Morgan and Little Creeks Local Watershed Planning Initiative

Meeting Announcement & Summary

Thursday, April 1st, 2004 meeting held at the Totten Center

Next meeting:

May 26th, 2004

2:00-4:00 pm

Totten Center, NC Botanical Gardens

Directions to the Totten Center:

From I-40: Take exit 273 from the West, 273-B from the East. Turn right onto Highway 54 W, go 2.4 miles; turn left at the traffic light onto Finley Golf Course Road. Go 0.6 mile and curve right onto Old Mason Farm Road. Go 0.7 mile, see North Carolina Botanical Garden sign on left; turn left into parking lot.

From the 15-501 and 54 Bypass (Fordham Blvd.): Look for the brown landscaped wall on the south side of Fordham Blvd., 0.6 mile west of the Hwy 54 overpass. Turn onto Old Mason Farm Road at the east end of the wall. See North Carolina Botanical Garden wooden sign on immediate right and turn right into parking lot.

Maps can be found at the following URL: http://www.unc.edu/depts/ncbg/info.htm#Directions

May 26thMeeting Agenda

- ► Welcome and Introductions
- ► Review and approval of April minutes
- ► Ranking Procedures for Possible Projects
- ► List of Recommended Sites
- ► Presentation by Friends of Bolin Creek
- ► Plans for Next Meeting

Team members present at 04/01/04 meeting:

Shari Bryant, NC Wildlife Resources Commission
Patricia D'Arconte, Town of Chapel Hill
Tina Moon, Orange County Planning Dept.
Doug Nicholas, Triangle Land Conservancy
Johnny Randall, NC Botanical Gardens/Morgan Creek Valley Alliance
Noah Ranells, Town of Carrboro
John-Ann Shearer, US Fish and Wildlife Service

Team members not present:

Brent Bogue, Natural Resources Conservation Service
Jim Blose, Dept. of Environment and Natural Resources
Ren Ivins, Orange County
Ed Holland, Orange Water and Sewer Authority
Karen McAdams, Cooperative Extension Service
Sydney Miller, Triangle J Council of Governments
Sharon Myers, UNC-Chapel Hill
Jonathan Parkinson, Friends of Bolin Creek
Fred Royal, Town of Chapel Hill
John Thomas Jr., US Army Corps of Engineers

Guests Present:

Gail Galbraith, Alamance Community College
Meg Holton, UNC-Chapel Hill Energy Services
Dave Otto, Friends of Bolin Creek
Wesley Poole, Orange County Planning Dept.
Hollie Rennell, Orange County Planning Dept.
Kristen Sinclair, NC Botanical Gardens
Cherri Smith, City of Durham

Support Staff Present:

Deborah Amaral, Cape Fear River Assembly
Jason Doll, TetraTech, Inc.
Bonnie Duncan, N.C. Ecosystem Enhancement Program
Jim Blose, Dept. of Environment and Natural Resources
Heather Fisher, TetraTech, Inc.
Samantha Sheehy, Cape Fear River Assembly

Summary of the 4/1/04 Meeting

Meeting Agenda / Stakeholder Introductions

Deborah Amaral of the Cape Fear River Assembly opened the meeting and reviewed the agenda items. Participants then introduced themselves and stated which organization they represented. Minutes of the February meeting were reviewed and approved.

Evaluation of Watershed Indicators

Jason Doll of TetraTech, Inc. presented a comprehensive review of the watershed health indicators assessed so far, as well as his subwatershed recommendations for targeting restoration /improvement and preservation/protection efforts. Water quality indicators, including nutrient analyses and loading potential have been evaluated, the morphology of the streams has been studied, and indicators linked to habitat condition have been assessed. This comprehensive assessment of indicators concluded the second phase of the project, where the overall LWP priorities have been established on a subwatershed level. Now, in the third and final phase, the team members and the Ecosystem Enhancement Program (EEP) together will focus their efforts on restoration, preservation and BMP implementation locations that will give maximum positive return for the restoration effort. Jason is seeking team member advice and consent for his ranking procedure/scoring system as well as his recommended focus subwatersheds.

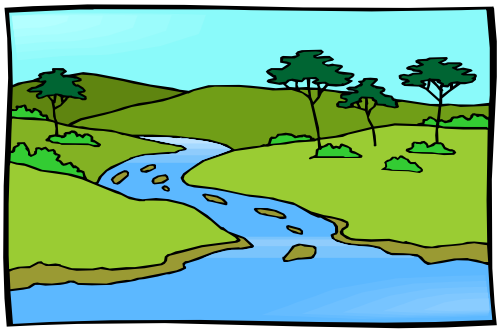
Existing and Future Indicators

Both existing and future watershed conditions have been considered in the ranking process, and the indicators of each will be scored in a weighted scheme to identify possible project locations. Existing indicators include stream stability ratings, SVAP ratings, SVAP morphology ratings, riparian buffer condition, imperviousness, nitrogen and phosphorous loading, floodplain encroachment, and habitat quality/preservation potential. Future indicators include stream stability ratings, imperviousness, and nitrogen and phosphorous loading. Future condition indicators will be evaluated in terms of incremental change from existing to future conditions in order to target areas where the greatest increases in risk to watershed functions are likely to occur.

Review of Assessment Results for Individual Indicators

Four major primary watershed functions were considered in the study: aquatic habitat, hydrology, water quality/water supply, and terrestrial habitat. The following indicators were used in different combinations in order to measure how well these primary watershed functions are performing:

Stream Erosion and Instability Analysis: This indicator was not analyzed everywhere, but mainly in rural areas in order to measure the effects of ongoing development/urbanization. Current risk areas for stream erosion and instability were high in lower Morgan Creek, Tom's Creek, and mid to lower Bolin Creek. For future conditions, the biggest impact will be in Wilson Creek and in the Chatham County portions of the watershed. Areas like the Horace Williams Tract kept upper Bolin Creek at a low future risk of erosion and instability. This indicator was used to evaluate the functions of aquatic habitat and hydrology.



SVAP and SVAP Morphology Ratings: The Stream Visual Assessment Protocol (SVAP) ratings were used as indicators of hydrology functions and viable aquatic habitat. Each stream is evaluated on 10 parameters, with 3 focusing specifically on stream morphology. For the general SVAP results, better conditions existed in upstream areas, with some localized disturbances due to development and agricultural sites. For the SVAP morphology ratings, the more resistant boulders and bedrock of Morgan Creek above Hwy 54 and other upstream areas returned excellent scores and are in great condition.

Riparian Buffer Condition: This indicator was used to evaluate the functions of aquatic habitat, hydrology, and water quality/water supply. There proved to be more buffer loss in urbanized areas, especially around downtown Chapel Hill/Carrboro and Chapel Creek, the stream running through an old

golf course with no stabilizing bank vegetation. Upper and lower Morgan Creek and the headwaters areas of upper Bolin Creek had less buffer degeneration and riparian buffers were in good shape in these locations.

Imperviousness: This indicator was used to evaluate the functions of aquatic habitat, hydrology, and water quality/water supply functions. Risk levels for this indicator were determined using the Center for Watershed Protection's Imperviousness Cover Model (ICM). This model demonstrates the general relationship between increased impervious surface and increased deterioration in the streams. According to the ICM, at 10% imperviousness within a watershed, noticeable stream degradation begins, and at 25% imperviousness, the degradation becomes severe. For existing imperviousness, lower Bolin Creek and lower Morgan Creek (downtown Chapel Hill/Carrboro) are the most severe with 25% and 22% impervious cover. When considering future buildout conditions in the watershed, development could raise impervious coverages an additional 11-15% throughout the urban area, so that some subwatersheds could contain above 32% impervious surface! One important exception is the University Lake Area, where the five acre building lot restriction serves to limit development, keep impervious coverage down, and protect streams from deteriorating. Future impervious coverages in this area remain in the 5-6% range, even with buildout conditions.

Existing and Potential Loading of Nitrogen and Phosphorous: These indicators were used to evaluate water quality/water supply functions. For the existing nitrogen/phosphorous loading to Jordan Lake, the highest loads are from the lower Booker Creek, Morgan Creek, and lower/middle Bolin Creek areas. Efforts are currently underway within the N.C. Division of Water Quality to develop a TMDL (Total Maximum Daily Load) to address nutrient loading and eutrophication issues in Jordan Lake. The final TMDL may require reductions in existing nonpoint source nutrient loads. Future nitrogen/phosphorous loads could come from Little Creek, Morgan Creek, the Booker Creek headwaters, and other water sources near the Durham area, which have high potential to be developed in the near future. Additionally, subwatersheds closest to the lake will transport the most nutrients because they are closer. The Morgan Creek corridor will be a high risk area, but the University Lake watershed mitigates the effects from other creeks on the western side by trapping the nitrogen/phosphorous in the reservoir.

Floodplain Encroachment: This indicator was used to evaluate hydrology functions in the watershed. As development and urbanization occur, we continually backfill into the floodplain, which causes more scour potential downstream. Areas of high floodplain encroachment risk include lower Booker Creek and lower Bolin Creek, where up to 8% of the floodplain is in buildings.

Terrestrial Habitat Functions

In order to evaluate terrestrial habitat functions, six pertinent indicators were used: Percent Forest Cover, Percent High Priority GAP Habitats, Percent NWI Wetlands in the Riparian Corridor, Triangle Land Conservancy (TLC)/Orange County Prime Forest Habitat, Natural Heritage Element Occurrences, and Significant Natural Heritage Areas. A GIS analysis was done to determine the proportional content of key metrics in each subwatershed, including the high value habitats from the GAP data, the NWI wetlands, and the overall percent forest cover. The subwatersheds were then broken into quartiles based on the content of each metric and assigned points. Bonus points were also given for the presence of Natural Heritage Element occurrences, significant Natural Heritage areas or TLC/Orange County high quality forest habitat areas. According to this assessment, the most desirable subwatersheds in which to implement preservation efforts are the Morgan Creek Headwaters, Tilley's Branch, Hogan Farm, Upper Bolin Creek subwatersheds, and the Morgan Creek and Little Creek Arms subwatersheds near Durham.

Comprehensive Assessment of Indicators

Because the ranking procedure was based on the subwatershed level, the fecal coliform data and the benthic data were not used in the scoring system, because they were not evenly distributed among subwatersheds, but will be used later in the process. There exist two distinct types of land cover in the watershed: rural land in the western portion (Orange/upper Chatham Counties), and urban land (Chapel Hill/Carrboro/Durham) to the eastern side. As conditions both now and in the future are different in each type, the indicators were evaluated such that urban subwatersheds were ranked among other urban subwatersheds, and rural areas were rated among other rural subwatersheds.

A GIS overlay of SVAP morphology scores and preservation priority habitats was analyzed in order to see the spatial relationships between streams in poor shape and high priority habitats. Again, the team should not be picking out isolated projects, but should focus efforts in a holistic approach in order to get multiple benefits from a single effort that can improve more than one watershed function. An example of focusing efforts to address multiple problems would be restoring a poorly functioning stream while protecting a high priority habitat. A similar GIS overlay of nitrogen loading and stream morphology was done in order to identify areas with high nitrogen loads and poorly functioning streams, so that a BMP retrofitting strategy could be identified that would help the stream recover while reducing the existing nitrogen load.

Proposed Subwatershed Scoring System

The proposed scoring system uses two types of scores given to each subwatershed in the area: an existing risk/priority score for management and a future risk/priority score for prevention. For score 1, the existing risk score, high number values equate to poor conditions in the subwatershed, so that for most criteria a "0" score was an excellent rating, and a "3" or even "4" score was a poor or very poor rating. Because the scores are intended to reflect not just risk, but the need for management (restoration/preservation/protection) efforts, the terrestrial habitat/preservation priority scores work in the opposite direction of other scores. For example, a subwatershed with a high score for stream erosion would be high priority for action (stream restoration) to repair that degradation, whereas a subwatershed with high quality habitat would be high priority for action to preserve those habitats, so would also be given a high score. The habitat quality/preservation potential is a weighted score (a very good habitat potential yielded a "6" score) due to the numerous indicators that were considered in this category. This metric system was used to establish ranges to compare individual scores across many indicators. Therefore, high scores led to high priority subwatersheds for restoration/protection/preservation efforts, while low scores equated to low priority areas. For score 2, the future risk/priority score, high scores also equated to high priority subwatersheds, while low scores indicated a low risk of future risk/priority for prevention. However, for each metric, the raw numbers and figures will be used in the final recommendations.

In evaluating the indicators of existing conditions, the upper Bolin Creek area (Hogan Farm, Upper Bolin Creek, and Horace Williams subwatersheds) as well as the Wilson Creek subwatershed had the highest existing risk areas among the rural subwatersheds. Erosion/instability, poor SVAP morphology ratings, poor stream conditions, and high priority habitat quality were indicators that drove the score in the Hogan Farm and Upper Bolin Creek areas, while imperviousness, phosphorous load, and buffer disturbance were driving the Horace Williams subwatershed score. The Wilson Creek subwatershed had high scores on the imperviousness, erosion/instability, nitrogen load, and buffer disturbance indicators. Low risk rural areas include the Phils Creek, Neville Creek, and University Lake subwatersheds.

Among urban subwatersheds, Lower Booker Creek and Lower Bolin Creek subwatersheds were the highest existing risk areas, with the imperviousness, SVAP morphology rating, SVAP stream condition,

nitrogen load, phosphorous load, buffer disturbance, floodplain encroachment, and habitat quality indicators driving the high scores. Low risk urban areas include the Crow Branch subwatershed, a tributary in the Booker Creek headwater area, and medium risk areas include the Booker headwaters themselves, along with middle Bolin Creek, and lower Morgan Creek.

For the indicators of future conditions, only the imperviousness, erosion/instability conditions, and nitrogen and phosphorous loading indicators were used, because the state of the other indicators was impossible to predict in the future. For example, if buffers are disturbed now, they are likely to be disturbed in the future, but what if they are restored in the meantime? Only these four indicators were used in the analysis, because their future conditions were foreseeable.

As in the existing state, for the future conditions, the upper Bolin Creek area (Hogan Farm, Upper Bolin Creek, and Horace Williams subwatersheds) was the highest future risk area among the rural subwatersheds. Imperviousness was a factor in all three subwatersheds, but erosion/instability was an additional factor in the Hogan Farm area, and erosion/instability as well as phosphorous load were high risk indicators in Upper Bolin Creek. The Morgan headwaters area and the University Lake area were very low future risk areas.

Among urban subwatersheds, the Morgan-Carrboro and Meeting of the Waters subwatersheds (both located in Chapel Hill/Carrboro) as well as the Little Creek Arm in Durham were the highest future risk areas. Imperviousness was the biggest driver of high risk scores for these three subwatersheds, with nitrogen loads an additional factor in the Meeting of the Waters and Little Creek Arm areas. The Eastwood Lake, Lower Bolin Creek, and Lower Morgan Creek were low future risk areas in the urban watershed category.

Subwatershed Targeting Recommendations

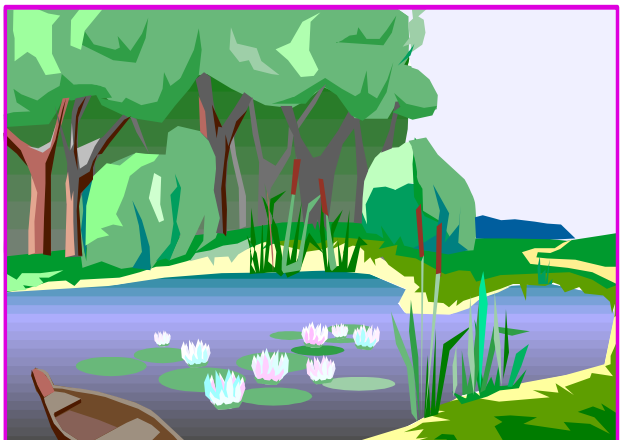
Based on the high and low risk areas identified in both the rural and urban parts of the entire watershed, two "tiers" were identified for the final targeting recommendation. Tier 1 refers to the most important targeting priority, or where the most cost effective efforts will return multiple benefits to the streams. This area includes upper Bolin Creek, upper Morgan Creek, middle and lower Bolin Creek, and lower Booker Creek, and contains high habitat priority as well as localized stream disturbances that can be addressed. It is in these areas that preservation and restoration projects should be pursued. Tier 2 refers to the second targeting priority, and includes the Booker headwaters, middle and lower Morgan Creek, and the Meadowmont/Ephesus subwatersheds. For the Tier 2 area, it is recommended that efforts to retrofit BMPs and strategies to address nutrient loading should be continued. However, recommendations for further focus and study can also be made about specific sites in Tier 2, such as the degrading streams of the Morgan Creek area. It is interesting to note the effect of the five-acre building restriction in the University Lake area, which scored very low risk to the watershed in both the existing and future conditions analysis. Some sites did not get tiered due to project logistics. This includes the Wilson Creek area, which includes land in Chatham County, which is not a team member of the Morgan and Little Creeks LWP.

Efforts to Implement Priorities Established by the Detailed Assessment

In the last phase of this local watershed planning effort, attention will be focused specifically on the high priority Tier 1 subwatersheds to identify specific restoration and preservation sites as well as BMP retrofitting opportunities to restore and enhance watershed functions. As project resources and timelines allow, attention will be focused on the Tier 2 subwatersheds to identify specific project opportunities within them as well. It should be noted that valuable opportunities for specific restoration or preservation projects identified in subwatersheds not included in Tier 1 and Tier 2 will not be ignored as a result of the rankings outlined here.

For the purposes of targeting preservation efforts within priority subwatersheds, a GIS analysis of specific parcels within those subwatersheds will be done, and the targeting criteria will be the same as used in the subwatershed habitat assessment, but the priority preservation scores will be delineated by parcel. Infrastructure constraints, such as proximity to sewer lines, feasibility of the project, possible benefit to aquatic habitat, and cost will be major considerations when identifying and prioritizing stream segments for restoration. In order to retrofit

stormwater BMPs, the storage needs of high risk areas will be determined, sites will be identified, and implementation will then be pursued. Possible BMP tools include stormwater wetlands and stormwater ponds to restore buffers and swales as well as filter out pollutants from directly entering streams and gutters.



Other important site issues include size of the site and the size of the drainage area. Stormwater wetlands are appropriate for a 70-90 acre watershed, and are shallower than a stormwater pond. A stormwater pond currently is being used at Southern Village, and a stormwater wetland at the Hillendale Golf Course. A bioretention area, or rain garden, drains a 2-10 acre watershed, but is too diffuse a scale for a big project. However, the team can make recommendations to local governments and municipalities in specific areas where a rain garden may be appropriate.

A cost-effectiveness analysis will be done at the stream reach level, and the watershed level benefit of management action will be calculated. The benefit of the restoration or BMP action is the sum of all downstream reach level changes in habitat function. These changes can occur either through changes in local habitat (restoration) or through changes in watershed risk factors (BMP implementation).

Site ownership is a key issue in determining a project site. Public land is most desirable and more feasible to work on, but private land can be used for projects with land owner consent. Some restoration projects will require the removal of trees, but they will be replanted once the stream is restored. Low impact design is another tool that could be considered in areas where redevelopment is occurring. Team members will be needed as advocates for implementation of recommended projects and preservation sites. At the next meeting, a list of possible sites and a ranking system to categorize these projects will be reviewed and discussed.

The meeting was then adjourned.

Next Meeting!
May26th from 2:00 pm to 4:00 pm
at the NC Botanical Garden

For more information about the Morgan and Little Creeks Local Watershed Planning Initiative contact:

Deborah Amaral, Ph.D.
Special Projects and
Communication Coordinator
Cape Fear River Assembly
919-815-2296
amarda@mindspring.com
www.cfra-nc.org