strategies were implemented to assuage concern about negative impacts associated with the plant siting, and commercial operation began in 1987. That same year, senior forestry students from North Carolina State University began to use the Harris Research Tract for the forest planning exercise in their capstone course. Inventories revealed the presence of a residual longleaf component in the closed canopy of mixed pines and hardwoods.

Officials at Carolina Power and Light had called a halt to timber management activities on company lands, essentially assuming a custodial posture for about a decade. Reactivating its timber management program in the late 1990s, the company began to realize benefits of its enormous forest assets and include them in its competitive strategy for a deregulating industry. This decision came at the same time that our research on the Harris Research Tract was prompting attention to the longleaf pine community that once existed there. Longleaf restoration emerged as another option among management objectives, but with it came the problem of reintroducing fire.

Managing for Multiple Uses

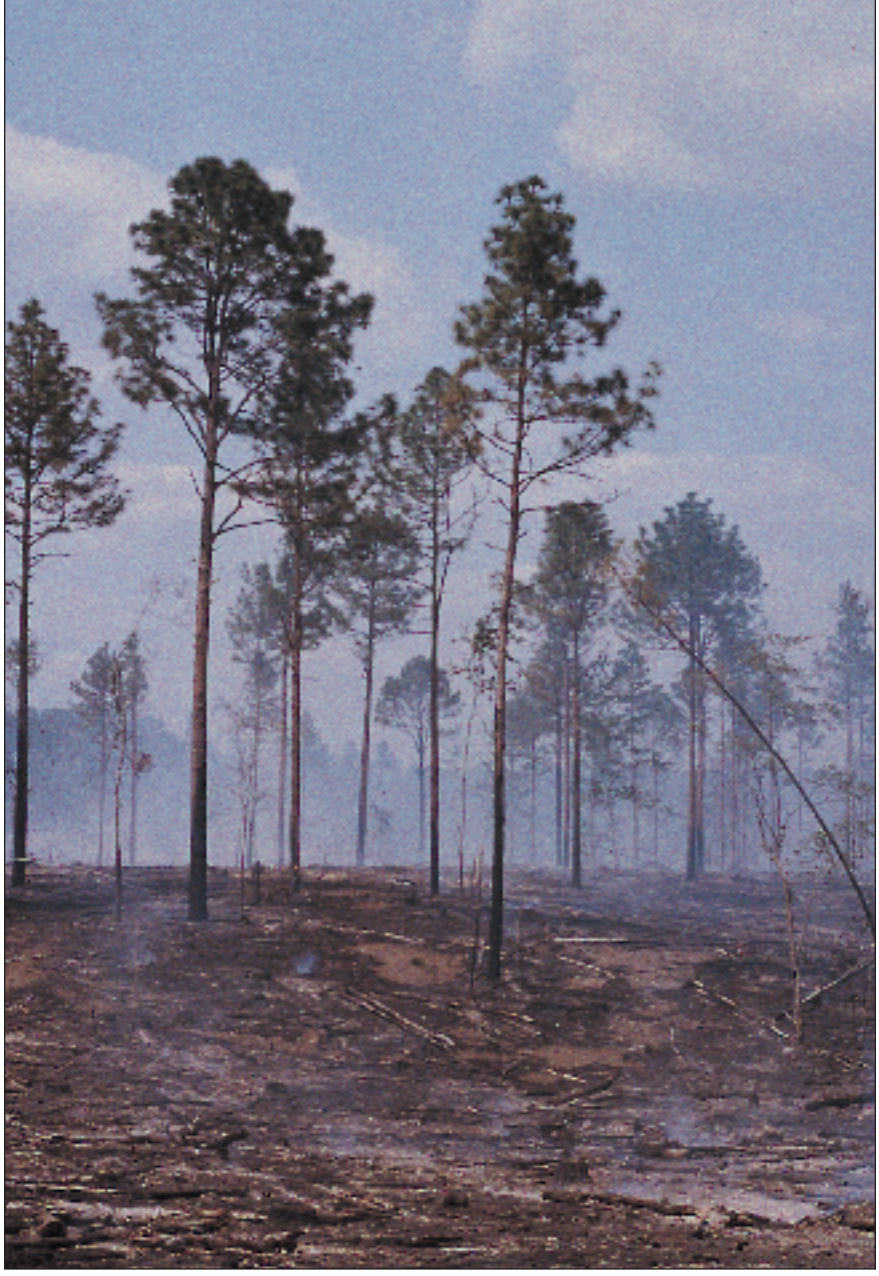
The Harris Research Tract lies within extensive holdings now managed by Progress Energy for various forest uses. The 4,100-acre Harris Lake provides a prime fishing and sailing venue with one of the cleanest bodies of water in the Triangle region. Forest areas amounting to approximately 5,000 acres enrolled in the North Carolina Gamelands Program provide huntable populations of white-tailed deer and wild turkey less than 20 miles from Raleigh. The Wake County open space plan notes that this is one of the most important hunting areas in the region. Wake County was offered and has subsequently developed a 600-acre regional park across State Road 1127 from the Harris Research Tract. On this recreational tract a mountain biking loop was developed, and a recent agreement gives additional trail access on the Harris Research Tract to bikers and horseback riders.

Besides the Harris lands, several large public tracts lie near the Research Triangle. Forests surrounding Falls and Jordan Lakes, and managed by the US Army Corps of Engineers, occupy large tracts northeast and southwest of Research Triangle Park. Both lakes and their encompassing forests provide water supplies and heavily used recreation facilities, but rapid development throughout their watersheds degrades water quality in tributaries and threatens to isolate these forests. However, the 25,979 acres of land buffering Jordan Lake lie almost contiguous with the Harris lands. Together, the two holdings, one publicly and one privately managed, present an impressive expanse of open space along the southwestern perimeter of the Triangle. The peripheral location of the Harris lands presents some hope for a limit to adjacent development pressure, if action galvanizes in time.

There is reason for us to be optimistic about the future of the Harris Lands and their role in providing benefits of green space to a rapidly urbanizing region. In April 1999, Wake County's draft open space plan identified six recommendations for the Harris Lake watershed:

- Conserve water quality.
- Protect and improve wildlife habitat and rare and native plant communities.
- Protect agriculture in the watershed.
- Protect historic and cultural resources related to open space.
- Protect land for recreation, greenways, and bike routes.
- Preserve places for hunting and fishing.

All of these uses have been integral to or furthered by Progress Energy's past activities on its lands. The plan calls for land planners and community leaders to encourage Progress Energy to continue managing its lands with sensitivity to conservation priorities. Cur-



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Restoring a fire regime following harvest will release longleaf seed trees, which should foster a return to savanna-like conditions posited for the site's presettlement cover type.

rently, 12 municipalities and the county are formulating comprehensive plans for spending $15 million raised through a bond issue to meet regional open space needs. Efforts to buffer the Harris lands from encroaching development may arise from this process, and conservation easements have been suggested as a mechanism.

The role of public lands has long been emphasized in creating spaces for recreation, aesthetic enjoyment, and habitat for wildlife. Often missed is the less obvious role played by lands under corporate ownership. The frequent liquidation of such properties for subdivision makes this example significant. In this case, intentional or not, actions taken decades ago have resulted in a framework for sustainable use of natural resources on large contiguous tracts of forestland just over the horizon from intense suburban sprawl and continuing forces of urbanization.

Conclusion

The acquisition of land needed to buffer the Shearon Harris Nuclear Power Plant in Wake County, North Carolina, now pays substantial benefits barely appreciated when the purchases were made. Meanwhile, significant encroachment by subdivisions and commercial development on open lands throughout the region have proven to be a tangible environmental threat. Ironically, a cautious response to a potential threat now proves itself a prescient act of landscape preservation.

On the Harris Research Tract, a rare plant community persisted by historical luck and was spared by corporate landowners' decisions to manage conservatively. Research driven by curiosity and thinking beyond conventional methods of forest management may provide an opportunity to reconstruct a once-prevalent natural community. In contrast to most large holdings in the region, these lands have not succumbed to subdivision for residential and commercial development and short-term profits relating to burgeoning Triangle population pressures.

As for the future, Progress Energy cannot sell off the bulk of its lands surrounding the nuclear facility; it is bound by licensing agreements when the plant was built. Parcel exchanges have occurred to eliminate isolated tracts along the northern periphery and create contiguous management units elsewhere. But the company has made commitments, and all parties expect long-term agreements now in place between Progress Energy and North Carolina State University, Wake County Parks and Recreation, and the North Carolina Game Commission to be perpetuated.

The company has upheld a policy against shoreline development around Harris Lake, but some have questioned how long such policies will remain intact. Making money from timber management is an important part of the company strategy for the land it holds today, but potential gains in land speculation suggest that permanent measures such as perpetual conservation easements should be brokered.

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