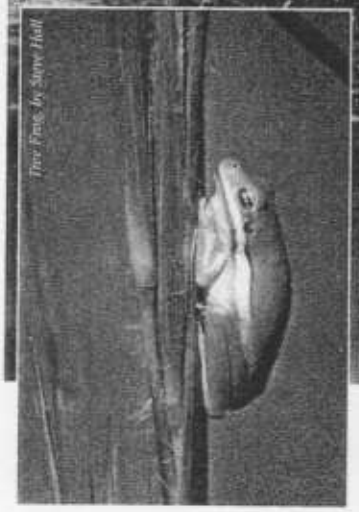
Blue Phlox, by Jim Pullman

Kestrel, by Grant MacNichol

Welcome Lily, by Jim Pullman

The New Hope Creek Corridor Master Plan and the New Hope Creek Advisory Committee

Ten Years Later



Tree Frog, by Steve Hall

Lower New Hope Creek, by Ken Coulter

Yellow Lady Slipper, by George Pyne

Crested Iris, by Jane Korest

Eastern Box Turtle, by Steve Hall

Durham and Orange County

New Hope Creek Corridor Advisory Committee

May 16, 2000

To: Chapel Hill Town Council
Durham City Council, Durham County Commissioners
Orange County Commissioners

From: New Hope Creek Corridor Advisory Committee

The New Hope Advisory Committee is pleased to offer you the attached report. It summarizes ten years of effort by us, by large numbers of interested citizens and private organizations, and by you to protect the resources of the New Hope Creek Corridor. The New Hope cuts across all four jurisdictions and forms, in many cases, a green and visible boundary between them.

The long term vision offered in the 1992 New Hope Plan was for a continuous vegetated corridor which would protect water quality, offer passage for wildlife, and provide a network of multi-purpose recreational trails. It would be anchored by access points that would provide parking and rest room facilities for trail users. Some of the access points, such as Leigh Farm and Sandy Creek Park, would be recreational destinations in their own rights.

Thanks to your own cooperation and, in many cases, your leadership, the acquisition of public land along the New Hope has been little short of spectacular. The protection of Leigh Farm, very early in the New Hope effort, was a major achievement. And portions of the trail system are just starting to open to the public. Although the environmental benefits of public investment were realized immediately, the recreational benefits are just starting to become available. We believe that the public will get enormous use and enjoyment from the major public investments made on its behalf.

The record on control of development in the corridor is decidedly mixed. Certainly there has been massive growth, and a visible and increasing transportation problem. The reduction in tree cover has been dramatic. On the other hand, in most developments the floodway and the (often very broad) floodway fringe have been protected. Often there has been provision of public access to these areas, sometimes by public purpose, sometimes by dedications by the developer. Several developers have worked very cooperatively with the New Hope Advisory Committee and with planning staff to take into account various provisions of the New Hope Plan. The Orange County Rural Buffer has been a great help, as has the more recent Durham Resource Protection Ordinance.

Development planning has been the weakest point. The New Hope Plan itself has proved to be marvelously informative and a lodestar for our ongoing monitoring of the corridor. However it has become increasingly obvious that better planning is needed outside the coverage area of the New Hope Plan: for headwaters and tributary streams, for the area below Hwy. 54, and for developments outside the original New Hope planning area that generate runoff and traffic that affect New Hope resources.

The New Hope Creek Corridor Advisory Committee strongly urges you, as the ultimate public decision makers, to take vigorous action to plan for growth in the entire area affecting the New Hope.

In addition to your own efforts, and ours, the New Hope has benefited from the efforts of many individuals and organizations. Among them are: planning and other staff members from all jurisdictions, notably Jane Korest and Beth Timson (Durham City-County Planning), the late Marvin Collins (Orange County Planning Director), Bill Webster (CH Parks and Recreation), the staff and board members of Triangle Land Conservancy, Pearson Stewart, who chaired the original New Hope planning group, and Kenneth Coulter, who wrote the Plan and helped use greatly in the original implementation years.

Special thanks should go to Ed Harrison, John Kent and Sharon Robinson, who have attended nearly all meetings of the Committee as advisors or organizational representatives. They, along with the New Hope Committee members, are the authors of the attached report.

As we testified before you in presenting the New Hope Plan in 1992, protection of the New Hope will be a twenty-year effort. The report treats a ten year period, from 1990 (when New Hope planning started) to 2000. Given our 1994 interim report to you, this report emphasizes progress made, and problems confronted, in the last five years.

The New Hope Creek Corridor—Ten Years After

Introduction

The New Hope Creek and its tributaries have long been recognized as one of the largest continuous open spaces in Durham and Orange Counties. As urbanization of the region continued, and indeed accelerated, in the 1980s and 1990s, new attention was paid to the need to preserve the natural and cultural attributes of the New Hope Corridor and to take advantage of its possibilities for public recreation. In 1986, the "Durham County Inventory of Natural Areas" listed the New Hope as one of the highest priorities for conservation. By 1989, the Friends of New Hope Creek was founded. Later that year, the four constituent jurisdictions (City of Durham, Durham County, Orange County, Town of Chapel Hill) each contributed funds to hire a planning consultant, Coulter Associates, to prepare a conservation and development plan for the New Hope Corridor. Upon completion of the plan, and public hearings, it was adopted by the jurisdictions in 1992. The plan called for an ambitious 20 year program of land acquisition and provision of trails, parking and other facilities for public use. We are now approximately ten years—two of planning and eight of implementation--into organized efforts to protect and enhance the resources of the New Hope Corridor and to make them available to the public.

This is the second in a series of reports on accomplishments to date, as well as our assessment of the challenges that must be faced if full implementation of the 1992 plan is to be accomplished. The first report was presented to elected officials in March 1994, in conjunction with a bus tour of the Corridor.

During the last five years, the New Hope Creek Corridor Advisory Committee ("NHCCAC") has been presented with the challenge of an unprecedented rate of development in, and adjoining to, the New Hope Corridor. It has also been offered unprecedented opportunities for land protection through both purchase and dedication. The local governments, with help from both the State of North Carolina and the non-profit Triangle Land Conservancy, have shown tremendous cooperation—and sometimes remarkable leadership—in acquiring land in the Corridor. Sandy Creek Environmental Center, Johnston Mill Preserve, Leigh Farm Park and a growing network of trails, will soon start to give the citizens a recreational return on its investment that will, we believe, be extremely popular. The record on controlling development has been much less positive, although experience has been rather good in securing protection of the floodway fringe and, in most cases, public access to it. Several developers and design consultants—though by no means all—have been very cooperative in protecting New Hope resources. And in Orange County, the existence of the Rural Buffer has provided a strong context for protecting the New Hope.

Throughout these experiences, **it has been very clear that without both the New Hope Plan and the New Hope Corridor Advisory Committee many opportunities would have been missed.** The Plan has literally served as a lodestar for efforts to protect the New Hope and provide access to it. Again and again, the Committee has turned to it for guidance in suggesting land acquisitions and in commenting on development proposals. Local governments and non-profits have often been guided by the Plan as well. The county Natural Heritage Inventories, recently revised in both Durham and Orange Counties, have provided valuable ecological

guidance. Indeed, one of the original motivations for the New Hope Plan was the Creek's prominent place in the first version of the inventories. Meanwhile, the NHCCAC, in close collaboration with the Durham Open Space and Trails Commission, and its analogues in Chapel Hill and Orange County, has provided a consistent forum, meeting each month, for discussing land acquisition, trails, and development proposals and providing comment and advice to local planning agencies and officials.

We have learned much from experience to date with the New Hope: the importance of planning as a guide to consistent and timely action; the importance of thinking in terms of a corridor rather than individual parcels; the diversity of public and private interests that are involved in decision-making; the need for timely notification and rapid action in advising the local governments on development proposals, and the importance of transportation in affecting natural features. The last section of this report discusses some of these lessons, particularly in their application to issues that are currently unresolved or that are likely to arise in the near future.

II. Land Acquisition

Approximately 802 acres of land in the New Hope Creek corridor have been placed under various forms of protection beyond that provided by regulatory controls. In some instances, land has been purchased; in others, conservation easements, restricting future development of specific parcels, have been granted by current property owners to qualified recipients of such easements.

The Master Plan suggested that between $ 2.7 and $ 5.4 million dollars would be required to complete "Priority Corridor Actions" in years 1-5 following adoption of the Master Plan, with an additional $ 5.8 - $ 11.1 million necessary to complete land acquisition in years 5-10. Additional amounts would be required for trail and other amenity development.

Appendix A summarizes the extent of land acquisition and protection that has occurred in Durham and Orange Counties. A not insignificant percentage of the above amounts (amounting to $ 4.23 million) has been pulled together from a wide diversity of sources to acquire and protect New Hope Creek open space. It is believed that:

- on-going development in the Durham-Chapel Hill area, which is shrinking other green areas,
- continued trail and park development, and
- more aggressive publicity of trail and park existence, leading to broader use,

should all help the community understand what has been achieved in implementing the plan and help build support for further protection of remaining areas.

Protection of open space is clearly a case where more is better – more money and more awareness of easements as a open space protection tool, leading to more land acquired or protected. Those involved in protection of Leigh Farm, the Johnston tract and a wide variety of other pieces of land, big and small, deserve the community's gratitude and support for the sometimes invisible work they have done in laying a foundation for future efforts and successes.

III. Trails of the New Hope Corridor

A. HISTORICAL CONTEXT

At the start of field studies for the New Hope Creek Master Plan in May 1989, not one inch of public trail existed in the entire planning area. A few hundred feet of abandoned farm roads and tall-grass sewer line easements offered access to the Creek and its tributaries.

By May 2000, over five miles of nature trail had been constructed by four jurisdictions and our regional land trust, with another 3 miles of rail-trail maintained by volunteers. In fact, large parts of the system have been built by volunteer effort.

This section will offer, for each trail, the following information: Trail name/Primary owner/ Location/ Access / Built mileage/ Planned mileage/Public investment (time and funds) /Comments on trail building and situation. Because these are mostly nature trails which will remain unpaved, costs of paving by distance are not part of the planning picture. Therefore, all trail mileages , built and proposed, are approximate. These data have been provided by those most closely involved with planning these trails, who deserve special thanks:

Audrey Booth, Triangle Land Conservancy volunteer
Kevin Brice, Triangle Land Conservancy staff
Thad Howard, Sierra Club and Triangle Rail-Trail Conservancy volunteer
Beth Timson , Durham City/County Planning Staff,
Bill Webster, Chapel Hill Parks and Recreation staff

B. TRAILS IN THE CURRENT MASTER PLAN AREA

DRY CREEK TRAIL (Town of Chapel Hill)

From: Dry Creek Trail Master Plan adopted in 1998

Location: Along sections of Dry Creek , a New Hope Creek tributary, in northeast Chapel Hill, mostly west of Erwin Road just inside I-40.

Access: No formal access as of Spring 2000. Current public use section starts at Cedar Falls Park with passage through the East Chapel Hill High (ECHH) Campus to western trailhead.

Built: About 3/4 mile of natural surface trail -- mostly from ECCHS east to Perry Creek Road.

Planned: Up to 3 miles total including section across I-40 .

Public investment: Staff time and production for draft and final Dry Creek Master Plan; trail construction costs ($35,000—$30,000 from the Federal government's National Recreational Trails Fund plus $5,000 of NC Adopt-a-Trail funds.

Comments : Virtually all land for the trail has been provided by the developers of Silver Creek and Springcrest, as part of recreational land requirements under the Town's subdivision regulations. Trails have been constructed by the Town and by using Eagle Scout candidates.

MUD CREEK TRAIL (City of Durham)

(Connector to Master Plan Component 7)

Location: West side of Oak Creek Shopping Center, corner of US 15-501 and Garrett Road.

Access: From designated parking spaces downhill to Mud Creek

Built: About 150 feet of boardwalk

Planned: When built out north-south, several miles, including a connector east to Sandy Creek

Public investment: Planner staff time; land purchases and boardwalk construction (City bond issue and Clean Water Management Trust Fund).

NEW HOPE CREEK NATURE TRAIL (Durham County)

(Master Plan Component 2)

Location: In the City of Durham on lands owned by Durham County (northern section, downstream from US 15-501) and by Boulevard Properties Limited Partnership (Michael Waldroup and family)

Access: From a parking lot on east side of Githens Middle School (south end) , and for residents of North Creek apartments from parking lots there (north end) . The north-south sewer line west of the floodplain provides access from Githens. The trail has an upland section, mostly dry much of the year, and a wetland loop.

Built: almost 3 miles

Planned: No more currently planned

Public investment : Funding for survey, footbridges, short sections of boardwalk, signage, and vehicle barriers from the National Recreational Trails Fund ($30,000) matched equally by the Durham County Board of Commissioners, plus $8,000 raised by New Hope Audubon Society.

Comment: DOST staff and volunteers cooperated with Mr. Waldroup in designing the trail sections on the family's land , and he is in the process of donating a 50-foot wide easement along the trail to Durham County. The entire trail system, including the access by sewer line, is beginning to show evidence of regular and frequent public use from both north and south.

SANDY CREEK (City of Durham)

(Master Plan Component 3)

Location: In the City of Durham , at the southern end of Sandy Creek Road, off Pickett Road, just west of US 15-501 Bypass

Access: From parking alongside the lowest section of Sandy Creek Road.

Built: About 1 1/2 miles

Planned : Up to 2 1/2 miles when it extends to planned parking area at Pickett Road (10-12 spaces. former DA land)

Public Investment: Planning Staff time to lay out alignment. Ongoing attempts to buy land for trail extension.

Comment: Along with development of the Education Center at this location (the abandoned "New Hope Treatment Plant"), both lowland and upland trails were laid out in 1995, and built by dozens of volunteers, many recruited by the Triangle Land Conservancy. Wellspring Grocery paid for the initial trail design and workday by TLC. Massive damage by Hurricane Fran made reconstruction necessary in 1997, again by dozens of volunteers, with the addition of many Sierra Club members. Upland sections adjacent to existing neighborhoods are being re-evaluated for appropriate alignments.

C. TRAILS UPSTREAM OF THE PLANNING AREA

JOHNSTON MILL PRESERVE TRAIL NETWORK (Triangle Land Conservancy)

Location: In Orange County north of Chapel Hill

Access: Trailheads (with accompanying small parking areas) start on Turkey Farm Road just north of the Creek (3-5 parking spaces), and on Mount Sinai Road (10 spaces). The small parking areas will be built over the course of Spring and Summer 2000.

Built: About 1.5 miles

Planned: About 3 miles

Public investment: Contributions for purchase of land and trails came from Orange County, The Town of Chapel Hill, private citizen and corporate gifts and the Clean Water Management Trust Fund.

Comment: Building of these primitive trails (foot-travel only) started in November 1999, and was performed by some 50 volunteers. Organizations most prominently involved included New Hope Audubon Society, students from NC School of Science and Mathematics, Duke's law and business schools and the UNC business school. Funding

for trails, bridges and parking lots has come from private donations, S&H Development, Inc., and the NC Clean Water Management Trust Fund.

D. DOWNSTREAM OF THE PLANNING AREA

EAGLE SPUR OF THE AMERICAN TOBACCO RAIL-TRAIL (U.S. Army Corps of Engineers)

Location: East of and roughly parallel to the southernmost section of New Hope Creek in Durham County, on Wildlife Mitigation lands owned by the US Army Corps of Engineers and managed by the NC Wildlife Resources Commission.

Access : From Stagecoach Road west of NC 751. No designated parking area. A small number of informal spaces are usable in the right-of-way of Stagecoach Road immediately next to the gate.

Built: On abandoned NC Railroad alignment (constructed to connect Durham to Fayetteville in 1905).

Planned: No trails are planned beyond the existing rail-trail corridor.

Comment: This is an official Rail-Trail Corridor in the State of North Carolina - the first so designated in the Triangle area. This is also the first foot and bicycle trail open to the public on Army Corps land in Durham County.

Several work days over the past three years, spearheaded by the Triangle Rail-Trail Conservancy, have cleaned up massive damage from Hurricane Fran.

IV. Review of major developments

The New Hope Creek Corridor Advisory Committee reviews development proposals within the New Hope Corridor, as well as proposals for large developments near the Corridor which are likely to have major impacts on New Hope resources. The New Hope Committee closely coordinates its review with that of the Development Review Committee of the Durham Open Space and Trails Commission. Planning and zoning staff, particularly in Durham, are now doing a good job of notifying the NHCCAC in a timely manner of proposals for rezonings in the Corridor. Among the developments given most attention by the NHCCAC during the last five years were:

New Hope Commons This major shopping center had been approved by Durham City Council in 1993. In February 1996, the NHCCAC sent a letter to Durham City Council members expressing concern about erosion and bank slumping behind the center. It also noted that "the arrangement of New Hope Commons' parking lots and buildings also makes for unnecessarily difficult access to the trail behind the center. Most of the thousands of people who visit the shopping center daily will not know that the trail even exists." The NHCCAC also made suggestions for environmental guidelines for future rezonings in the area.

Target Stores (P96-43) This application proposed rezoning for a large, single level discount department store on a 19 acre tract across Mt. Moriah Rd. from New Hope Commons.

The Committee expressed particular concern about leveling of steep slopes, especially in view of the problems at New Hope Commons. This rezoning request was withdrawn by the applicant.

Hope Valley Commons (P96-86) This application proposed a shopping center with 13 acres of impervious surface on a 25 acre site at the SE corner of Rts. 54 and 751. The Committee commented that the site abuts an important Durham Inventory site which would be severely impacted by the proposed development and that the proposed zoning did not conform with land use plans for the area.

Trammell Crow (Alta Crest 1997) The application proposed development of 292 apartments on 25 acres at the NW corner of Old Chapel Hill Road and Watkins Rd. The Committee commended the fact that the developer was combining several small parcels into a single large one (with the exception of one parcel on Watkins Rd.) and the fact that this relatively high density development was well located with respect to a proposed transit corridor.

Trammell Crow (Garrett Road--P97-81) This application proposed a 330-unit PDR on Garrett Road, just south of Garrett Farms. The NHCCAC noted favorably the extensive open space provided, including provision of stream buffers and the developer's "good faith effort to respond to our concerns." Although the relatively high density (PDR 5.0) was located near the 15-501 corridor and hence might have access to future transit, the Committee expressed concern that the developer was unable to secure cooperation from the owner of a large adjoining tract even closer to the highway. Joint development of the two tracts would have enabled even better integration of the housing with future transportation options. The Committee expressed concern that, although areas along the floodplain are not proposed for development, they are protected only by the development plan, rather than by permanent dedication or recorded easement.

Mt. Moriah Rd. apartments This application proposed a large apartment development on the east side of Mt. Moriah Rd. north of New Hope Commons. Working with the NHCCAC, the developer's design consultant provided for clustering and protection of lower areas along the New Hope, amounting to more than half the total area.

Boulevard Properties (P98-14) This application proposed a 1.58 million sq. ft. mixed-use on a 169 acre tract SE of the intersection of 15-501 and Mt. Moriah Road. The NHCCAC noted favorably that the developer had attempted to reduce traffic generation by mixing uses and planning for future transit stops, and had been very cooperative in integrating the development into New Hope trail and park planning.

Borden & Bocook The application proposed 535,000 sq. ft. of office space ("The Fountains") near the entrance to Leigh Farm Park (I-40 and Rt. 54). The developer made a presentation to the Committee, noting that in an attempt to reduce visibility from the road, the buildings had been grouped facing a central open space, with parking decks constructed around them. The Committee noted concerns regarding traffic generation, possibility of night-time light pollution, and potential incompatible use of an outparcel not controlled by the applicant. Later revisions of the application dealt adequately with the lighting issue, and the outparcel was acquired and incorporated into the project.

Communications Structures Inc. (M94-9) This application for a Major Special Use Permit proposed a 330 ft. telecommunications tower on the east side of Mt. Moriah Rd., approximately one half mile north of Hwy. 15-501. The NHCCAC commented on esthetics,

possible impacts on bird migration, visibility from trails, landscaping and impacts on the future use of adjoining properties. It noted that the developer had agreed to sublease, for a nominal fee, land near the tower base for future possible trail access and to provide parking for up to 10 cars.

Bell South (D95-648) This application proposed a 160 ft monopole tower on the Trenton Road side of Leigh Farm. The Committee made several suggestions regarding ways to limit the visual impact of the tower, especially by curving the entrance drive so there would not be a "clear shot" down the dirt road leading to the base of the tower. The tower was ultimately not built at this location.

Hollow Rock Store The NHCCAC participated in several meetings with the NC Department of Transportation on alternatives to closing of the store during replacement of the Erwin Road bridge. Unfortunately, NCDOT did not accept these suggestions, and the store has been demolished. The NHCCAC did make suggestions regarding maintaining a wildlife corridor under the bridge, and it appears that the final bridge design is consistent with these.

ATT cell tower (Oct. 1999) This application proposed a 180 ft. monopole tower near the entrance to Sandy Creek Environmental Center. It was to be placed on a portion of City-owned land within the park that had been zoned commercial. A rental with City of Durham provided for payment of $2500/mo. plus 15% (later raised to 20%) of the income from up to 3 co-locators. The NHCCAC was not notified of this proposal until it had gone through the Zoning Committee. Nevertheless, the Committee prepared detailed comments, which included concerns about tower design, impact on trails and viewsheds, design of the access road, and the fairness of the split of co-locator revenues (which could result in a net negative rental for ATT on what is claimed to be a very valuable site.) There was excellent coordination in evaluating this proposal between the NHCCAC and DOST.

Overall, there were mixed results to these efforts. The Target rezoning application was withdrawn and, like the earlier Wal-Mart proposed for the same site, not built. On the other hand, the ATT cellular tower was built despite the NHCCAC's strong opposition (though our efforts did result in a reduction in the area of access road.) For most proposals, developments were eventually approved. Usually, there was provision for protecting open space along the Creek, and sometimes provision for public access to it. In several cases, our comments resulted in design modifications—for example, provision in the plans for Borden and Bocook's Leigh Farm property for directional lighting in the parking lots. Perhaps our greatest frustration was the inability to do much, evaluating one proposal at a time, about traffic generation, particularly the kind of cumulative impacts that ultimately create pressure for road widenings in the Corridor.

In August 1995, the NHCCAC sent written comments to the U.S. Army Corps of Engineers on the update of the Jordan Reservoir Master Plan.

Several NHCCAC members participated in the 15-501 MIS Citizen's Advisory Committee, including Mike Waldroup and Bill Hutchins, who co-chaired the Citizen's Advisory Committee.

In 1997 the Committee commented on planning for Sandy Creek Park, noting its support for community gardens as one possible use for the site.

V. Water quality

New Hope Creek water quality has been monitored along its length by citizen volunteers since 1990, following training by the NC StreamWatch coordinator. Taking monthly readings at

six locations between the Creek's headwaters in Orange County and Lake Jordan, they have acquired data which helps provide an understanding of what is happening to New Hope Creek water quality during an annual cycle, and also the means for examining year-to-year or longer-term trends. The three-dimensional surface graph shown in the figure entitled "New Hope Creek Mean Dissolved Oxygen (DO) Percent Saturation by Month & Station Nov 1990 - May, 2000 " represents one part of the results of monthly sampling on New Hope Creek (November, 1990 through May, 2000).

New Hope Audubon Chapter, New Hope Improvement Assoc. and the Office of the Duke Forest have consistently and graciously supported this project, as well as a wide variety of environmental and student groups from Duke, UNC-CH, the NC School of Science and Math, among others.

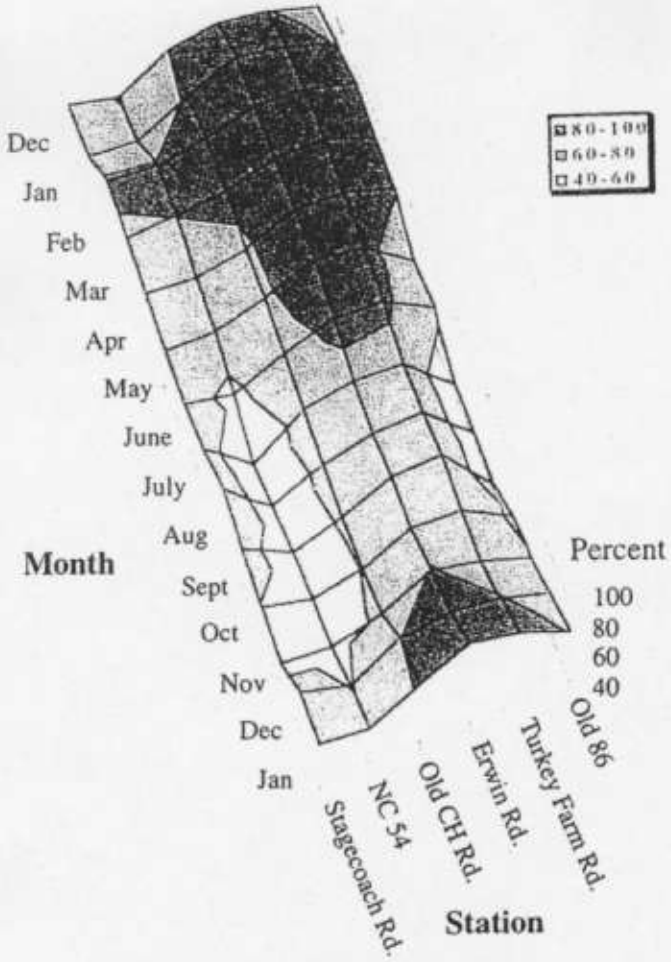
Dissolved Oxygen Percent Saturation:

In water quality sampling, checking for dissolved oxygen ("DO", measured in parts per million, ppm) is important because it shows by itself how well gill-breathing organisms can live in the sampled water. However the amount of DO is affected by water temperature, and water temperature varies with the seasons. One expects (and usually finds) higher DO readings in the colder months and lower DO readings when the weather is warmer. In order to compare DO readings in different months, it is necessary to account for differences in water temperatures, and this is done by calculating "percent saturation", which expresses actual DO levels as a percentage of DO levels that water of that temperature could contain when "saturated". With this standard, one can ask some very good follow-up questions. For example, if a cool water temperature says that the DO should be higher than it is, follow-up questions might focus on what is causing the difference. Is something else preventing a high DO reading? Is something (natural process? pollution?) "soaking up" the DO in the water?

To calculate percent saturation one simply divides the actual DO sample reading by that which is predicted from temperature. Signifying temperature predicted DO as DOpr(C) and C the number of degrees Celsius, we have for percent saturation (PS) the formula: PS = DO/DOpr(C) x 100%. PS can be thought of as a test grade; 90+%, for example, is good performance.

To use the formula for PS, one also needs a calculated value for DOpr(C), temperature predicted DO. DO for pure water under standard conditions can be predicted via an empirical formula from: a) atmospheric pressure, b) water temperature (in degrees Celsius) and c) the amount of salt in the water. (What is actually predicted is the maximum concentration of DO possible at a particular temperature, pressure and salinity.) In the list above, factor a) is considered for precise measurements or as one moves significantly above sea level, and factor c) is not important for the New Hope basin. The empirical formula is long and hence is not given here, but it has been used with the computer to calculate the values used to make the surface graph.

To illustrate the numerical relationship between temperature and DO, a simplified (and useful) formula is: DOpr(C) = 468/(31.6 + C) ppm. At zero degrees Celsius for example, the DO predicted by temperature is about 14.8 ppm; at 20 degrees Celsius (the same as 68 degrees Fahrenheit) it is about 9.1 ppm. Generally the lower the (unfrozen) water's temperature, the higher its maximum concentration of DO. As a rule, when sampling water, 14 ppm is considered a very good DO reading, while anything below 5 ppm is generally a bad DO reading.



New Hope Creek
Mean Dissolved Oxygen (DO)
Percent Saturation
by Month and Station
November 1990 - May 2000

Notes on the Surface Graph:

On the graph surface up is good; higher is better, to the neighborhood of 100%.

To understand the graph surface, consider the "month/station grid," shown on the graph surface and note that each intersection and corner of the month/station grid represents one station in one month of the year. To tell which station and which month is associated with which intersection or corner, consult the labels associated with the tick marks along the flat, horizontal plane (the "month/station plane") which forms the "floor" below the graph surface.

Note that in the month/station grid on the graph surface, each grid intersection and corner is placed at a height that depends upon the magnitude of a particular average. It is the average of all the percent saturation results calculated for the grid indicated station taken in the grid indicated month of the year, during the years included in the life of the monthly sampling project.

For various reasons not all stations have the same number of data points used to calculate the average in a particular month of the year. The average number of data points used per intersection or corner is a little over 8.5. There are over six hundred data points used to make the graph.

One should note that in the data behind the graph, the minimum average percent saturation was just above 40 percent; accordingly the lowest value on the vertical axis was set to 40. Such a change in the graph avoids a large area of unused space appearing if the lowest value is set at zero. The maximum average percent saturation was just above 97.

The three shaded areas of the surface are assigned by the computer to designate ranges of average percents. The surface is as a result like a topographic map. The "high hills" are made up of the performance of stations in good months. The "valleys," or "pools," are just the opposite.

Time on the graph moves from up left to down right across the figure. (Note the data for January and December are shown twice to aid reading the graph. In particular the far and near "ribbon" areas of the surface, between the January and December month lines, are the same.)

Because of the yearly cycle of months, one can consider the graph as a big (uneven) circular belt that's been taken apart and stretched out over (hovers over) the above mentioned flat, month/station plane. (The duplicate December/January ribbon area can be considered as a flap used for gluing the disassembled belt back together.)

graph and section on water quality by John Kent

General Conclusions

Stations at Turkey Farm Road and Erwin Road are the best in all seasons, and quality falls off as one moves up and downstream from these stations.

Cool months are still better than the warm months, even controlling as we have for temperature. Monthly fluctuations, up and down, are also almost certainly influenced by annual patterns of natural processes, e.g., leaf litter availability. They may also be influenced by annual cycles of human activity, e.g., construction and agriculture.

Downstream from the Turkey Farm and Erwin stations, quality falls off until the area around NC 54, with it rising in most months at the Stagecoach Road sampling location. This last, modest improvement may be attributable to the augmented flows from the wastewater treatment plant on Farrington Road.

Related Thoughts

The fall in water quality downstream of Erwin Road and upstream of the NC 54 station is very probably attributable to the introduction of urban run off, the initial portions of which enter the Creek's main stem in three tributaries between US 15-501 and Old Chapel Hill Road. The introduction of the typical constituents of urban runoff makes it harder for water to hold dissolved oxygen.

A factor to be considered regarding the good performance of Turkey Farm Road and Erwin Road is the influence of topography. The elevation of the Creek falls about 180 feet between NC 86 and Erwin Road, leading to waterfalls, which act to aerate and cool the water and raise its DO content and percent saturation. The good performance of Turkey Farm Road and Erwin Road is almost certainly favorably influenced by the large forested areas in the nearby, upstream portions of the watershed.

VI. Outstanding Issues and Recommendations

The progress that has been made implementing the New Hope Creek Corridor plan has depended on three fundamental features. First, the plan focuses on areas that are critical to protecting water quality and preserving biodiversity. By attending to critical areas, the plan enables land acquisitions and oversight of development proposals to focus on the most important impacts on the integrity of the New Hope Creek. Second, the plan provides a comprehensive picture of activities necessary to protect in a pro-active manner the valuable biological resources of the creek. Third, there is an institutional structure, in this case the NHCCAC and other advisory bodies, that can provide continuous monitoring and encouragement of the implementation of the plan. The potential progress that may be made in the next five years depends on extending the considerations of these fundamental features. It is important to build on the progress to date by attending to new areas and by examining the development impacts likely to occur.

- ***Establish a Watershed Approach for the New Hope Creek Basin***

The central reach of the New Hope Creek has been the focus of the protection and conservation efforts of the preceding five years. The geographic area should be enlarged,

encompassing both upstream and downstream reaches of the watershed. It is widely accepted among professional water quality engineers and environmental planners that an approach that examines the entire watershed of a stream is necessary to guarantee the long-term health of the water body. This allows a comprehensive approach to both pollution source control and cost-effective mitigation measures to be undertaken. As a result, we believe it is important for the governing bodies to consider extending the geographic area of planning for the New Hope Creek, and, by doing so, initiate a comprehensive watershed approach for future planning.

1. Headwaters: The planning area should be extended to include more of the headwaters of the creek. Protecting the sources of the creek can prevent degradation of water quality that characterizes so many water bodies. The means for undertaking this planning should be examined by the relevant planning authorities with recommendations made to the governing bodies as to the feasibility and utility of extending the planning areas to the headwaters of the creek.

2. Reach Below NC 54: The planning area should also be extended to the reach of the creek below NC 54. The original boundary for the creek's planning stopped at NC 54 largely based on the assumption that management of the Corps of Engineers land would provide adequate protection for that part of the creek. Experience has shown that developments in this area occurring outside the Corps area and south of NC 54 can have an impact on the creek's water quality. With the extensive development that is underway in this area, it seems prudent for the governing bodies to consider charging a group with specifically attending to protection of the creek south of NC 54. We note that the Durham Planning Department has underway planning activities for southwest Durham, and these may provide a natural connection to such an extension of the New Hope Creek plan. However the governing bodies choose to proceed, it is clear that the existing land ownership by the Corps cannot by itself protect all of the environmentally important land in the lower New Hope. Attention to this deficiency is important for the future of the Creek's environmental quality.

- ***Examine the Cumulative Impacts of Development in the New Hope Creek Watershed***

When the New Hope Creek Plan was adopted, the explosive growth that presently is surrounding the watershed in southwest Durham was still in the future. As discussed in other parts of this report, the Committee has devoted substantial efforts to reviewing the accelerating development proposals throughout the watershed. By necessity, these reviews have been sequential, and have focused on the incremental effects of each proposal. We are concerned, however, that the cumulative effects of this substantial development are not being considered adequately. Certainly, the Committee lacks the resources to provide such a broad-scale analysis of each proposal. We are hopeful that the revisions to the southwest Durham plan that are underway and which were discussed above can provide a means for examining the impacts. Whatever the results of this planning effort, it is clear to the Committee that if the development impacts are examined on an incremental basis, the water quality and the biodiversity of the watershed will be negatively impacted. Incremental development can also make it more difficult, and more expensive, to develop a first-rate system of trails.

Consequently, the Committee recommends that any future planning undertaken for the areas drained by New Hope Creek carefully consider the cumulative impact of development. This planning should consider potential impacts of land use changes not only in the area covered

by the 1992 New Hope Corridor plan but also development in upstream sections in Orange County and along tributaries (e.g. Third Fork Creek) that impact the New Hope but are outside the Corridor itself. The widespread use of GIS technology makes it much cheaper and easier to map areas not corresponding to neighborhood or road boundaries (e.g. stream drainages) and to manipulate multiple data layers. And the new natural heritage inventories in both Durham and Orange counties offer a rich new data source. A comprehensive picture of the impacts of the burgeoning development throughout the New Hope drainage is necessary if we are to avoid the unacceptable loss of quality and habitat that motivated the planning effort in the first place.

Use the New Hope model to protect other stream corridors

The "New Hope model", which involves participatory and comprehensive planning, and creation of a long-lived advisory body to monitor and encourage implementation of the plan, seems relevant to other stream corridors in Durham and Orange counties. It might be considered, for example, for the Little River, the Flat River and Morgan Creek. Our suggestion of comprehensive planning for the upper tributaries of the New Hope and for the wide floodplain between the current planning area and Jordan Lake might be best implemented by creating new planning and advisory bodies that would involve the multiple interests most concerned about these areas and most knowledgeable about them.

Put new open space bond issues on the ballot

Much of the success in land acquisition and in trail and park development in the New Hope has been due to the availability of local government funds derived from past open space bond issues. To the extent that these funds are now depleted, each jurisdiction should put new open space bond issues on the ballot. The scheduled opening of many new public trails, due to past bond issue success, should encourage the voters to support new bonds.

Encourage the rebuilding of Hollow Rock Store and an associated access point

Although the old Hollow Rock Store has been demolished as a result of bridge reconstruction, there is great community interest in rebuilding it. Local governments should work with the store owner and with Duke University, which owns an adjoining tract of land, to not only rebuild the store and to also create the access point (with appropriate parking and rest room facilities) called for in the New Hope Plan.

Appendix A

Durham County		"Parcel"/Seller	Acq. Date	Uses of Funds: Acres protected	Uses of Funds: Acquisition Cost	Sources of Funds: City of Durham	Durham County	Landowner Donation	NC Heritage Trust Fund	Clean Water Trust Fund	Triangle Land Cons.
Land Acquisition											
Leigh Farm	•	B-1 and D	1992	29.8	$ 390,000	$ 205,000	$ 185,000				
	•	E-1	1993	6.7	$ 69,000	$ 34,500		$ 34,500			$ 30,500
	•	B2	1994	1.8	$ 61,000		$ 30,500				
	•	A - "Historic core"	1994	7.0	$ 105,000				$ 105,000		
	•	C - "Trust"	1996	18.3	$ 285,000				$ 285,000		
	•	E	1997	23.0	$ 345,000				$ 345,000		
		Leigh Farm subtotal		*86.6*	*$ 1,255,000*	*$ 239,500*	*$ 215,500*	*$ 34,500*	*$ 735,000*		*$ 30,500*
Other	•	"New Hope Commons" bottomland	1995	30.0	*land donation*						
	•	Lands"	1996	32.0	$ 19,007		$ 19,007				
	•	NC Mutual	1994	55.0	$ 83,297		$ 83,297				
	•	Garrett Farms Assoc.	1994	37.5	$ 61,899		$ 61,899				
	•	Duke Power Co.	1995	18.5	$ 26,893		$ 26,893				
	•	Colonial Bank	1996	5.5	$ 5,972		$ 5,972				
	•	Clifton Garrett	1996	7.6	$ 17,512		$ 17,512				
	•	Branch Heirs Estate	1996	15.0	$ 17,150		$ 17,150				
	•	Alma Hunt	1997	0.9	$ 5,000		$ 5,000				
	•	Sandy Creek WWTP	1997	101.7	*n.a.*						
	•	Davis/Barbee	1999	5.5	$ 226,024	$ 226,024					
	•	Wellington Hay	2000	36.0	$ 15,400		$ 2,600			$ 12,800	
		subtotal (other acq.)		*345.3*	*$ 478,154*	*$ 226,024*	*$ 239,330*			*$ 12,800*	
		Total - Durham County		431.8	$ 1,733,154	$ 465,524	$ 454,830	$ 34,500	$ 735,000	$ 12,800	$ 30,500

Orange County							Clean Water Trust Fund	Triangle Land Cons.
Land Acquisition								
Purchase	•	Johnston Mill Nature Pres.	1999	296	$ 2,495,000	*on New Hope Creek - TOCH, OC & private donations to acquire*	$ 1,815,000	$ 680,000
Donations	•	Steep Bottom Natural Area	1995	29	*donation to TLC*	*mature hardwood slopes along NHC tributary "Steep Bottom Branch"*		
	•	Timberlyne	1992	6	*donation to TLC*			
		acquisition subtotal		*331.0*	*$ 2,495,000*		*$ 1,815,000*	*$ 680,000*
Conservation easements								
	•	Currie Hill	1996	39	*donation to TLC*	*oak-hickory forest along NHC*		
		cons. easement subtotal		*39*				
		Total - Orange County		370.0	$ 2,495,000		$ 1,815,000	$ 680,000
Total (Orange +Durham)				801.8	$ 4,228,154			
				% of total expend.	*100.00%*			

	Durham City	Durham Co	Donation	NC Her. Prog.	CWTF (D/O)	TLC
	$ 465,524	$ 454,830	$ 34,500	$ 735,000	$ 1,827,800	$ 710,500
	11.01%	*10.76%*	*0.82%*	*17.38%*	*43.23%*	*16.80%*

Funds still available for acquisition $ 146,640 $737 K / 225 K

Appendix B

New Hope Ten Years After

A Field Trip for Public Officials

May 16, 2000

Meet at: **New Hope Fire Station**, Whitfield Road

Tour Route: **Numbers correspond to those on the accompanying map**

5:00 Depart New Hope Fire Station—introduction—Bob Healy

West on Whitfield Road to Turkey Farm Road

1. **Johnston Mill Preserve—Triangle Land Conservancy**—Audrey Booth

Turkey Farm Road to Mt. Sinai Road, east on Mt. Sinai to Friends School Road. Left on Friend's School Road—

2. **Widener Farm addition to the Duke Forest**—*Judson Edeburn (recreational use of Duke Forest, wildlife habitat, teaching and research)*

Friends School Road to Cornwallis Road, right on Cornwallis Right on Cornwallis to

3. **Troy Couch Farm addition to the Duke Forest**—Judson Edeburn

Cornwallis Road to Kerley Road, left on Kerley to NC 751, Right on 751, 751 to 15-501.

4. **NC 751 Scenic Road designation**--Edeburn.

Right on 501 to Cornwallis Road, left on Cornwallis to Pepsi plant road, Pepsi plant road to Pickett, right on Pickett Road to Sandy Creek service road, left on service road to

5. **Sandy Creek Environmental Center**—Bob Healy

Picket to Tower Road, right on Tower to 15-501.

6. **South Square redevelopment**—Bob Healy

Right on 15-501 south past South Square to Garrett Road (New Hope Creek in distance, transit corridor), left on Garrett,

7. **Garrett Road developments**—Bob Healy

Garrett road to NC 54, right on 54, right into Leigh Farm entrance,

8. **Borden and Bocook project;**

9. **Leigh Farm**—Healy

Leave Leigh Farm, right on NC 54, 54 to Farrington Road, right on Farrington; cross Old Chapel Hill road to Watkins Road and parking lot of Githens Middle School,

10. Audubon Trail and Davis/Barbee/Easterling property—Healy (active vs. passive recreation, trail head)

Watkins Road to

11. Patterson Place development, transit corridor—Healy

Watkins Road to 15-501, cross 15-501 to

12. New Hope Commons, development proposals, collapse of "Wall"mart—Healy

Mount Moriah Road past

13. Cell tower

to Erwin Road, right on Erwin Road to

14. Hollow Rock Store site/trail access—Edeburn (Collaboration between TLC, Orange County and Duke)

Erwin to Pickett Road, right on Pickett

15. Wade Penny property Dallas Branch property/Trinity School—Audrey Booth

Turn around at Triangle School, Pickett back to Erwin, Erwin to Whitfield Road, right on Whitfield to New Hope Fire Station—Let's eat!

Appendix C

Name and affiliation of past and present NHCCAC members
(indicates current member)*

*Audrey J. Booth, Chapel Hill Greenways Commission
Norm Christensen, Dean, Nicholas School of Environment, Duke University
*Judson Edeburn, Duke University
*Gerald A. Emison. Durham Open Space and Trails Commission
Richard Hamilton—NC Wildlife Commission
*Robert G. Healy--co-chair, liason to Durham Open Space and Trails Commission
Isaac Harold—*alternate*, NC Wildlife Commission
*Bill Hutchins—Friends of New Hope Creek, Orange County
*Annette Jurgelski—Orange County Commission for the Environment
Joan Magat--property owner, Mimosa Drive Neighborhood, Orange County
Stella Maunsell, Orange County Open Space Commission
Carol Pekar, Chapel Hill Greenways Commission
Wade H. Penny, Jr., landowner, Durham
*Hildegard Ryals--co-chair, Friends of New Hope Creek, Durham
*Thomas Stark, Durham Open Space and Trails Commission
*J. Michael Waldroup--land owner, Durham

Advisors and Organizational Representatives

Kenneth Coulter
Edward Harrison
John Kent
Sharon Ryan
U.S. Army Corps of Engineers

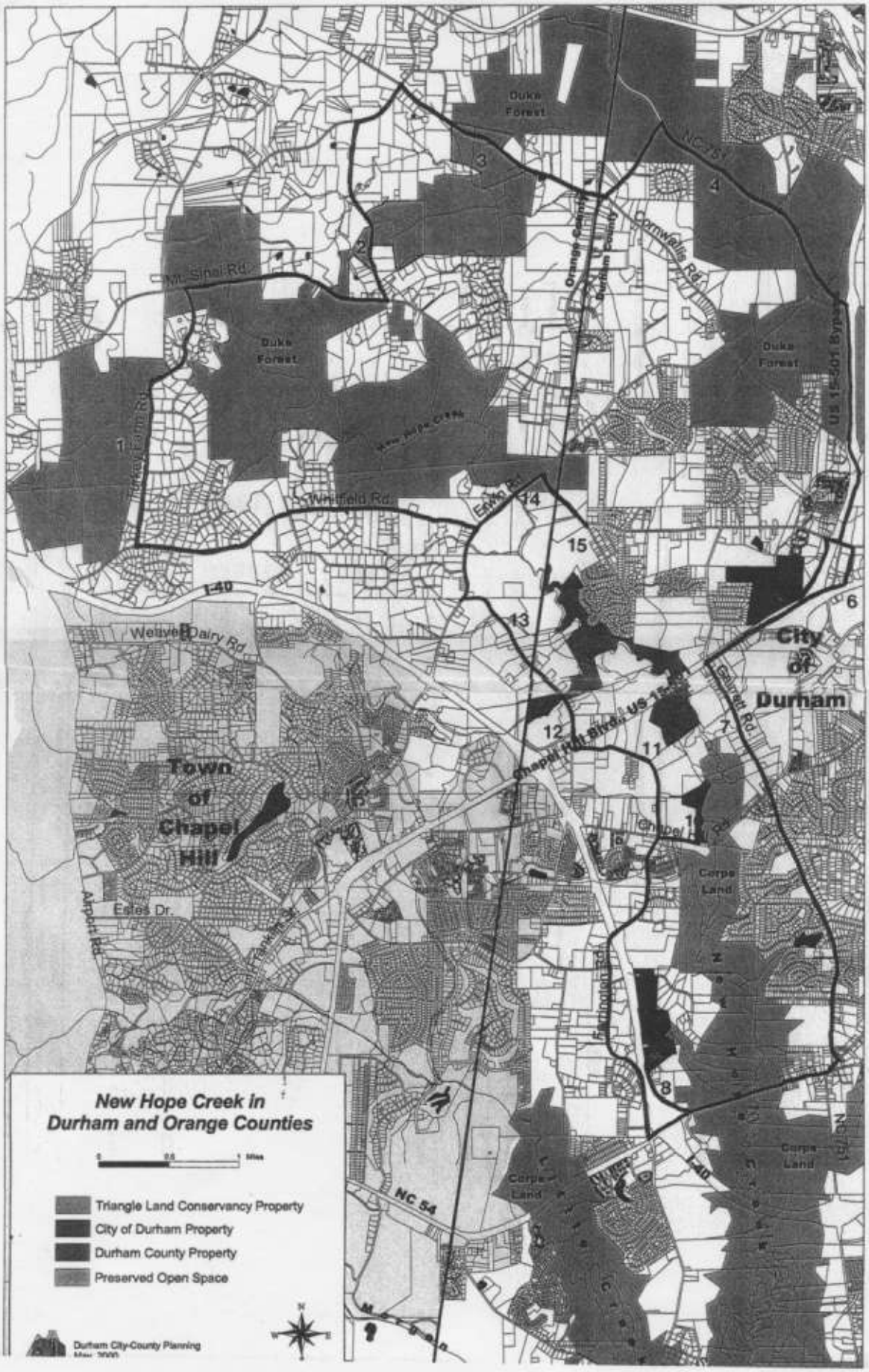
Other resources on New Hope Creek:

Hall, Stephen P. and Sutter, Robert D. Durham County Inventory of Important Natural Areas, Plants and Wildlife Elizabeth Pullman and Ann C. Simpson, editors Durham NC 1999

Le Grande, Jr., Harry B. Everett Jordan Project: Inventory of Rare, Threatened and Endangered Species Natural Community Inventory NC Natural Heritage Program, Raleigh NC 1997

Wiley, Haven, Luddington, Livy and Hall, Stephen P. A Landscape With Wildlife For Orange County Triangle Land Conservancy, Raleigh NC 1997

New Hope Creek, A Comprehensive Study NC School of Science and Mathematics, Durham NC 2000


Duke Forest
NC 751
Mt. Sinai Rd.
Orange County
Durham County
Cornwallis Rd.
Duke Forest
Duke Forest
US 15-501 Bypass
Hickory Tavern Rd.
New Hope Creek
Whitfield Rd.
Erwin Rd.
I-40
Weaver Dairy Rd.
City of Durham
Gimghoul Rd.
Chapel Hill Blvd.-US 15
Town of Chapel Hill
Corps Land
Estes Dr.
Fordham Blvd.
Corps Land
NC 54
Corps Land
I-40
New Hope Creek in Durham and Orange Counties
0 0.5 1 Miles
Triangle Land Conservancy Property
City of Durham Property
Durham County Property
Preserved Open Space
N
Durham City-County Planning