Bolin Creek Watershed Situation Assessment

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Final Draft

Watershed Education for Communities and Officials
NC Cooperative Extension
North Carolina State University

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Executive Summary

The Bolin Creek watershed begins in rural Orange County, with its headwaters just north and west of Carrboro. Bolin Creek flows nine miles southeast through portions of downtown Carrboro and Chapel Hill, before joining Booker Creek to form Little Creek. Little Creek eventually flows to Jordan Lake in the Cape Fear River Basin. Since Bolin Creek flows to Jordan Lake, a major water supply source, its watershed is subject to the new Jordan Lake Rules. Bolin Creek is on the state's 303(d) list of impaired waters for not supporting the numbers or diversity of biological species that would be found in a comparable healthy stream. A 2003 NC Division of Water Quality (DWQ) report identified the following effects of urbanization as the primary factors stressing the Bolin Creek watershed: habitat degradation, riparian degradation, channel incision, low base flow (dry weather flows), and toxicity. The Towns of Carrboro and Chapel Hill , the NC DWQ and the US Environmental Protection Agency (EPA) formed the Bolin Creek Watershed Restoration Team (BCWRT) in 2006 to improve water quality such that Bolin Creek and its tributaries can support their designated uses and be removed from the 303(d) list. The BCWRT has received grants (NC Clean Water Management Trust Fund (CWMTF), and EPA) in partnership with North Carolina State University, the Friends of Bolin Creek and other local organizations to identify restoration projects, to develop a watershed plan required by the EPA, and to implement and monitor projects.

The BCWRT identified one of their main challenges to long-term restoration as difficulty in coordinating and leveraging efforts with the many active and interested citizens in the watershed. The BCWRT subcontracted part of a current EPA grant to Watershed Education for Communities and Officials (WECO), a NC Cooperative Extension program, to conduct a situation assessment in the Bolin Creek watershed. The purpose is to better understand the interests of watershed stakeholders and organizations, to identify opportunities to engage stakeholders in Bolin Creek restoration while meeting multiple interests, and to determine how stakeholders would like to participate in restoration efforts.

WECO staff conducted interviews and focus groups representing residents, businesses, non-profits, local and state government staff, and recreationists from a cross section of interests in the watershed. Most interviewees identify with Bolin Creek as a special and valuable community resource, and interact with it in many different ways. We were impressed with the community resources available and being used for a broad array of efforts to maintain and improve water quality, stream habitat, recreation, and educational opportunities. Agreement was not heard on the causes and sources of Bolin Creek's impairment, or on the preferred strategies for restoring the creek. While respondents overwhelmingly commented on the need for improving Bolin Creek, various efforts are underway that could provide more effective and sustainable restoration efforts if they were coordinated with each other. Many people cited differences in opinion about how to manage the riparian corridor through Carrboro and the Carolina North Forest- this has been a flashpoint of conflict for some segments of the watershed population.

A desire for comprehensive, collaborative visioning and goal-setting for the Bolin Creek watershed was clearly heard through the interviews. Stakeholders are ready and willing to participate in a coordinated effort to improve communication, share information, leverage resources, and improve restoration efforts. We recommend stakeholders focus on the

impressive number of positive attributes in the community and build on those as they move forward.

We recommend the BCWRT support this effort through the following recommendations which are more fully explained in Section V of this report.

A. Create a multi-organizational, collaborative watershed initiative to serve as the nexus for the watershed. This Bolin Creek Watershed Initiative can use the principles of inclusiveness, shared responsibility, neutral facilitation, consensus-based decision making, and can focus on leveraging the positive attributes of the community.

B. Enlist a neutral party to develop and actively manage an interactive online hub for the watershed community that enables interactive communication and houses links to all stakeholder organizations and relevant documents.

C. Examine how to more holistically plan and manage water resources across departments and jurisdictions

D. Increase community outreach and engagement on the Carolina North Forest Stewardship Plan.

E. Investigate how to raise revenue dedicated to water quality protection and restoration, such as a stormwater utility or other mechanism.

F. Continue to work together to address the landfill and groundwater contamination issues in the Roger-Eubanks community.

G. Convene a facilitated search for common understanding about ways to connect pedestrian and cyclist routes while also protecting and improving Bolin Creek's riparian corridor.

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I. Introduction

A. Purpose of the Situation Assessment

The Towns of Carrboro and Chapel Hill began meeting with the NC Division of Water Quality (DWQ) and the US Environmental Protection Agency (EPA) in April 2006. Together they formed the Bolin Creek Watershed Restoration Team (BCWRT) in an effort to restore Bolin Creek. The BCWRT's long term goal is to improve water quality such that Bolin Creek and its tributaries are able to support their designated uses and be removed from the 303(d) list. To date they have achieved the following successes:

In 2006, Bolin Creek was selected as one of only seven watersheds in the state to receive focused assistance from the NC Division of Water Quality (NCDWQ) and the US Environmental Protection Association's (USEPA's) Science and Ecosystem Support Division in preparing grant applications and leveraging other resources to remove it from the 303(d) list.

> What do we mean by collaboration?
>
> Collaboration is a process of shared decision-making in which all the parties with a stake in a problem constructively explore their differences and develop a joint strategy for action.
>
> - Scott London, Collaboration and Community

In 2007, the BCWRT received a Clean Water Management Trust Fund stormwater mini-grant used to conduct a detailed assessment of stream reaches to identify areas of erosion, instability, and other high risk locations. The final report identified and prioritized areas for future restoration projects (EarthTech, 2007).

In 2008 and 2009, the BCRWT in cooperation with NC State University, the Friends of Bolin Creek, and other local organizations received two 319 Grants funded by the USEPA through the NC DWQ Section 319 Nonpoint Source Grant Program. Section 319 refers to the US Clean Water Act. Nonpoint Source (NPS) refers to any pollution that does not have a discrete source, such as stormwater runoff. Through these grants the BCWRT is pursuing watershed assessment, monitoring, and specific restoration projects (Town of Carrboro).

There is great potential for achieving measurable improvements in the health of Bolin Creek, in large part due to the capacity for and strength of environmental initiatives from both local governments and local stakeholder groups. However, both town employee project coordinators have experienced unanticipated challenges in coordinating efforts with watershed stakeholders, including grant partners, given the complexity of the issues. In addition, watershed stakeholders hold strong and differing opinions on how to manage Bolin Creek's riparian areas.

The BCWRT has begun developing a watershed plan as required by the USEPA. Due to the previously mentioned difficulties, they have not yet been able to comprehensively engage watershed stakeholders in the watershed planning process required for the EPA grant . In addition, a major watershed organization is creating a separate conservation plan for a portion of the watershed. The BCWRT has identified one of their challenges to restoration

as difficulty in gaining support of property owners and recruiting participants. Engaging stakeholders through education and planning efforts is crucial to achieving support and active participation during implementation. Effectively coordinating with stakeholder efforts and leveraging resources is also crucial to achieving long term restoration of the Bolin Creek watershed.

For these reasons, the BCWRT requested assistance communicating and coordinating with, and engaging watershed stakeholders in Bolin Creek watershed management efforts. The Towns subcontracted a portion of their 319 Grant, *The Bolin Creek Watershed Initiative*, to Watershed Education for Communities and Officials (WECO), a NC Cooperative Extension program at NC State University (NCSU) to conduct this situation assessment. Effectively involving the public requires understanding their interests and how they want to be involved. This report intends to:

- identify organizations and individuals who can influence watershed decisions or are influenced by watershed decisions (stakeholders);
- identify issues of importance to the local community;
- seek to understand how stakeholders see these issues;
- identify conflicts and barriers to effective stakeholder involvement;
- identify opportunities to engage stakeholders and meet mutual interests; and
- determine how stakeholders would like to communicate and participate in restoration efforts.

This report does not intend to provide a quantitative, statistically accurate analysis of the issues, but rather a summary of the issues identified. The summary is followed by our interpretation of the stakeholder interests identified, and recommendations for the BCWRT and watershed stakeholders that may offer the most effective course for building the community's capacity for communication, networking, coordination, and leadership required for successful long-term watershed restoration. Although this report was written primarily for the BCWRT, recommendations are also provided for other organizations with responsibilities and interests in the watershed. The recommendations are intended to address a broad range of the diverse interests in the Bolin Creek watershed. Increased efforts to address these diverse interests can help to expand community involvement and support of watershed restoration activities. Whether or not these interests appear to be directly related to restoration activities, we include them because inviting multiple interests in community planning and management is necessary to find creative and long-lasting watershed restoration solutions.

B. About the Bolin Creek Watershed

The Bolin Creek watershed contains all of the land which drains into Bolin Creek. It is located completely within Orange County, NC. The headwaters begin on the southern side of Bald Mountain west of Old 86. Buckhorn Branch and Jones Creek join on the east side of Old 86, south of Eubanks Road and Twin Creeks Park, before flowing into the main stem of Bolin Creek. From its headwaters, Bolin Creek flows approximately nine miles southeast through portions of downtown Carrboro and Chapel Hill. Just south of Fordham Boulevard, Bolin Creek joins Booker Creek to form Little Creek which eventually flows to Jordan Lake,

in the Cape Fear River Basin (Bradley). A map of the Bolin Creek Watershed is found in Appendix 1.

Moving downstream, the Bolin Creek watershed transitions from rural to suburban to dense urban land uses. The headwaters are best characterized as rural with a mix of forested, agricultural, silvicultural, and low density residential land uses. Flowing south and east across Old 86 and Eubanks Road, the headwaters enter Orange County's future Twin Creeks Park and Educational Campus, and the Town of Carrboro's Northern Transition Area, a mix of forested, silvicultural, and mixed density residential land uses. Portions of this area are actively under development, with Morris Grove Elementary School and the Jones Creek greenway going in recently as well as a handful of recent and planned residential developments. Continuing south and east, across Homestead Road and Seawell School Road, Bolin Creek flows near the Chapel Hill High, Smith Middle and Seawell Elementary School campuses, the Carolina North Forest, and a mix of residential and commercial land uses as it passes downtown Carrboro and Chapel Hill. From MLK Jr. Blvd, the creek flows south past the University Mall area until it joins Booker Creek to form Little Creek. With the exception of the Carolina North Forest, the publicly owned and protected Adams Tract, and a privately owned tract of land, the Bolin Creek watershed south of Carrboro's Northern transition area is essentially "built out", transitioning between suburban and dense urban land uses as it flows downstream.

Bolin Creek is listed on the state's 303(d) list as biologically impaired. The State of North Carolina (NC) is required by the US Environmental Protection Agency (EPA) to put all water bodies that are not meeting their intended uses on this list. The 2005 NC Division of Water Quality (DWQ) Cape Fear Basinwide Plan indicates Bolin Creek is impaired for biological integrity (NC DWQ, 2005). This means it does not support the numbers or diversity of biological species that would be found in a comparable healthy stream. A list of studies conducted in Bolin Creek can be found in Appendix 2. The 2003 NC DWQ Little Creek Watershed Assessment Report identified the following effects of urbanization as the primary factors stressing the Bolin Creek watershed:

- habitat degradation;
- riparian degradation;
- channel incision;
- low base flow (dry weather flows); and
- toxicity.

Other potential stressors included:

- temperature ranges and extremes;
- high BOD/COD levels (biological and chemical oxygen demand, or measures of the amount of oxygen that bacteria will consume while decomposing organic matter);
- high nutrient levels; and
- cross-connections or leaks from sanitary sewer lines.

These problems were more prominent moving downstream in the watershed (NCDWQ WARP, 2003).

II. Methods

Stakeholders were identified through a snowball sampling method, which relies on referrals from initial subjects to generate additional subjects. Initial subjects included known stakeholders who have been actively involved with Bolin Creek issues. We interviewed thirty-eight (38) stakeholders including residents, businesses, non-profits, government staff, and recreationists representing a cross-section of interests. We also conducted a focus group with 6 members of the Friends of Bolin Creek, 3 of which were subsequently interviewed. All told, 41 stakeholders contributed and are referred to as interviewees or respondents throughout the report. The purpose was not to interview every person possible, but to reach a swath of stakeholder interests. For example, the team did not speak to every resident identified, but tried to interview people from throughout the watershed.

All interviews were conducted in person. Interviews lasted 40-60 minutes, with one team member taking notes while another conducted the interview. We used a set of questions (see Appendix 3) for guidance during the interviews. Interviewees were sent a copy of the questions ahead of time when possible.

Answers from the interviews were grouped by question and topic for review. We then summarized those answers in the "Results" section without attributing comments to specific people. Direct quotes from interviews are noted in quotation marks. The analysis is not intended to be a statistically quantitative report. Rather, we summarized the range of issues raised by people. If more than one person raised the issue, we reflected that in our report, but we typically did not quantify how many people raised the issue.

We responded to the information that we gathered with an analysis of the situation in the "Discussion" section, and then provided our "Recommendations" on how to best move forward. Our recommendations are based on our experience in collaborative watershed planning and consensus based decision making, informed by the resources in the "References" section.

The following table lists the interests represented in the interviews, and the number of interviewees who self-identified as representing that interest. The number of people interviewed from each interest group adds up to more than 38 since people interviewed often represented more than one interest group. For example, someone who is a resident of Bolin Creek watershed may also be a member of a certain community group and/or a resident of Carrboro or Chapel Hill. This is most likely a conservative account of residents (and other broad interest groups), because several people who worked in the watershed did not indicate if they lived in the watershed and/or Carrboro or Chapel Hill, etc.

In addition to the interests in the table below, many activities take place in the watershed including, hiking, running, biking on trails, biking on greenways, dog walking, bird watching, playing in the creek, exercise, walking meetings, non-motorized transportation, and mushroom harvesting, to name a few.

Interest Group Represented by Interviewee	# Interviewed
Business leadership organizations	2
Carrboro elected / appointed officials	4
Carrboro resident	3
Carrboro staff	3
Chapel Hill elected / appointed officials	4
Chapel Hill resident	6
Chapel Hill staff	5
Developers	2
Farmers	1
Friends of Bolin Creek	8
Haw River Assembly	1
Landowner along Bolin Creek	3
NC Department of Transportation	1
NC Division of Water Quality	1
NC Ecosystem Enhancement Program	3
Orange County Cooperative Extension	1
Orange County Soil and Water Conservation District	2
Orange County staff	3
OWASA	1
Private instruction	1
Professional Trailbuilding Association	1
Real estate agents	3
Recreational users	18
Resident in headwaters	3
Resident – other than headwaters	9
Rogers-Eubanks Coalition to End Environmental Racism	1
Save Bolin Creek	3
Sierra Club	1
Triangle Off Road Cyclists	2
University of NC- Chapel Hill	3

Given our time constraints we were not able to interview every interest we sought, including some that were identified by the interviewees. The following interest groups were contacted and asked to comment on a draft with specific attention paid to whether anything was missing from the report. The team worked to incorporate this feedback. A few interviewees noted the need to reach out to stakeholders who are not associated with an identified stakeholder group such as runners and cyclists not affiliated with clubs. The team was not able to contact those interest groups and hopes that stakeholders can present and distribute the final report as a method to reach those people.

Interests not interviewed that were contacted to comment on the final public draft report:

- UNC-Chapel Hill staff other than those interviewed
- Carrboro and Chapel Hill staff other than those interviewed
- County staff other than those interviewed
- NC Botanical Gardens
- OWASA staff other than those interviewed
- Chapel Hill Carrboro City Schools
- Trailheads running group
- Pacers running group
- Developers
- Land use consultants
- Board of Realtors
- Friends of Downtown
- Specifically named residents and/or landowners
- NAACP
- Neighbors for Responsible Growth
- Churches, communities of faith
- NC Wildlife Resources Commission

III. Results: What We Heard

This section of the report includes only data gathered from the respondents. WECO's comments are not included in this section.

A. How Do Respondents View Bolin Creek?

When asked to characterize or describe Bolin Creek, the interview team was surprised by the wide range of stakeholders who felt a connection to the creek. Of all the people interviewed, only a handful were either not very familiar with Bolin Creek and/or did not value it as a local resource. The rest felt it was a special and valuable resource. Several people commented on the scenic beauty it provides. Some mentioned it offers a feeling of being out of town. Others appreciated the wildlife drawn to the creek.

> "I used to play and swim in it as a child. It used to be deep enough to swing on a rope swing and jump into it."

Bolin Creek and its watershed were recognized by interview respondents as serving many purposes for the residents. Interviewees discussed agricultural uses and open space in the headwaters as well as urban uses downstream. Some see Bolin Creek as a natural connection of communities. Others said it provides open space and opportunities for recreation and non-vehicular transportation.

One recurring theme among interview respondents was the difficulty characterizing Bolin Creek. It varies significantly depending on location. Some commented on rock bluffs and scenic floodplains, especially in the areas upstream of Chapel Hill. It was noted that the watershed has two Significant Natural Heritage Areas, Bolin Creek Natural Area and Battle Park. Others mentioned sewer easements, urban encroachments and even piped segments. Most agreed that Bolin Creek is a struggling urban stream that exhibits progressive impairment as it moves downstream due to decades of development pressure and human activities.

> "It's very attractive. It's a nice scenic area, but it is polluted. The [living] things that used to be in there are not in there now in the numbers they used to be."

There was general consensus among those interviewed that Bolin Creek is impaired. Many people mentioned that Bolin Creek does not support the range of aquatic species that it used to. Some commented that they used to play, fish, or swim in Bolin Creek and now they would not or could not. One participant pointed out that development in the watershed dates back to the 18th century and that, in addition to current stressors, Bolin Creek is still dealing with a sediment problem from previous agricultural uses and old mill dams. Several interviewees commented on how low the water levels are compared to the past. One person attributed it to drought and another attributed it to upstream development.

B. Issues

In this section we summarize issues of concern and interest that were raised by people in response to the question "What issues concern or interest you or your organization regarding Bolin Creek and its tributaries?" This section is part of **'Results: What We Heard'** and does not contain input or opinions from WECO. The pronouns he and she are used indiscriminately. Direct quotes are marked with quotation marks. Issues are listed in no particular order.

Nature / Wildlife

Several interviewees said there used to be more plants and wildlife, such as mollusks, wildflowers, and different fish in the watershed. Others said there is currently a great abundance of wildlife, including great blue herons, snapping turtles, owls, song birds, and crayfish. It was reported that there is a historical record (from 1980) of a state special concern species, the four-toed salamander (Hemidactylium scutatum) in the Bolin Creek watershed. Invasive plant species were often mentioned as a problem. A few respondents mentioned the importance of having natural areas. Both the Chapel Hill greenway and Carolina North Forest were mentioned as suburban oases and a "way to commune with nature in what is actually a very developed place."

> "There is still a lot of life in the creek despite the problems and it gets people excited."

Development

A few interviewees stated the biggest threat to the watershed is from development. Several interviewees emphasized the need for sustainable development. One interviewee stated "I don't see development as a major risk to the Bolin Creek watershed." A few people cited the agricultural land in the upper headwaters as the only place development could occur on a large scale.

One respondent stated the problem everywhere is: "Some people want less regulation and more development and others want tighter regulations and more environmental restrictions." Another respondent stated that people blame others for the environmental degradation caused by development. ". . . In fact it is usually blamed on the new development that hasn't been built yet. No one ever seems to blame their own development where they live or that they helped build."

One land owner/developer stated, "Years ago I was concerned about the open space requirement for development but I now understand its value to the community and I support that requirement now."

A few interviewees stated that finding places for development and growth in a very built environment while also protecting the stream was a difficult challenge. One of these stated the need to meet all goals and requirements of the watershed including water quality and economic growth.

Local Policy

A few interviewees stated local policies were not strong enough to protect water quality. One respondent stated local policy on development issues was purposefully confusing. Another respondent said stormwater policy was too restrictive and didn't allow for creativity. A number of interviewees said local policy is touted as very pro-environment, when in fact they thought it was not as good as it could be. The Orange County erosion control program was mentioned as good for the county, but that it didn't work for Carrboro and Chapel Hill, and the University didn't have to follow it.

Two respondents stated the redevelopment rules are so restrictive that current non-conforming uses of land would remain because it is too costly to redevelop to a better use.

One respondent stated developers are unfairly singled out because even though current agricultural and residential development causes more problems overall, government can't force them to do anything.

Several interviewees stated that all costs should be considered when developing policy, including the long term environmental costs to the local economy both positive and negative.

Local Government

Some citizens said they would like to have more face time with local government staff regarding Bolin Creek, while local government staff expressed that it was getting more

difficult to spend large quantities of time on duties specific to Bolin Creek in the face of declining budgets and increasing stormwater management responsibilities attached to the new Jordan Lake Rules.

Some interviewees stated that municipal governments need to communicate and coordinate better, both internally and externally. Some citizens praised local government staff themselves for their expertise and ability, but found local government bureaucracy confusing.

One citizen stated that some issues are so sensitive the towns' staffs have trouble working on them because they become political issues, such as abandoned storage tanks, old dry cleaners sites, and old heating oil tanks. A couple citizens are worried that staff may be restricted from making innovative positive changes without support from above. Another citizen stated a reluctance of the towns to look at some issues.

It was noted that the management of Bolin Creek is different between Chapel Hill and Carrboro, which is the norm for many neighboring communities, but maybe it doesn't have to be. The Jordan lake rules will be an opportunity to shine or fail. One citizen said town staff is instrumental in protecting water quality because of the things they do, and congratulated them on working so diligently. Another citizen said stormwater issues need to be a part of everything the town does in the watershed.

Several interviewees noted that OWASA is a quasi-government agency that needs to both be involved in decision making and take responsibility for helping to meet community needs.

Greenway / Carolina North Forest /OWASA Corridor / Transportation

Some respondents worry that the OWASA sewer line and access road through the Carolina North Forest contributes to stream impairment; others feel the causes are from the headwaters upstream. One respondent said the OWASA easement is not a significant sediment source and paving the greenway is not a water quality issue. Another respondent stated the easement has negative side effects when located near a stream. Many voiced disagreement over paving a potential Bolin Creek greenway trail through the Carolina North Forest versus leaving it unpaved, as well as which of these options would be more damaging to the stream. Quotes about this issue included: "[It] is so polarizing it divided the community," "people lost friendships," and "it got ugly." One interviewee mentioned the need for discussing matters like "BMP retrofits - that may be more important to the creek" than whether the greenway is paved or not. A few interviewees offered that others don't prioritize supporting full accessibility by all, which would require meeting the Americans with Disability Act standards. A non-runner stated runners don't want the trail paved. A non-mountain biker stated the mountain bikers don't care if it is paved or not since they use other trails. One respondent noted that avoiding damage is good for everyone because damage requires remediation which could impact future use and access. One interviewee stated that people of other interests groups that he is not a part of are well intentioned but may not understand ecology.

Using the trail as a paved non-motorized transportation corridor was mentioned as a need by a number of respondents. Alternately, a number of respondents cited other roads and corridors that could be used for non-motorized transportation. Commuter safety is a

concern, as well as neighborhood connectivity. Some bicyclists interviewed feel strongly that the alternate routes offered are dangerous. A few respondents suggested that adjacent residents don't want to see changes in their own "backyard."

Some people expressed different aesthetic preferences for greenways. One respondent said the Chapel Hill Greenway is ugly, while another said it is beautiful.

Trails through Carolina North property which are not near the stream were also named as contributing to degradation, as well as dog waste, user defined trails, and trails crossing perennial and intermittent tributaries. A few respondents, including some mountain bikers, mentioned the need for a master plan or land management plan for Carolina North Forest.

We were told the Adams Tract, owned by Carrboro, was slated to hold a greenway connection. We were also told it has restrictions in place for bicycles, and another respondent said the restrictions are for paving and automobiles. Several respondents mentioned the importance of another privately owned undeveloped tract, as a key piece of land for connectivity of a trail along Bolin Creek.

The Carolina North development planned by UNC-Chapel Hill was mentioned by several interviewees. Some concern was expressed about the potential impacts on water quality. Many stated that only a small portion of the actual tract planned for development drains into the Bolin Creek watershed, though there were concerns about where infrastructure, such as utilities, would be allowed. Some mentioned they were pleased that a large portion of land would be set aside and left undeveloped and felt UNC could set a good example for how to develop and protect the creek.

Communication / Collaboration

One respondent stated certain "environmental interests groups have become alienated from the general public and they don't seem to care. Maybe since they've been beaten on for so long they don't know how else to function. They are just used to the uphill battle."

Another respondent said local "public involvement isn't always done so well, there isn't as much communication about how decisions will be or were made."

A number of interviewees stated their willingness to collaborate and work together to improve the creek.

A few respondents noted that the paving conflict (in the Carrboro section of the Carolina North Forest) has been the context for discussing anything to do with the creek for almost two years. Another stated, "people become so focused on the negative" and "when there is this conflict, it makes it hard to move positive things forward." One interviewee asked "how can we engage one another in a positive way", while another said we "want a happy community."

Landfill, Illegal dumpsites, and Groundwater Contamination

A few interviewees noted concern about groundwater contamination coming from the legal landfill, illegal dumpsites, and underground storage tanks (USTs). We were told a local

citizen group has located 42 illegal dumpsites within a ¾ mile radius of Rogers Road. In addition, the group conducted soil and water sampling on its own as well as with Orange County staff and presented the results to the Towns of Carrboro and Chapel Hill. We were told the health department found MTBE in the wells on Rogers Road, but there was some disagreement on the actual sources. Local government staff reported that DENR is currently monitoring two groundwater plumes of dry cleaner solvent and that town staff have also located many legal and illegal dumpsites in the Bolin Creek watershed, outside of the Rogers - Eubanks area.

Hydrology

Several respondents noted flooding in the lower watershed, mainly at businesses along the creek. One interviewee said cars get submerged about once a year and the force is enough to damage nearby condominiums. Another interviewee noted there was development in the floodplain, such as University Mall and a number of apartments. Flooding was blamed on upstream impervious surface, building in the floodplain, beaver activity, and vegetation in the stream corridor. One respondent told us some of this development is in the FEMA floodplain which is defined as an area with 1% or greater annual chance of flooding, as compared to the "natural floodplain" which extends much further and is rarely flooded.

Stormwater was mentioned as causing noticeable erosion problems, including undercutting tree roots. One respondent said it has been getting worse over time. Another said stormwater "shoot[s] like a water cannon out of the storm drain pipes into the buffer and creek." Local government staff notified us that changes in stormwater (amounts and timing) were identified by Earth Tech, 2003 DWQ report, and government staff as causing considerable changes in channel morphology (shape) including severe streambank and streambed erosion.

A few respondents noted the lack of water in the creek. One said that when it rains, the water is gone the next day. A few also mentioned that increased development was to blame for the lack of groundwater recharge and lower stream levels. One person mentioned how the lack of water affects everything living in the watershed: plants, people, animals, and insects. One interviewee said the upper watershed has creeks drying up but she doesn't know why.

Water Quality

One respondent said, "there has been no progress cleaning up the creek." Water quality issues mentioned include: sediment, erosion, fertilizer, pesticide, runoff, trash, sewage, nutrients, petroleum products, and chemicals used by households and businesses. One interviewee stated, "the tools we have to protect and improve water quality are not necessarily the best for the job, but they are what policy allows." Another respondent noted, "having clean water is a responsibility that society should provide." A mountain biker expressed concern about damage to the creek.

Interviewees provided many reasons for the cause of water quality problems. The following were listed by different respondents as causes of water quality degradation: the upper watershed, upstream construction and future runoff from development, OWASA water main breaks, house painters cleaning their paint brushes in the creek, development

channeling runoff into the creek, lawn fertilizing, and stormwater runoff, specifically from impervious surfaces.

Concerning human contact with the water, the following was noted from several interviewees: "Bolin Creek is dirty, filthy. I wouldn't let my kids play in it. I see kids in it all the time. It is pretty, so there is a perception of cleanliness, but I wouldn't drink from it. I wouldn't let my kids play in although now that I think about it, I do let them play in it - they turn over rocks and find crayfish."

C. Data Needs

When asked what information to collect to determine the health of Bolin Creek, respondents' answers ranged from general water monitoring to specific examples such as fecal coliform; biological data; regular monitoring of invertebrates and fish; an inventory of reptile, bird, and mammal species; stream flow and stormwater discharges; nitrogen; phosphorus; total solids; sediment; turbidity; pesticides; herbicides; fertilizers; hydrocarbons; caffeine (to detect sewage spills); population density; impervious surface density; and groundwater and soil testing to determine contamination from illegal dump sites.

Numerous participants mentioned the need for benthic or macro-invertebrate monitoring. Some people commented that this data is already collected by the Towns, the Haw River Assembly and the Friends of Bolin Creek. Several mentioned a need to increase the frequency of benthic monitoring and to expand monitoring to tributaries in addition to the main stem of Bolin Creek. We heard that increasing benthic monitoring in the same place more frequently than quarterly may damage the benthic population. One participant mentioned that the NC DWQ has fish monitoring sites on Bolin Creek. Another wanted to identify champion species throughout the Bolin Creek watershed, so people would know what they were preserving. One interviewee told us they heard creek monitoring had been temporarily halted.

Respondents use the following sources to get information about Bolin Creek. (Numbers in parentheses indicate how many interviewees cited that source.)

- local government employees (14)
- local newspapers (11) including Chapel Hill News, Herald Sun, Independent
- Bolin Creek itself (8)
- Friends of Bolin Creek (8)
- through work (7)
- local government websites (4)
- other websites (3)
- NCDENR/DWQ (4)
- existing studies (3)
- word of mouth (2)
- emails (2)
- neighborhood listserv (1)
- Haw River Assembly (1)
- monitoring results (1)
- NC State University (1)
- UNC Advisory Board (1)
- UNC Campus "Drains to Creek" signs (1)

Another recurring theme was the desire for stream flow data, or the amount of water flowing in Bolin Creek, the "missing piece" as one person put it. One respondent had checked into the feasibility of installing US Geological Survey water quality and stream flow monitoring stations, but found them to be cost prohibitive. Another commented that stream flow was easy to measure and they would love to see it happen. More than one respondent recommended developing a hydrograph for the Bolin Creek watershed, both as it exists and then using it to model stream flow by assuming development of the upper watershed. One interviewee wanted to see real time monitoring of several parameters and offered to build sensors for wireless pickup or data download. Town staff commented that they are limited by the requirement of standardized methods of data collection and very specific data quality requirements. People generally felt the need to determine the cause of the biological impairment and the location of pollutant sources. Specific suggestions included determining the source of sediment in Bolin Creek, identifying sources of erosion (from development, streambanks, or recreational trails), studying the impact of construction sites, identifying points of entry for private stormwater connections, identifying stream crossings that impede aquatic life, and identifying areas where pet waste is an issue.

> "This corridor has been studied six ways from Sunday. It's been multidisciplinary . . . They issue reports but there is not any one clearinghouse where you can go and look at everything. There is a lot to collect without reinventing the wheel, [before] commissioning a new study."

Several respondents said a lot was already being done to determine the health of Bolin Creek, but the information wasn't easy to access, such as the existing benthic monitoring by the Towns, the Haw River Assembly and the Friends of Bolin Creek. One participant said that every major tributary and the main stem of Bolin Creek were walked in 2007 and 2008 as part of a detailed assessment of stream reaches to identify areas of erosion, instability, and other high risk locations (Earth Tech, 2007). Several respondents did not know where to access information on Bolin Creek.

D. Participants' Ideas for Solutions

In answer to the question of what can and should be done regarding Bolin Creek, many respondents brought up the need for education and outreach to develop greater community awareness. One respondent pointed out that the majority of watershed residents are not adjacent to creeks and do not understand how individual behaviors contribute to the health of Bolin Creek. Other respondents suggested specific audiences and educational messages. Target audiences included homeowners, HOAs, urban property owners, recreationists, lawn and landscape management companies, construction professionals, developers, OWASA, and the public in general.

> "We, the whole group of involved people, have to examine this all in detail so it isn't causing the divisions that it is causing now".

Possible educational topics included watershed management, pollution prevention, ephemeral streams, wildlife and plants, stormwater and runoff management practices such as rain gardens, erosion and sediment control, landscaping practices, and dog waste management. Specific outreach activities suggested include a stream steward award program, regular emails and quarterly workshops to inform the community about progress, bike and trail maps, partnering with new library and with schools (particularly Seawell Elementary, Smith Middle, and Chapel Hill High). Other outreach ideas include events to get people out into the creek corridor, such as festivals, foot races, litter removal, invasive plant removal, and student and community service projects.

Summarizing outreach strategies that will effectively get more people on board, one citizen recommended positive approaches that make people happy rather than scare tactics, providing the positive example of helping to engage people outdoors with their children.

> "One of the great things I hope that comes out of this interview process is a way for us all to work together and take clear steps that we all know about".

Many respondents also recommended implementing stormwater best management practices (BMPs) in the Bolin Creek watershed. Since much of the watershed is already developed, retrofit projects such as rain gardens or cisterns that capture and hold excess stormwater on-site were suggested. One respondent noted the previously identified BMPs in the Earth Tech study and suggested the towns seek funds to construct these or determine a prioritization. Municipal employees suggested retrofitting and improving stormwater management on Town owned properties, and creating a regional stormwater pond for Tanyard Branch, which receives the stormwater runoff from downtown Chapel Hill. One respondent mentioned the need for highly visible stormwater management and stream restoration projects so people can see, touch, feel, and understand where their stormwater money is going. The benefit of visible projects was further validated by a person who recommended stream restorations "like the one the [Clean Water Management Trust Fund] is doing on the tributary I live on". Many commented that a few BMPs weren't going to restore the watershed, but using those projects to educate and recruit greater participation would help with long-term restoration. Two respondents from separate government agencies suggested dealing with limited resources by conducting hydrologic modeling to determine where stormwater management practices will have the most effect and using the results to prioritize the implementation list. Another said start with the headwaters and work downstream. Regarding the headwaters, fencing livestock out of the stream was suggested. Upstream health was noted as important to the success of downstream restoration and biological recolonization. This interviewee suggested protecting the creek from further degradation was a necessary step before beginning restoration.

A wide range of respondents had ideas on ways to improve stormwater management through policy and incentives. A couple respondents suggested giving grants for residential rain gardens. Other suggestions included stricter controls on future development than currently exist to ensure that Bolin Creek is protected; better land use planning; and better enforcement of existing environmental regulations. A resident in the upper watershed recommended placing restrictions on how the remaining undeveloped areas are managed. He gave the example of a hardwood forest near Jones Creek that was recently clear cut and wondered what the impact would be to Bolin Creek. Two respondents voiced a need for

assistance for businesses and small businesses without engaging the regulator (i.e. education and help creating stormwater management plans).

Several respondents mentioned the importance of preserving stream buffers. A municipal employee, a county employee and two residents advocated for land purchase and land conservation, particularly along stream corridors and other locations the community determines are most valuable to preserve. One respondent said we need to actively mitigate the effects of OWASA easements within the riparian zone, and thought the work OWASA was doing to move the sewer line away from Bolin Creek near Umstead Road was an excellent start. Several respondents suggested invasive species control and two suggested water quality monitoring. In addition, several respondents expressed the need to development a master plan on trails and a forest management/conservation plan for the Carolina North Forest and the Adams Tract.

> "Bolin Creek and [stormwater] runoff is not on anyone's radar, so an education program about what is wrong and why, would be good."

Respondents had a lot to say regarding the need for a common plan of action and increased communication and collaboration among stakeholders. A watershed restoration plan is being developed by the BCWRT as a requirement of existing 319 grants. At least one respondent expressed a wish for more communication and discussion surrounding the plan. In addition, there is a desire by stakeholders to work together and come up with a vision for improving the creek and a common action plan with clear steps that everyone can learn about. One respondent mentioned the need for a non-political resource center for Bolin Creek, as well as the possibility of a non-political website for Bolin Creek. At least two respondents recommended having a watershed coordinator that was independent of the towns. In general, there was a perceived need to "ramp up the stakeholder process". One suggestion was to hold a public meeting once this report was together to let people know about the problems and hopefully get more stakeholders involved. One interviewee noted the need to plan holistically across all the land tracts in question.

Interestingly, several respondents talked mostly of the controversy of constructing a paved greenway along the streamside sewer easement in the Carolina North Forest and the land entering Carrboro. No matter which side of the issue the stakeholders are on, there is consensus that it has been an extremely divisive issue in the watershed.

All interviewees responded with potential solutions except one who stated, "I don't know what the problems are".

What Can be Accomplished Together?

When asked this specifically, respondents created a large list of what they could potentially accomplish together. Two stakeholders envisioned Bolin Creek as a unifying feature of the community- one that could help energize and bring people together, while another suggested the community could enjoy features of the creek, together.

Possibilities include open communication among stakeholders and elected officials and improved coordination between them. The idea of developing common goals and objectives

between Carrboro, Chapel Hill, UNC and stakeholders was repeated. A few people suggested community planning for an open space plan, a Carolina North Forest Management plan, and greenway planning. One mentioned the benefit of increased funds for grant matching through collaboration, and increased likelihood of receiving grants. Greater oversight of development resulting in better enforcement of regulations such as sedimentation and erosion control was mentioned.

Many said that working together can accomplish the long term goals of improved water quality, healthy aquatic community, and biological diversity. Many saw possibilities for implementing projects to improve water quality and other valued services, similar to those mentioned in the previous section (i.e. reducing the impact of dog waste, riparian reforestation, stream restoration, open space conservation, Rogers Road residents removed from septic and wells, trails are improved through partnership, public access for non-motorized use, transportation corridors improved, and illicit discharges and trash in the creek eliminated).

E. Current Local Initiatives

There are an impressive number of initiatives already going on within the Bolin Creek watershed related to water resources. Respondents told us about the following. There are likely other initiatives occurring that were not captured through our interviews.

Towns of Carrboro and Chapel Hill

- Both participate on the Bolin Creek Watershed Restoration Team: help develop a watershed restoration plan; implement stream restoration and stormwater BMP retrofit projects; pursue grants and other resources; conduct stream monitoring with the end goal of restoring Bolin Creek's biological health.
- Both have Phase II NPDES Permits which steer stormwater management activities.
- Both are implementing the Jordan Lake Rules (i.e. updating land use ordinances, planning for retrofits of existing development, etc.).
- Both undertake many forms of municipal work that help protect water resources, land acquisition and management, trail maintenance and management, street sweeping and maintenance, stormwater system inspections and maintenance, stream restoration activities , stormwater management activities, environmental education to public and schools, community environmental organization such as Big Sweep clean ups, illicit discharges education, clean-up of spills in cooperation with OWASA.
- Both have citizen based Greenways Commissions, Environmental Advisory Boards, Planning Boards, etc. which make recommendations to elected officials.
- Chapel Hill created a Stormwater Management Utility in 2004 to fund stormwater BMP projects, stream restoration projects and environmental education.

Orange County

- Acquires land for parks, open space, farmland preservation, water quality protection, etc. through the Lands Legacy Program. Bolin Creek and land

conservation along Bolin Creek is in Orange County's Conservation Action Plan. Holds conservations easements, leverages funds with other organizations like the Triangle Land Conservancy (TLC).

- Operates and maintains the Jones Creek Greenway. Developing and operating a 193 acre park and educational campus in the upper watershed, 95 acres of future parkland and 96 acres of school sites. Pursuing environmentally friendly design.
- Conducts environmental education programming.
- Does stream restoration and pond restoration. Looking at downstream impacts of removing some of the farm ponds in the watershed.
- **Cooperative Extension Service** provides research based information to citizens through educational programs, publications and events.
- **Soil and Water Conservation District (SWCD)** assists rural landowners with erosion problems, streambank stabilization, and agricultural BMPs; has limited cost sharing resource for urban BMPs through the NC Community Conservation Assistance Program (NCCAP). Closes abandoned wells.
- **OWASA** (Orange County Water and Sewer Authority) maintains existing sewer lines and infrastructure. OWASA recently installed a new sewer line under Umstead Road between MLK Jr. Blvd. and Estes Road Extension to replace an undersized sewer line that ran along Bolin Creek.

State Agencies

- **NCDOT** (NC Department of Transportation) oversees construction, operation, and maintenance of state maintained roads in the watershed.
- **NCDWQ** (NC Division of Water Quality)advises Towns on restoration efforts. Helps identify and meet needs. Helps identify and write grants for restoration activities.
- **NCEEP** (NC Ecosystem Enhancement Program) developed a local watershed plan for Morgan and Little Creeks, which included Bolin and Booker Creeks (TetraTech, 2004).
- **University of NC-Chapel Hill**
  - Developed a stormwater master plan in 2009. Has 6.5 people working in stormwater. Has a Phase II NPDES permit. Finds and fixes broken sewer lines through its illicit discharge program.
  - Plans to construct stormwater BMP retrofits when Carolina North is developed.
  - Is establishing conservation area in perpetuity in parts of the Carolina North property. Hired staff to help conserve, manage and protect the Carolina North Forest.
  - Is working on implementing the Jordan Lake Rules.
  - Helps towns with illicit discharge education and prevention.

Private Entities, Nonprofits, Community Groups

- **Business Leadership Organizations**: Help members understand stormwater regulations. Many area businesses use the Green Plus assessment tool, www.gogreenplus.org, which factors in water consumption and conservation as criteria. Help towns with illicit discharge education and prevention.
- **Friends of Bolin Creek (FOBC)**: Advocates to protect and improve the creeks within the Bolin Creek watershed. Works with the schools, community members, utilities and government to improve water quality in the watershed. Active

programs include a Healthy Watersheds Symposium, monitoring program, online library of scientific studies, and education through the schools, including McDougle Middle School Rain Garden.

- **Save Bolin Creek**: Advocates for not paving the trail along Bolin Creek north of Carrboro.
- **Advocates for Carrboro Greenways:** Adopted objectives include: protect and improve water quality along Bolin and Jones Creeks; protect, conserve wildlife habitat in the Bolin Creek watershed; connect surrounding land by providing a non-motorized mode of transportation; provide safe access to Bolin and Jones Creeks; enhance the quality of life by providing a recreational facility for all citizens of Carrboro, specifically including the elderly and disabled who are excluded by the current OWASA roadway.
- **Haw River Assembly (HRA)**: Conducts benthic monitoring in the watershed. Assists FOBC with outreach and education programs. Previously organized Muddy Water Watch program.
- **Orange/Chatham Sierra Club**: Has been removing invasive plants for nine years.
- **Triangle Off Road Cyclists (TORC)**: Holds Memorandum of Understanding (MOU) with UNC to help maintain and manage trails in the Carolina North Forest and beyond.
- **Landowners**: Entered into conservation easements in the headwaters and allow use of the land by permission**.** **The Lloyd-Andrews Historic Homestead** in the headwaters includes 121 acres (Triangle Land Conservancy conservation),
- **Farmers:** studying and implementing sustainable agricultural practices, including no-till and raising grass fed cattle.
- **The N.C. Wildlife Resources Commission**: provides the Green Growth Toolbox, a guide for counties, towns, and cities with tools for nature friendly growth. [http://www.ncwildlife.org/greengrowth] Also has a Wildlife Friendly Development certification program in coordination with the NC Wildlife Federation and the NC Chapter of the American Landscape Architects. [http://ncwildcertify.org/index.htm]
- **Colonial Heights Neighborhood:** on-going debate on whether to put up a conservation district for the neighborhood.
- **Pacifica Neighborhood: W**orks with NC State University to monitor runoff from their neighborhood and help evaluate low impact design practices.
- **Roger-Eubanks Neighborhood**: Located illegal dumpsites and organized a cleanup. Collected over 2,000 pounds of trash in their first cleanup. Working with Orange County to organize future cleanups. Hold workshops and tours at the Rogers-Eubanks Neighborhood Association's Center.
- **Talbryn Development:** has 135 acres protected by covenants.
- **Orange County Justice United in Community Effort (JUSTICE UNITED)**: A broad-based, multi-racial, multi-faith, multi-issue, strictly non-partisan citizens' power organization dedicated to making change on social justice issues provided support to the landfill and dumping issues in the Rogers Road Neighborhood.

F. Community Strengths

Progress in Bolin Creek

When asked what progress has been made in Bolin Creek, many respondents immediately thought about stream health and water quality, commenting that improvements have yet to be seen. When the interviewer explained that progress could mean anything, most respondents gave other examples.

Some responses focused on public awareness of Bolin Creek, education that is occurring, and the increase in relationships between stakeholders. A few discussed citizen involvement as a sign of progress, including stream litter clean-ups. A few responses pointed to studies that have been completed, including the local watershed plan developed by NC Ecosystem Enhancement Program.

Participants mentioned tangible projects as signs of progress including the opportunities created by Chapel Hill, Carrboro, and the Friends of Bolin Creek. It was mentioned that specific projects, including the Baldwin Park stream restoration and the McDougle School rain garden and cistern can be used for education and positive publicity. Other projects showing progress include invasive plant removal, the greenway constructed in Chapel Hill, increased recreational access, farmers moving to no till pasture instead of row crops in the headwaters, trail and road improvements and maintenance conducted by UNC-CH and Triangle Off-Road Cyclists (TORC) to reduce sediment in Carolina North forest, as well as sewer improvements on Umstead Road by OWASA.

Improvements in regulations were mentioned as signs of progress, with specific mention of stricter regulations in Carrboro (BMP requirements, stream buffers, open space, and stormwater ordinances), and Chapel Hill (stream buffers, stormwater, and erosion control). One mentioned that these helped to slow the decline in water quality.

Conservation of land was mentioned as progress, including the large conservation easements in the headwaters by Triangle Land Conservancy (TLC) and Orange County, Carrboro's purchase of the Adam's Tract, Chapel Hill's purchase of forested area adjacent to the creek UNC's preservation of land in the Carolina North Forest, and the protective covenants in the Talbryn development.

The issue of greenway paving was mentioned by one as an awareness-building event. One respondent noted that not adopting the paving plan was progress and gave credit to Save Bolin Creek. Setting aside this issue was mentioned as progress by another participant.

Community Resources

One of the most often heard responses to the question of what community factors have led to progress so far, was that Chapel Hill and Carrboro have an educated, motivated, environmentally aware community, evidenced by many people who actively participate in meetings for example. This response was provided by participants who represented a broad range of interests, including local government staff who appreciate active citizens' efforts in raising issues and ensuring the issues get attention. Some said that public use of

the Bolin Creek corridor and natural area increases awareness, while others mentioned educational programming has been helpful.

Some participants cited specific efforts, again the most praise went to Chapel Hill and Carrboro for providing leadership in environmental protection and initiating and implementing two EPA 319 Clean Water grants; many appreciated Friends of Bolin Creek for their role in recruiting volunteers, advocating and raising issues for consideration, and co-hosting educational demonstrations/events; Save Bolin Creek for its advocacy work; the Haw River Assembly's Muddy Water Watch for helping with erosion control enforcement; UNC-Chapel Hill for developing a Carolina North Forest trail management plan as part of a Forest Stewardship plan, hosting volunteer work days, and building a bridge over the creek that raised awareness; OWASA for trying hard to be a good environmental partner in the community; and NC Ecosystem Enhancement Program for sponsoring local watershed planning.

Some mentioned regulations and programs as factors for progress, including the Jordan Lake Rules, more stringent erosion-control measures, the Chapel Hill stormwater utility, and a general high level of environmental regulations in Chapel Hill and Carrboro. One commented that a positive aspect of the Town of Carrboro's greenway conceptual plan was that it focused people's attention on Bolin Creek.

A few people were unsure of what factors were leading to progress, as they either weren't sure of progress, or they weren't familiar enough with the watershed.

When asked what resources they or their organization could provide, almost all people interviewed stated that their organization could participate in a collaborative group. In addition, the following contributions and resources were offered by interviewees. There are likely other groups with resources to offer.

Organization	**Resources available for the Bolin Creek effort**
Advocates for Carrboro Greenways	Members who are biologist, botanists
Business leadership organizations	Staff time, outreach to members, helping people have a positive attitude about it, meeting space, information about economics & efficient stormwater management
Colonial Heights Neighborhood	Neighborhood listserv
Friends of Bolin Creek	Knowledge base of members and friends, coordinate and share technical inventory of watershed, advocate for the creek, create educational materials and conduct neighborhood education about rain gardens, host/conduct educational events
Haw River Assembly	Training for water quality monitoring, partner on grants, education and outreach to adults and children
NC Division of Water Quality	Technical assistance, sharing information between watershed partnerships in NC
NC Ecosystem Enhancement Program	Implement stream and wetland restoration projects that meet NCEEP criteria; possibly implement BMPs if state develops strategy to implement BMPs for mitigation credit.

Organization	Resources available for the Bolin Creek effort
NC Department of Transportation	For NC highway rights of ways- expertise in hydraulics, project development and analysis.
NC Wildlife Resources Commission	Green Growth Toolbox and Wildlife Friendly Certification Programs
Orange County	Staff who can evaluate biology of properties, maintain parks and greenway; funding for riparian land acquisition for stream restoration projects; ability to apply for grants that are available only to local governments.
Orange County Extension	Staff time and volunteers
Orange County Soil and Water Conservation District	Education and outreach; Potential funding for rural area BMPs to help developments over 3 years old with stormwater retrofits (CCAP program); apply for grants; share costs; experience; contacts, info.
Orange Water and Sewer Authority	Information about infrastructure, meeting space.
Professional Trailbuilders Association	Non-profit association of professional trail contractors, consultants, and designers
Roger Eubanks Neighborhood	Database of volunteers, professional partners (engineers, epidemiologists). Experience organizing stream clean-ups.
Sierra Club	Volunteer labor, invasive plant eradication program
Town of Carrboro	Education on websites and publications, targeted mailings, meeting space, help acquire grants, monitoring, implement Jordan Lake Rules, evaluate regulations
Town of Chapel Hill	Manage restoration projects, acquire and manage grants, provide education and outreach, purchase open space and easements , organize clean ups, provide recommendations on drainage and erosion problems, provide guidance on riparian improvement and protection
Triangle Off Road Cyclists	Sustainable trail design, construction, and maintenance; outreach to TORC members.
UNC-Chapel Hill	Provide technical support, access to professionals in various departments, kiosks in Carolina North Forest, organize community projects.

G. Collaborating on Solutions

Interviewees were asked to provide us with ideas about ways for people and organizations to work with each other. Several ideas emerged about collaborative partnerships, and the need for a coordinating organization. Specific suggestions included:

- Include small groups to undertake specific activities
- Create a structure for getting things done
- Set a mission and clear goals
- Identify shared motivation for success
- Include representation from the Towns, Orange County, and others
- Create a watershed group to bring organizations together

A few people suggested the use of online technology for helping work together, specifically suggesting raising funds over the web, and providing a clearinghouse for information on Bolin Creek. One stated that people are eager to use technology.

> "Give them a [way] to participate that is fun- people are really yearning for that type of stuff."

Some ways to work with people arose, including conducting community visioning for Bolin Creek, exhibiting transparency, and creative partnerships. A couple people mentioned this situation assessment as a way to help people work together. Some mentioned working through existing groups such as the Sierra Club, neighborhood associations, and Town commissions like the Greenways Commissions, possibly giving them something unique and interesting to add to their discussions. A few suggested FOBC working collaboratively with public and private entities, and expanding/bringing any divided factions back together.

Other ideas mentioned by interviewees:

- Activities initiated by Carrboro Recreation and Parks Department;
- Improve willpower for public access to creek (greenway);
- Communication and outreach concerning resource protection;
- Identify steady funding sources;
- Work together on projects to leverage resources - clean ups, stream monitoring, etc.;
- Approach private companies in return for advertising and marketing;
- Invite people to volunteer, by working in their backyards, helping with monitoring, giving them a way to help;
- Create educational forums to involve neighborhoods and HOAs;
- Bigger public meeting/forum for community;
- Festivals - use as community kick off events / hold at Umstead Park;
- Connect Chapel Hill and Carrboro Greenways, to break the artificial boundaries;
- Bolin Creek as Chapel Hill/Carrboro "Central Park";
- Build pride over Bolin Creek watershed (like historic districts do);
- Local government consortiums that meets occasionally;
- More collaboration between town departments;
- OWASA is good at getting information out in mailings;
- Carrboro should have a stormwater utility fee;
- Carrboro should make and implement plans for Jordan Lake rules;
- Engage municipal staffs to think bigger when it comes to the creek and floodplain;
- Continue with Chapel Hill's public comment/review process for plans and development review;
- Carrboro and Chapel Hill should each provide one staff member to work exclusively on Bolin Creek;
- Tighter controls are needed on design and construction of new developments to minimize pollution generation;
- Both towns need to enforce their standards and inspect for violations; and
- Friends of Bolin Creek is developing homeowner tool kits for water quality improvement, since the majority of the watershed is privately owned.

> "It is only constrained by the imagination."

A Coordinating Entity or a Collaborative Organization

Many participants suggested this option earlier in the interview without the prompting of Question 15, which asked: "How helpful would it be to have a coordinating entity or collaborative organization?"

Of 31 who answered the question, 28 said it would be helpful, with 11 qualifying that it would be very or always helpful, or extremely important, and 7 qualifying that it would only be helpful if certain conditions applied, including:

- it is not just another layer of bureaucracy;
- it is not a new entity, but one that already exists;
- the number of meetings are managed;
- somehow new people are informed as it goes;
- participating organizations are willing to give up some authority to the group;
- the goals and participants' roles are clear and agreed upon;
- a skilled mediator is involved;
- it needs to be a collaborative venue, with people willing to hear all sides;
- it has diverse representation and is not dominated by any one stakeholder group;
- it is well organized;
- if Chapel Hill, Carrboro, and Orange County would be willing to create a joint task force that meets separately from existing groups; and
- elected officials supported it.

Three of the 31 respondents answered no, stating that the pieces are already there but could be managed better by the Towns, and that the Chapel Hill Stormwater Department should already be doing this so no more taxpayers' funds should be used for it.

> "[Bolin Creek] could be quite a unifying feature."

Additional suggestions for how a collaborative organization could work include:

- an outside group with no stakeholder group affinity should coordinate;
- somebody needs to devote time to organizing it;
- the group should establish goals;
- outcomes do not bind the hands of property owners;
- existing organizational structures are explored, to prevent redundancies;
- a neutral organization creates and maintains a website to serve as a clearinghouse;
- the group includes residents beyond stakeholders adjacent to Bolin Creek and Carolina Forest;
- Friends of Bolin Creek may be able to coordinate this;
- it does not get bogged down by local politics; and
- make it fun.

IV. Discussion

In this section, the writers highlight and analyze the major issues that stakeholders raised, particularly focusing on the positive aspects of common ground on which the community can move forward.

Causes of Bolin Creek Impairment

Even among the actively involved stakeholders, we did not hear agreement nor complete understanding about the sources of Bolin Creek's impaired status. People may not have full access to available data and reports, or do have access to the information but are interpreting reports differently and independently. The technical reports completed by consultants for the NC Ecosystem Enhancement Program and the municipalities over the last nine years identify sources of impairment and potential restoration projects, stormwater retrofit projects, and policy actions for improving Bolin Creek. However, each stakeholder group has their own views of what should and should not be done to address the problems in the creek. A facilitated conversation to enable common understanding and goals among Bolin Creek watershed stakeholders would help to move the process forward. Several interview respondents suggested prioritizing restoration activities by determining "hot spot" areas of hydrologic changes and pollution. This would be a worthwhile effort, if results are shared with and reviewed by the broad range of stakeholder groups, and not just the Bolin Creek Watershed Restoration Team. The community needs to be engaged to provide feedback on the criteria used to select restoration activities.

Carolina North Forest

We heard consensus that the Carolina North Forest area is seen as an oasis by the community, though it is seen through different lenses. It is viewed as both degraded AND beautiful, and is highly used in multiple ways by the community. Many adjacent residents see it perfect as is, without need of improvement, while others see signs of degradation that can be improved upon. This latter group includes residents who live further away but actively use it for recreation. People hold various visions for this area, based on their use and interest. It would be an interesting exercise to allow users a forum to express their vision, and seek common ground. They may have more in common than they realize, as none of them want to see the area developed.

Town of Carrboro Greenway

We were told that the issue of extending Carrboro's greenway along the OWASA corridor through Carolina North Forest has diverted energy and resources from multiple groups and individuals. We did not ask people about the greenway issue; they brought it up. When the Town of Carrboro's greenway planning process raised the possibility of extending a paved greenway along the OWASA corridor through Carolina North Forest and on towards Chapel Hill, many concerns and opinions were expressed. During public meetings and online forums, the issue became framed in the community as "to pave" or "not to pave", resulting in opposing positions. Some feel that Carrboro's decision of 'not making a final decision' on the greenway through the Carolina North property is a positive result; others feel their interests regarding this issue are not being met. We heard a strong desire from the community to focus on positive issues and to heal wounds that arose from this divisive

issue. We believe this is possible through facilitated community discussion and collaborative decision making. Providing an opportunity for citizens to discuss the interests (the reasons why) behind the positions (to pave or not to pave) in a facilitated group process may help community members find creative long-term solutions to meet those interests. Interests we heard include improving the creek and the riparian corridor to better meet water quality and habitat needs; providing a natural recreational experience; providing safe and convenient pedestrian and cyclist connections; and providing citizens of all abilities with access to natural areas.

Development

The middle and lower portion of the watershed is developed and was constructed mainly before stormwater regulations were in effect. The upper portion of the watershed still has development potential. A previous regional agreement between local governments, the Orange County -Chapel Hill - Carrboro Joint Planning Agreement, channeled development to agricultural areas of the Bolin Creek headwaters in an effort to limit development in adjacent drinking water supply watersheds (Morgan Creek and University Lake). This trade-off from many years ago is seen by some as unwise now. The growing population's need for water may require OWASA to draw from Jordan Lake, which is downstream of Bolin Creek. A regional view of watershed management in outreach efforts could help the community understand the trade-offs made and discuss where they want development and open space conservation to occur. Nobody interviewed stated a desire to stop development, though many stated a desire for development that provides fewer impacts to water resources.

Many commented that development, stormwater and erosion and sediment control ordinances are much improved from the past, though a few commented that they could possibly be more stringent, and more commented that improved enforcement of existing regulations would be helpful.

We heard concerns that inflexible stormwater regulations may be limiting redevelopment in urban areas, and thus preventing the implementation of accompanying retrofits that may benefit the creek. Flexibility and predictability in stormwater regulations, as well as creative incentives for implementing retrofits, were mentioned as ways to help get stormwater runoff reduced in urban areas as redevelopment moves forward.

Education

Many interviewees stated that education was needed, necessary, and a solution to a lot of issues. There is a lot of experience and ability in the watershed, and many education initiatives taking place. There may be opportunities for collaboration and sharing of curricula between the many interest groups. Education is often an easy topic to agree upon if the outreach is science based and without value judgment.

Several people mentioned the need to educate residents and organizations about practices they could implement to improve water quality, and a few expressed frustration with the difficulty of reaching the diverse audiences. Convincing people to change their behaviors requires learning about the targeted audience, crafting an educational message or program that addresses their needs, and providing that audience access to the technical and/or

financial resources they need to enact the change. Increased successes may result from watershed stakeholders collaboratively identifying and prioritizing audiences for efforts in Bolin Creek, learning about the audiences, and working together to leverage resources in implementing educational outreach and engagement with the audiences. The County Cooperative Extension, Soil and Water Conservation District, Town of Chapel Hill, Chapel Hill-Carrboro City School system, Friends of Bolin Creek, and the Carolina Center for Educational Excellence are just some of the resources available for education outreach efforts.

Communication and Public Involvement

Many commented on the need for the local governments , OWASA and stakeholder groups to work together better, particularly including elected officials, and to collaborate on visioning and goal setting.

Most people interviewed do have the common goal of protecting Bolin Creek, but without a framework for communication and collaboration, and agreed upon common goals and objectives, one group's attempt at protecting the creek may be seen by another group as detrimental. One example is a restoration activity undertaken in the Carolina North Forest. UNC-Chapel Hill built a bridge over Bolin Creek to protect the stream from erosion, built large enough to withstand a large rain event without constricting its floodplain. Some people are happy about the bridge and how it keeps people out of the stream below, others think it is an eyesore and entirely too big. In addition, it limits access to the stream, which is "good from a conservation point of view, but bad if what you want to do is get close to the stream." Community discussion may have helped people to understand why it was so big, and that it was built to improve the stream's condition, or community input could have been solicited for the design. It is very possible that increased collaboration and agreement on common goals, and prioritized objectives to reach those goals could have resulted in a management action in the Carolina North Forest that was widely accepted as a successful step towards protecting Bolin Creek.

Many people suggested without being prompted that improved coordination by a non-biased third party was necessary for successful long-term watershed improvement. When we did ask interviewees if they thought a coordinating entity and collaborative organization would be helpful, they overwhelmingly responded "yes". A few people thought that coordination of all watershed activities should be the responsibility of the municipalities, particularly the Town of Chapel Hill since they have a stormwater utility. We heard that the broad responsibilities of addressing environmental issues, and the new responsibilities of implementing the Jordan Lake Rules, limit the time and resources that staff can contribute to comprehensive public involvement strategies that the public desires for Bolin Creek. This may be interpreted as a lack of interest, but in reality they are seeking ways to meet the needs and requirements of supervisors, elected officials, and citizens. Staff approved this situation assessment as a means for learning how to improve public involvement and outreach, and appear quite willing to find new ways to improve Bolin Creek efforts.

In addition, the towns are not seen by all stakeholders as neutral and non-biased in the watershed effort- the towns have their own goals and responsibilities that they must pursue, as do all of the stakeholder organizations who were interviewed.

Efforts and Resources Among Groups in the Bolin Creek Watershed

We were impressed by the number of activities groups are undertaking to improve watershed conditions, and the energy buzzing in the community. Many groups are working independently, some are partnering on projects. There are "unlimited" opportunities to communicate and leverage better, we were told, and most people interviewed expressed a desire to communicate and work together better. The resource table shows a broad array of resources that groups are ready and willing to contribute, and many are already contributing them. There are many other groups that likely have similar resources they may be willing to contribute. For example, we only interviewed residents from a handful of neighborhoods, representing a small portion of the watershed. Targeted efforts to reach other neighborhoods will unveil new networks of potential collaborators and other resources including listservs, project sites, and volunteers.

Most people interviewed acknowledged the positive roles and hard work of municipalities, the Friends of Bolin Creek, and other groups towards improving Bolin Creek. While improvements in the water quality, habitat and hydrology of the creek itself have not been seen, that is to be expected in an impaired urban watershed restoration project. The interim successes are visible - grant funds have been acquired, educational efforts have yielded segments of the population who are eager to participate in restoration activities, high-profile demonstration projects have been installed, and much data on Bolin Creek has been collected and analyzed. Current grants end soon, and the time is ripe for celebrating these successes and moving to the next, higher level of restoration activities together.

The pieces for a foundation of successful long-term watershed restoration are present in this engaged Bolin Creek watershed community. To leverage on the progress made by members of the community so far, we present our recommendations here for creating the final pieces of the foundation of long term success- the collaborative Bolin Creek watershed community.

Landfill and Groundwater Contamination in the Roger-Eubanks Community

While the landfill is outside of the Bolin Creek watershed, the Rogers-Eubanks Neighborhood is a stakeholder group largely within the watershed. At the time of the interviews, the perceived lack of action regarding previously promised remediation appeared to impede water quality restoration and outreach efforts in the Rogers Road area. Until this issue is addressed, the community's attention and energy may be required to resolve it, not allowing them to focus as much time on restoration activities. Since the interviews, the Orange County Board of Commissioners, Chapel Hill Town Council, Carrboro Board of Aldermen, and Hillsborough Town Board agreed to create a task force to decide how the Rogers -Eubanks neighborhoods will be compensated for living next to the Orange County landfill for the past 40 years. This agreement took place on January 26, 2012 at an Assembly of Governments meeting. The task force consists of two representatives from each municipality, two county commissioners, and two members of the Rogers-Eubanks Neighborhood Association (RENA). The task force will explore plans and costs for the community center and sewer lines requested by RENA, and present its finding to the governing boards at the end of the year.

V. Recommendations

Stakeholders pointed out a real opportunity to focus on Bolin Creek as a synergizing community feature. Many people experience and care about the creek and particularly, the Carolina North Forest and Adams Tract sections. With this in mind, we propose all activities focus on positive attributes within the community, further building on the strengths of Bolin Creek community network and successes. We make the following recommendations to build more networks, create more linkages, and design a lasting communication and coordination structure to steward long-term watershed restoration. The recommendations are for the Bolin Creek Watershed Restoration Team (BCWRT) and all organizations affected by or responsible for management decisions in the watershed, including all local governments and OWASA.

> What do we mean by collaboration?
>
> Collaboration is a process of shared decision-making in which all the parties with a stake in a problem constructively explore their differences and develop a joint strategy for action.
>
> - Scott London, Collaboration and Community

The recommendations do not spell out the action items needed to implement them because implementation can take many forms. A number of the recommendations require public involvement. We suggest following the Core Values for Public Involvement of the International Association of Public Participation. These values, also followed by the US EPA, set out a guideline or best management practice for involving the public. See Appendix 4.

The recommendations address a broad range of interests. Increased efforts to address these diverse interests will help expand community involvement and support of watershed restoration activities. Whether or not these interests appear to be directly related to water quality and restoration, they invite multiple interests in community planning and land management to find creative and long-lasting watershed restoration solutions.

A. Create a multi-organizational, collaborative watershed initiative to serve as the nexus for the watershed. This Bolin Creek Watershed Initiative can use the principles listed here.

- The Initiative is inclusive of all groups, governmental entities, and neighborhoods that are interested in participating.
- Responsibility for the Initiative is shared - no one group with a stake in the Bolin Creek watershed is "in charge".
- To begin, BCWRT can engage an entity with no vested interest in the watershed to coordinate and facilitate the Group (WECO, TJCOG, Dispute Settlement Center of Orange County are organizations who regularly do this work).
- The Initiative uses consensus based decision making rather than voting. This allows all stakeholder groups to be heard, and enables finding creative solutions to meet multiple groups' goals.

- The Initiative focuses on positive attributes in the community, on creative possibilities for the future, on success in the watershed.

Participants need to undertake the following activities:

- Learn consensus decision-making skills.

  (Natural Resource Leadership Institute, WECO, UNC-CH School of Government, and Dispute Settlement Center of Orange County are all qualified to teach these skills.)

- Share their visions and develop a commonly defined vision for Bolin Creek watershed. A public kick-off meeting would be ideal for this exercise.
- Review existing plans and reports for Bolin Creek watershed.

  (A watershed plan is required by the EPA and is currently being drafted by Carrboro and Chapel Hill. Watershed plans are dynamic documents that change as new information or new stakeholders are discovered.)

- Develop and agree upon a set of goals and objectives for the Initiative to support.

  (To prevent "meeting fatigue", after developing a vision and goals, the Initiative could meet annually or bi-annually, and split out into working committees to address specific topics.)

- Form workgroups to develop plans for the following topics:
  - education and outreach;
  - restoration/ stormwater retrofit planning and implementation;
  - monitoring, evaluation, and reporting;
  - watershed restoration finance

B. Enlist a neutral party to develop and actively manage an interactive online hub for the watershed community. This online hub needs to:

- house links to all stakeholder organization websites, reports, data, and relevant documents;
- have interactive features for online communication, such as a forum or other technology that allows discussion among the community;
- have the ability for stakeholders to post documents and for the watershed community to provide comments and feedback;
- allow and promote regular posting of upcoming events, including meetings and volunteer opportunities;
- provide a means for interaction between face to face meetings.

C. Examine how to more holistically plan and manage water resources across departments and jurisdictions.

Future sustainability of water calls for increased communication and coordination across local government departments, both internally (within) and externally (between). Issues of water supply, wastewater treatment, stormwater, watershed management, land use planning and zoning are all interconnected. Cooperative and collaborative relationships may require more energy and time upfront, but deliver a great return on the investment. This recommendation applies to all local governments and OWASA. Some ideas follow.

- Review policies and ordinances to assess how they can better protect water quality by using performance based standards, removing impediments to low impact design (LID), and providing incentives for LID. TJCOG conducted a policy review for member municipalities based on Center for Watershed Protection Better Site Design principles. This could be used as a basis for discussion .
- Share ideas for water resource management through interdepartmental meetings, a separately tasked committee, or by adding this topic to existing meeting agendas. The UNC Institute of Government or NC League of Municipalities may have additional resources for improving interdepartmental communication.
- An interdepartmental listserv can be used for sharing ideas and raising questions.
- Develop a regional approach to water resources management, while continuing to work together on utility infrastructure planning and maintenance.
- Hold a cross-jurisdiction discussion on the Jordan Lake Nutrient Strategy, to compare notes and determine if opportunities exist to work together.

D. Increase community outreach and engagement on the Carolina North Forest Stewardship Plan.

- Enlist UNC-Chapel Hill staff and the Carolina North Forest Advisory Committee to implement this recommendation.
- Provide opportunities for the broader community to offer input on management, conservation, restoration, trail usage, and maintenance to help increase buy-in for active personal stewardship.
- Additional educational outreach efforts, in partnership with others, could help raise awareness of the stewardship plan.

E. Investigate how to raise revenue dedicated to water quality protection and restoration, such as a stormwater utility or other mechanism.

- Enlist the Town of Carrboro to implement this recommendation.
- The investigation needs to include stakeholder feedback. The UNC Environmental Finance Center is a source for technical guidance.

F. Continue to work together to address the landfill and groundwater contamination issues in the Roger-Eubanks community.

- Enlist local governments and OWASA to implement this recommendation.
- The newly formed RENA Task Force is a positive step in moving this forward.
- All data, information, and updates on progress pertaining to the landfill remediation plans, illegal dumpsites, and contamination issues need to be available to the public in an easy to access website.
- Local governments and OWASA need to make efforts to address contamination throughout the watershed.

G. Convene a facilitated search for common understanding about ways to connect pedestrian and cyclist routes while also protecting and improving Bolin Creek's riparian corridor.

- Enlist Carrboro, Chapel Hill and UNC-CH to implement this recommendation.
- All stakeholder groups need to be represented to learn together and seek solutions to meet various interests.
- This needs to occur as a separate effort from the Watershed Initiative's efforts.
- This group needs to review existing greenway and bikeway plans, and other transportation plans, to determine any additional information needs.
- Ideally this will take place after Watershed Initiative participants have built trust and achieved some successes that they can use as examples of what can be accomplished together.

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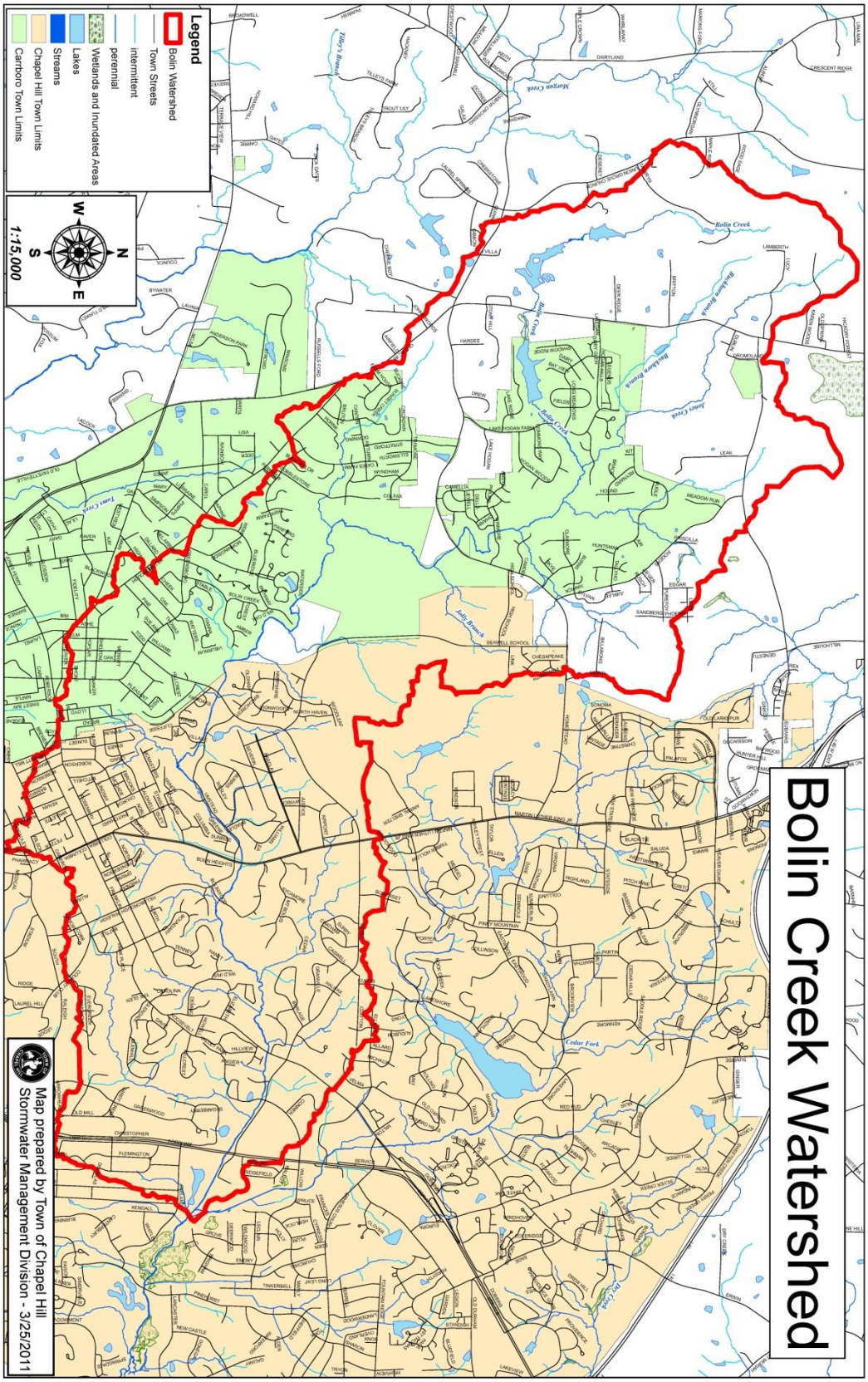
Appendix 1: Bolin Creek Watershed Map



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Appendix 3: Bolin Creek Situation Assessment Interview Script

1. What groups or interests do you represent in the Bolin Creek watershed?
2. What activities do you participate in within the watershed?
3. What issues concern or interest you or your organization regarding Bolin Creek and its tributaries?
4. How would you characterize or describe Bolin Creek?
5. What information should be collected to determine the health/environmental quality of Bolin Creek?
6. What plans does your organization have within the Bolin Creek watershed? (recreation / growth/ development/ restoration/ education & other programs)
7. Are there any imminent changes to the watershed that you think might impact Bolin Creek, either positively or negatively?
8. What do you think can and should be done concerning Bolin Creek?
9. Where do you get information about Bolin Creek?
10. How interested would you (or your organization) be in learning about opportunities to improve Bolin Creek? Some examples: landscaping projects like rain gardens, streambank restoration, litter clean-ups, invasive vegetation removal.
11. What progress has been made in improving Bolin Creek?
12. What factors in the community have led to progress in efforts to improve Bolin Creek?
13. What could the community accomplish in the Bolin Creek Watershed if they worked together effectively?
14. What are possible ways for people and organizations to share information, leverage resources, plan and do projects together?
15. How helpful would it be to have a coordinating entity or collaborative organization?
16. What resources can you or your organization provide?
17. What about other watersheds/water bodies in the area?
18. How important is improving water quality of area creeks relative to other issues those local governments face?
19. Could we add you to our contact list for the listserv and mailings of updates?
20. Who else should we interview?
21. Before we leave, is there any other issue you want to talk about?

Appendix 4: Seven Core Values of Public Participation

As an international leader in public participation, IAP2 has developed the "IAP2 Core Values for Public Participation" for use in the development and implementation of public participation processes. These core values were developed over a two year period with broad international input to identify those aspects of public participation which cross national, cultural, and religious boundaries. The purpose of these core values is to help make better decisions which reflect the interests and concerns of potentially affected people and entities.

Core Values for the Practice of Public Participation

1. Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
2. Public participation includes the promise that the public's contribution will influence the decision.
3. Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
4. Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
5. Public participation seeks input from participants in designing how they participate.
6. Public participation provides participants with the information they need to participate in a meaningful way.
7. Public participation communicates to participants how their input affected the decision.

For more information, visit the IAP2 Web site at www.iap2.org.

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