

# **UPPER NEUSE WATERSHED MANAGEMENT APPROACH**

**PREPARED FOR THE**

**UPPER NEUSE RIVER BASIN ASSOCIATION  
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**

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## **ACRONYMS AND ABBREVIATIONS**

BMP	best management practice
CES	North Carolina Cooperative Extension Service
COG	Council of Governments
CWMTF	Clean Water Management Trust Fund
DEH	Division of Environment Health, DENR
DENR	North Carolina Department of Environment and Natural Resources
DFR	Division of Forest Resources, DENR
DLR	Division of Land Resources, DENR
DO	dissolved oxygen
DOC	North Carolina Department of Commerce
DOT	North Carolina Department of Transportation
DSWC	Division of Soil and Water Conservation, DENR
DWM	Division of Waste Management, DENR
DWQ	Division of Water Quality, DENR
DWR	Division of Water Resources, DENR
EMC	North Carolina Environmental Management Commission
EPA	U.S. Environmental Protection Agency
GIS	Geographic Information Systems
HU	Hydrologic unit
NCDA	North Carolina Department of Agriculture
NFS	National Forest Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PCC	Policy Coordinating Council
PGC	Policy Guidance Committee
PWS	Public Water Supply Section, DEH
QA/QC	quality assurance/quality control
SWCC	Soil and Water Conservation Commission
SWCD	Soil and Water Conservation District
TAC	Technical Advisory Committee
TJCOG	Triangle J Council of Governments
TMDL	Total Maximum Daily Load
UNRBA	Upper Neuse River Basin Association
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WQS	water quality standard

# **EXECUTIVE SUMMARY**

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## **INTRODUCTION**

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The Upper Neuse River Watershed includes eight public drinking water supply reservoirs which currently provide high-quality drinking water for an estimated 450,000 people. In addition, lakes and streams in the watershed provide important recreational opportunities and abundant fish and wildlife for the region. With some water resources currently stressed and with the watershed's population projected to increase by 90,000 in the next two decades, proper management will be increasingly complex, expensive and challenging.

Outlined in this document is a state-local watershed management approach which will allow current and future challenges to be met in ways that are environmentally sound and fiscally responsible. It is an approach in which all stakeholders pool and coordinate their technical and financial resources to achieve water resource protection goals.

From June 1998 through October 1998, key water resource agencies participated in a series of facilitated workshops to build the basis for comprehensive, integrated management and protection of water resources in the Falls Lake watershed. Two committees were formed to advise the Upper Neuse River Basin Association (UNRBA)—a Policy Guidance Committee (PGC) and a Technical Advisory Committee (TAC). The PGC was charged with guiding overall approach development and advising its respective boards. The TAC was charged with designing recommended processes and procedures for working together.

### **Why a Watershed Approach?**

Watershed management is not new. This watershed management approach builds upon and strengthens work already undertaken by local, state and federal agencies and provides a way to better coordinate existing water resource programs. Since watershed management activities encompass numerous functions of government agencies, as well as many other public and private efforts, significant coordination is essential to sound decision making and management.

### **Goals of the Watershed Management Approach**

Key to the success of the Upper Neuse Watershed Management Approach is for partners to build on and integrate their strategic planning and resource management efforts, jointly working toward common goals. The following are six key goals.

#### ***Goal 1. Address established water quality and water quantity issues.***

The approach must improve resource management and protection, both restoring impaired waters and protecting valuable water resources and wetlands for current and future uses.

***Goal 2. Meet localized needs in addition to basinwide objectives.***

The Upper Neuse Watershed partners recognize that the collective communities in the watershed have their own unique character and resource concerns. At the same time, they recognize that they are part of a larger region. The approach must produce plans that address local geographic issues and help meet basinwide objectives.

***Goal 3. Build a strong watershed management partnership through a consensus-based process.***

Natural processes and human activities will change over time. Resource needs will change and will, at times, be in conflict. The Upper Neuse Watershed partners wish to provide a forum to bring together multiple interests, perspectives, and disciplines to reach consensus on how to best balance multiple objectives over time.

***Goal 4. Improve the information base for decision making.***

An improved information base will require providing coordinated, targeted monitoring and systematic data management. In addition, the information should be presented clearly and effectively to citizens and decision makers.

***Goal 5. Achieve long-term sustainability.***

A key factor of the management approach must be long-term sustainability of natural systems, the regional economy and the watershed partnership.

***Goal 6. Produce rational and achievable management strategies.***

The approach must help create management strategies that are rational, consistent, efficient and realistic.

## **CORNERSTONES OF THE WATERSHED MANAGEMENT APPROACH**

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The Upper Neuse Watershed Management Approach rests on four cornerstones or fundamental elements:

1. **Watershed management units** provide the spatial basis for coordinating watershed protection and restoration activities. The management units are based on the 28 subwatersheds delineated by the Natural Resources Conservation Service (NRCS).
2. **A recurring management cycle** with agreed-upon activities and time lines helps balance workloads and facilitate coordinated watershed management.
3. **Forums to support cooperative action and public participation** reflect an effort to involve all interested parties in watershed management activities and make it easier to work together.
4. **Existing authorities and programs** that influence water resource management are coordinated to improve efficiency and effectiveness. This Approach neither diminishes nor adds authority; it leverages existing authority for concerted future action.

## **CORNERSTONE #1: Watershed Management Units**

Agreed-upon watershed management units are the focus of the resource-oriented watershed management approach and provide a spatial basis for coordinating efforts. The Approach begins with the smallest hydrologic unit (HU)—the NRCS 14-digit code watershed—and aggregates to larger units as needed. These nested management units can be used at various scales to report and solicit input on assessment findings, watershed priorities and management actions.

## **CORNERSTONE #2: Watershed Management Cycle**

The watershed management cycle provides a time frame for activities to occur, thus focusing efforts more effectively and facilitating cooperation among stakeholders. Planning and implementation are not one-time activities. The repeating management cycle reflects the Upper Neuse partners' understanding that the nature of watershed management is dynamic and that the Approach must provide a systematic, yet flexible, way to respond to changing conditions.

## **CORNERSTONE #3: Coordinated Stakeholder Involvement**

A stakeholder is any individual or organization involved in or affected by watershed management activities. The term *stakeholder* covers a broad range of people and organizations, which can be grouped into two general categories: government and the public. The Upper Neuse Watershed Management Approach includes multiple coordinating forums which provide an opportunity for everyone to participate according to the level of effort they wish to contribute. Forums include the Policy Coordinating Council (PCC) which coordinates policy and resource allocation and provides sustained leadership; the Technical Advisory Committee (TAC) consisting of staff representatives from governmental agencies who will carry out the activities of the watershed management cycle and report recommendations to the PCC; the Partner Network/Partners Forum which includes public, private, and nonprofit group contacts and other interested parties that are willing to conduct outreach and solicit participation from their respective constituency groups; and the Information Management Consortium which coordinates information and data management, including public relations.

## **CORNERSTONE #4: Existing Authorities and Programs**

Currently, there are a number of local, state, and federal water resource-related planning, regulatory and technical assistance programs applicable to the Upper Neuse River Watershed. Authority for the water quality and quantity programs and responsibilities carried out by the Department of Environment and Natural Resources are derived from numerous state and federal mandates. State and federal laws also enable staff to give broad financial and technical assistance to protect or restore water quality. Local communities may establish other water resource goals that reflect local concerns and values. These local goals are important in interpreting data and prioritizing management actions.

# THE UPPER NEUSE WATERSHED MANAGEMENT CYCLE

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## Cycle Phases

The Upper Neuse Watershed management cycle has three components that create an orderly system for focusing and coordinating management activities on a continuous basis:

- **Agreed-to management activities:** a common series of steps or activities that partners agree to use for watershed planning and implementation.
- **Length of cycle:** a specified length of time to complete each iteration of watershed planning and to begin implementation of strategies.
- **Schedule of management activities:** a schedule for management activities in the Upper Neuse Watershed.

### **Phase 1- Scoping**

The first phase of the watershed management cycle serves to scan and summarize existing information about watershed conditions and to establish Upper Neuse Watershed goals and priorities.

The Technical Advisory Committee will begin scoping and data gathering and will prepare a Status Report that clearly communicates watershed conditions and trends, apparent problems (existing or potential), and sources of these problems. The Status Report will outline draft goals and priorities, key information or data gaps, and actions that can be undertaken immediately. The Status Report is to be communicated through existing forums and followed up by compiling comments to refine the draft goals and priorities. After the Status Report has been reviewed, partners will establish the Upper Neuse Watershed goals and priorities.

### **Phase 2- Assessment**

During the Assessment Phase, partners will develop and implement strategic data collection plans and analyze the data to quantify the severity and extent of water resource impacts and the sources of those impacts. A Strategic Data Collection Plan will be created based on the information gaps identified in the Phase 1 Status Report.

After collecting information, the second key activity in Phase 2 is interpreting and analyzing the data to quantify the severity and extent of water resource impacts and the sources of those impacts. A key product of this phase is the Assessment Report, which summarizes methods used and findings.

### **Phase 3- Setting Priorities**

The purpose of Phase 3 is to identify priorities in subwatersheds and to target management efforts. Partners and interested stakeholders will work together to establish a priority ranking of subwatersheds or "problemsheds" within the Upper Neuse Watershed. After priority waterbodies have been identified, targeting will take place. Through the targeting process, partners and stakeholders will evaluate the feasibility of allocating limited resources to address particular issues. Then, partners will select priority issues on which to focus their integrated management efforts.

### **Phase 4 - Evaluating and Selecting Strategies**

Solutions in many priority problemsheds will likely be complex and undoubtedly will require the efforts of many stakeholders. This phase includes clarification of watershed-specific management goals and objectives and identification, evaluation and selection of appropriate management alternatives. A draft management plan will be prepared in this phase which will describe management actions, stakeholders' roles and responsibilities, funding and timetables for implementation.

### **Phase 5 - Implementation**

Implementation may begin at any point in the management cycle when issues have straightforward, relatively easy solutions. When issues require more complex analysis and multiple solutions, implementation begins after the Watershed Management Plan has been finalized. The Implementation Phase includes completing applications for NPDES and other permits, public notices of and hearings for permits, and issuance of permits. It is also the time for public notices of possible action on local government ordinance changes. Design and installation of best management practices and other approaches to specific water quality or quantity problems will also take place during Phase 5. A critical part of implementation is securing funding and resources for carrying out management actions, special studies (if needed) and the recurring activities of the management cycle.

## **Schedules of Management Activities**

The Upper Neuse Watershed's cycle and the state's Neuse basinwide 5-year cycle work in tandem. Although the phases have a different duration and emphasis for each cycle, the output of one is critical input to the other.

## **PARTNER ROLES AND RESPONSIBILITIES**

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The Upper Neuse Watershed Management Approach does not supersede any agency or program components. Rather, it establishes an approach to more effectively leverage existing authorities and to more efficiently coordinate programs that influence the supply and quality of water. Each partner assumes leadership in certain activities according to its expertise and available resources.

Additional partnerships with other state or federal organizations are likely to emerge as a result of this watershed management approach. Participants in this approach will encourage such partnerships and collaborate with all interested parties. The roles and responsibilities of partners will evolve over time depending on new authorities, expertise, and resources.

## **MAKING THE TRANSITION**

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Transition to this watershed management approach will begin with getting organized and developing the first management plan over the next two years. In the year 2001, partners will initiate their first full five-year cycle and begin to synchronize the Upper Neuse Watershed's management cycle and the state's Neuse Basinwide Management cycle as envisioned in the Approach Document.

## **Keys to Success**

Successful implementation of the Upper Neuse Watershed Management Approach will depend on effective, consistent leadership throughout the transition and the five-phase cycle. It will be key for members of the Upper Neuse Watershed Policy Coordinating Council, NCDENR, NCDOT, UNRBA and the EMC to provide strong and consistent leadership in maintaining the viability of the partnership.

The Upper Neuse Watershed Management Approach is not mandated by statute or regulation. Therefore, neither program-based incentives nor regulatory penalties exist. Long-term implementation success comes from partners' commitment to incorporating the guidelines in this document into their standard operating procedures, adjusting program work plans to accommodate the watershed management cycle and adjusting budget allocations to reflect priorities identified in the Upper Neuse Watershed Management Plan.

## **Issues to Address in the Transition**

Several issues regarding transition to the new approach should be addressed immediately to help ensure greater success and other longer-term approach refinement issues should be addressed in the near future. Management Approach coordinators and members of the Policy Coordinating Council should track actions to address these issues and should periodically evaluate their effectiveness and overall impact on achieving the goals and objectives of the new approach.

### **Issues for Immediate Attention**

Issues for immediate attention include helping partners and stakeholders "think" watersheds, understanding and demonstrating commitment, raising public awareness and participation, streamlining existing committees to reduce meeting time and avoiding and/or managing participant burnout.

### **Refining the Approach**

Time constraints prevented the Technical Advisory Committee from completing design of some of the Approach components. Updating the Management Approach with additional guidance in these areas will ensure partner consensus and save time in the future by guiding efforts more efficiently.

## **CONCLUSION**

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It is the hope of the Upper Neuse Watershed management partners that this innovative approach will bring about a spirit of cooperation between stakeholders in the Watershed. The approach includes ways for everyone who is interested to "plug into" the watershed management process. With each partner making a commitment to work cooperatively and contribute to the management cycle activities outlined in the Approach Document, we can achieve more integrated, cost effective and environmentally sound management of our water resources.

## *Chapter 1*

# **INTRODUCTION**

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The Upper Neuse Watershed (Figure 1) includes eight public water supply reservoirs, which currently provide high-quality drinking water for an estimated 450,000 people. In addition, lakes and streams in the Watershed provide important recreational opportunities and abundant fish and wildlife for the region. With some water resources currently stressed and with the watershed's population projected to increase by 90,000 in the next two decades, proper management will be increasingly complex, expensive, and challenging.

The work is already daunting. When resource managers and policy makers in the Upper Neuse Watershed were asked, "What makes it difficult to carry out your responsibilities?" challenges often repeated included

- Trying to meet or balance multiple public objectives and priorities.
- Providing public stewardship of water resources and meeting mandated regulations while respecting the sovereignty of individual communities and property owners.
- Needing better information for policy makers, citizens, and the media.
- Getting buy in from local elected officials.
- Lack of adequate time, money, and staff.
- Coming up with feasible plans that work.

Outlined in this document is a state-local management approach to meet these current and future challenges.

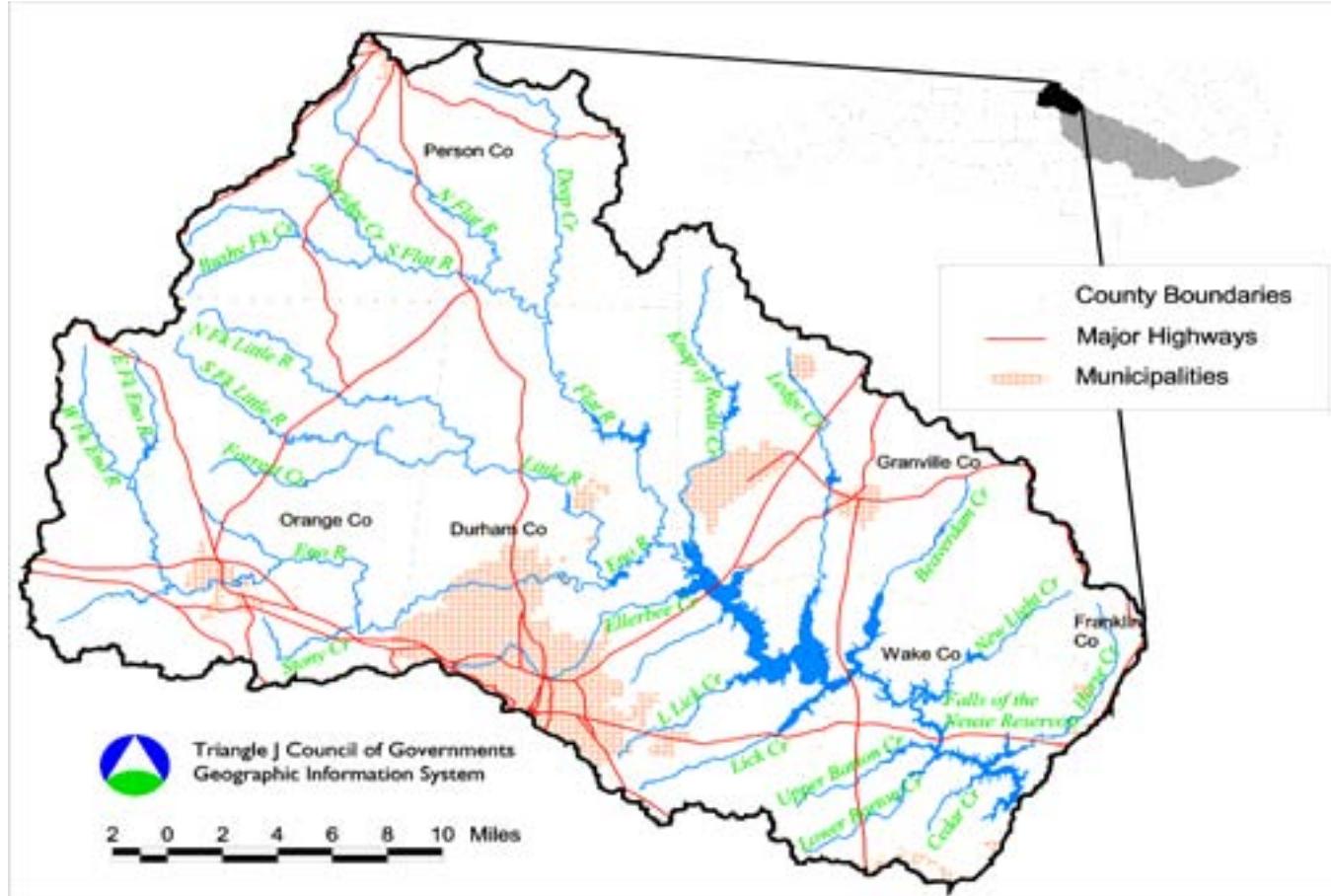
It is an approach in which all stakeholders pool and coordinate their technical and financial resources to achieve water resource protection goals in as cost-effective and environmentally effective a manner as possible.

Design of this local-state watershed management partnership was jointly undertaken by the Upper Neuse River Basin Association (voluntarily formed by the 14 local governments with land use planning and zoning jurisdiction in the 770-square mile watershed plus the Soil and Water

### **Upper Neuse Watershed Partnership Undertaken By:**

Durham County  
Franklin County  
Granville County  
Orange County  
Person County  
Wake County  
Butner  
Creedmoor  
Durham  
Hillsborough  
Raleigh  
Roxboro  
Stem  
Wake Forest  
Soil and Water Conservation Districts  
North Carolina Department of Environmental and Natural Resources  
North Carolina Environmental Management Commission  
North Carolina Department of Transportation

Conservation Districts) and the policy leaders from the North Carolina Department of Environment and Natural Resources (NC DENR), the North Carolina Environmental Commission (NC EMC), and the North Carolina Department of Transportation (NC DOT).



**Figure 1. Location Map of Upper Neuse Watershed**

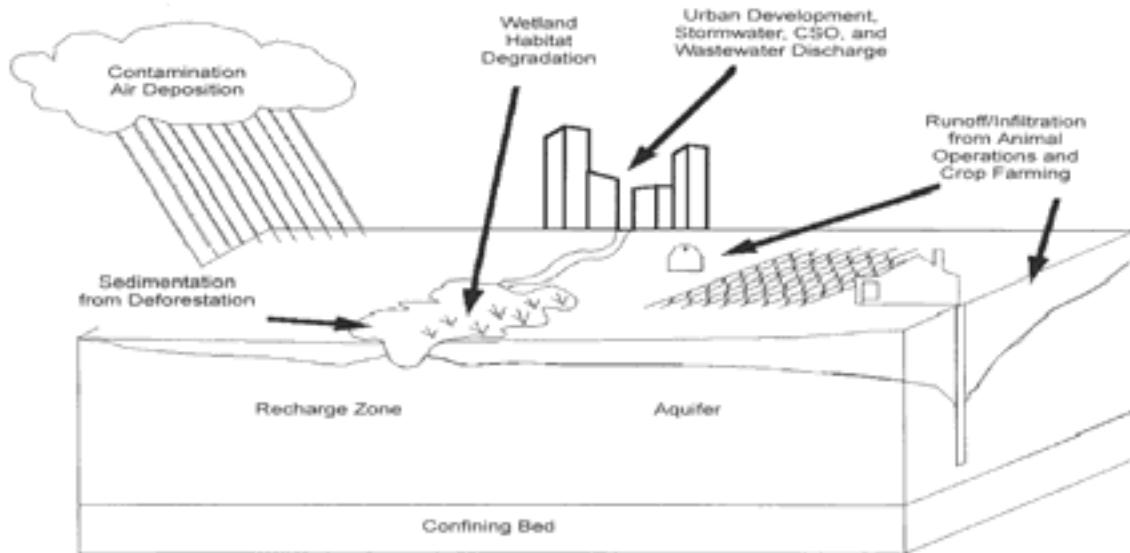
## Why a Watershed Approach?

Watershed management is not a new regulatory program. This approach builds upon and strengthens work already undertaken by local, state, and federal agencies. For example, Durham County has developed studies of the Little River and Lake Michie watersheds. Raleigh completed studies of the Barton Creek and Honeycutt Creek watersheds. The state commissioned the Falls Lake Study and developed the Neuse River Basinwide Water Quality Management Plan. Day to day, multiple agencies are working on issues in the Upper Neuse. This approach simply provides a way to better coordinate operations of existing water resource programs.

The term *watershed*, in this context, is broadly defined as the boundaries of a waterbody system (a lake, stream, or river) and the land area that drains into it. Because of their readily identifiable boundaries, watersheds provide functional spatial units for coordinating management efforts. Watershed management uses watersheds as a way to organize and focus partners' activities, based on the premise that water resource protection and restoration are best addressed through

integrated efforts within defined hydrologic regions. It emphasizes assessing and addressing the state of the environment from a broad perspective, taking into consideration all facets of the system and the many human factors that affect water quality and quantity (Figure 2).

Watershed management is a resource-centered approach. Success is measured in terms of improving and maintaining environmental quality and protecting public health. Implementation fosters protection and restoration of specific water uses such as drinking water supply, aquatic habitat, recreation, and irrigation.



**Figure 2. Human factors affecting water resources**

Sound water resource management decisions depend on understanding the relationship between water quality, water use, and conditions within the watershed. Essential to this understanding are accurate watershed assessments that

- Characterize the physical, chemical, and biological conditions of waterbodies.
- Identify causes and sources of water resource contamination and degradation.
- Evaluate the effectiveness of alternative management actions.

The culmination of watershed-based assessments is the implementation of regulatory and nonregulatory management actions that address local water resource problems. This integrated assessment and management—addressing all sources of pollution—reflects the interconnected nature of watersheds themselves. In addition, it fosters innovative, responsive, and cost-effective solutions.

Integrated management does not just happen. Since watershed management activities encompass numerous functions of local governments, NC DENR, and NC DOT, as well as many other public and private efforts, significant coordination is essential to sound decision making and management.

The Upper Neuse River Basin Association (UNRBA) was formed in 1996 to “preserve the water quality of the Upper Neuse through innovative and cost-effective strategies.” The next step toward integration was taken in 1997 when the North Carolina General Assembly authorized development and implementation of cooperative, integrated state-local water resource protection plans for river basins and watersheds. SB114 enabled coalitions of local governments to work together with the state to develop alternative strategies for protecting water resources. This legislation provided a new role for local governments in the state’s basin management and was intended to yield a strong forward-looking partnership.

## **Partners Developing and Implementing This Approach**

From June 1998 through October 1998, key water resource agencies, at the invitation of the UNRBA, participated in a series of facilitated workshops to build the basis for comprehensive, integrated management and protection of water resources in the Upper Neuse River Basin. Two committees were formed to advise the UNRBA, the NC EMC, and other respective boards—a Policy Guidance Committee (PGC) and a Technical Advisory Committee (TAC). The PGC was composed of five members of the UNRBA Board, one member from the EMC, one member from DENR, and one member from DOT. The PGC was charged with guiding overall approach development and advising its respective boards. The TAC was charged with designing recommended processes and procedures for working together.

The short-term goal of the groups was to organize for developing a plan pursuant to SB114 and for addressing issue and requirements of the Nutrient Sensitive Waters Rules. For the longer term, it was the intent of these committees to design a durable, flexible approach—one that can be strengthened based on lessons learned or expanded as new partners seek to participate. To signal their support for coordinating management efforts, partner agencies have signed a *Resolution of Mutual Intent* establishing a partnership for watershed management (Appendix A).

## **Goals of the Watershed Management Approach**

Key to the success of the Upper Neuse Watershed Management Approach is for partners to build on and integrate their strategic planning and resource management efforts, jointly working toward common goals. Upper Neuse partners are designing and implementing a watershed approach to achieve six key goals.

### ***Goal 1. Address established water quality and water quantity issues.***

The approach must improve resource management and protection, both restoring impaired waters and protecting valuable water resources and wetlands for current and future uses. There are many important resource issues and objectives; the approach must provide a basis for setting priorities.

### ***Goal 2. Meet localized needs in addition to basinwide objectives.***

The Upper Neuse Watershed partners recognize that the collective communities in the watershed have their own unique character and resource concerns. At the same time, they recognize that they are part of a larger region. The approach must produce plans that address local geographic issues, such as protection plans for individual water supply sources; improve the competitiveness of the region; and help meet basinwide objectives.

***Goal 3. Build a strong watershed management partnership through a consensus-based process.***

Natural processes and human activities will change over time. Resource needs will change and will, at times, be in conflict. The Upper Neuse Watershed partners wish to provide a forum to bring together multiple interests, perspectives, and disciplines to reach consensus on how to best balance multiple objectives over time. This consensus-based process should strive to

- Equitably balance benefits and burdens.
- Identify all stakeholders and develop a public participation strategy that ensures all have an opportunity to be heard.
- Increase understanding of environmental and economic impacts.
- Build strong, working partnerships.

***Goal 4. Improve the information base for decision making.***

An improved information base will require providing coordinated, targeted monitoring and systematic data management. In addition, the information base should provide comprehensive data assessment and interpretation to better understand

- water resource problems and the relative risks they pose.
- communities' relative contribution to water quality problems.
- equitable, science-based, fiscally sound, and cost-effective solutions.

This information should be presented clearly and effectively to citizens and decision makers.

***Goal 5. Achieve long-term sustainability.***

A key factor of the management approach must be long-term sustainability of

- Natural systems (water, land, wetlands and riparian areas, and air).
- The regional economy (economic opportunity, standard of living, and tax base).
- The watershed partnership (distributing resources and costs equitably and stretching resource management funds through coordination).

***Goal 6. Produce rational and achievable management strategies.***

The approach must help create management strategies characterized by

- Rational connection between strategy and measurable management objectives.
- Consistency and integration of strategies to achieve multiple objectives.
- Efficient and realistic plan implementation.

In summary, the overarching goal of this Approach is to sort out what partners should work on collectively so they can efficiently and wisely manage water resources.

## *Chapter 2*

# **CORNERSTONES OF THE WATERSHED MANAGEMENT APPROACH**

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The Upper Neuse Watershed Management Approach rests on four cornerstones or fundamental elements:

1. **Watershed management units** provide the spatial basis for coordinating watershed protection and restoration activities. The management units are based on the 28 subwatersheds delineated by the Natural Resources Conservation Service (NRCS).
2. **A recurring management cycle** with agreed-upon activities and time lines helps balance workloads and facilitate coordinated watershed management.
3. **Forums to support cooperative action and public participation** reflect an effort to involve all interested parties in watershed management activities and make it easier to work together.
4. **Existing authorities and programs** that influence water resource management are coordinated to improve efficiency and effectiveness. This Approach neither diminishes nor adds authority; it leverages existing authority for concerted future action.

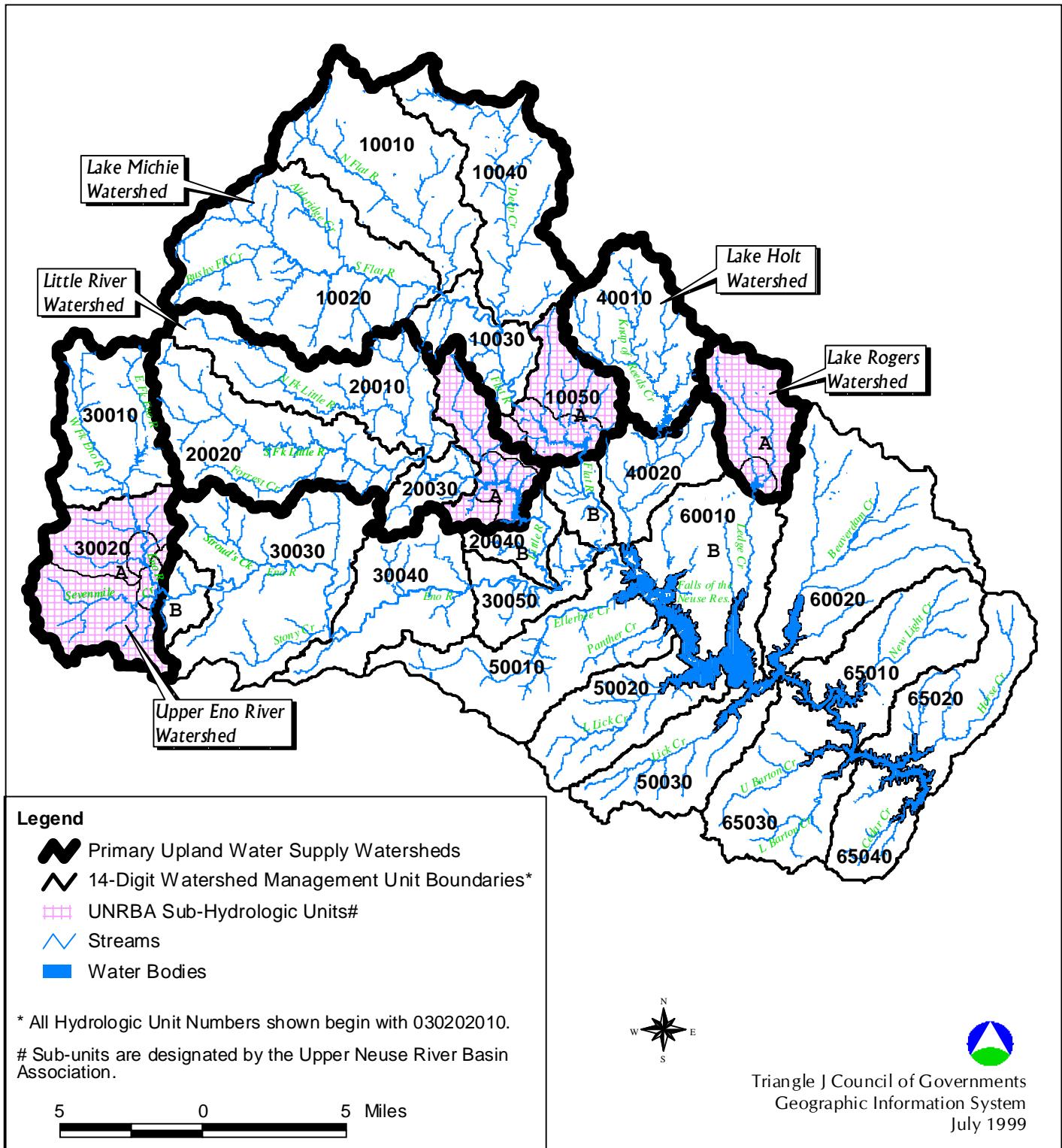
## **CORNERSTONE #1: Watershed Management Units**

Agreed-upon watershed management units are the focus of the resource-oriented watershed management approach and provide a spatial basis for coordinating efforts. Uses of the management units include

- Data/information storage units
- Analytical units
- Reporting units
- Units for defining public stakeholder groups
- Management coordination units

To meet these needs, the Approach begins with the smallest hydrologic unit (HU)—the NRCS 14-digit code watershed—and aggregates to larger units as needed. For information collection and storage, the Approach will emphasize the 14-digit watersheds and subwatersheds for existing and planned surface water supplies. For data analysis and modeling, the partners will use the 14-digit HU up to the Division of Water Quality's Subbasin 01 HU, plus watersheds for existing and planned surface water supplies. These nested management units can be used at various scales to report and solicit input on assessment findings, watershed priorities, and management actions.

Figure 3 shows the boundaries of these nested watersheds. Table 1 details the watersheds' names, codes that will be used to store and manage information, watershed land area, and primary surface waters.



**Figure 3. Upper Neuse Watershed Management Units--14-Digit Watersheds and Proposed UNRBA Subwatersheds.**

Watershed Code	Land Area		Primary Surface Waters
	Acres	Square Miles	
1	3020201010010	25,798	40.31
2	3020201010020	36,157	56.50
3	3020201010030	9,681	15.13
4	3020201010040	23,659	36.97
5	3020201010050	16,848	26.32
5A	10050A	12,086	18.88
5B	10050B	4,762	7.44
6	3020201020010	21,119	33.00
7	3020201020020	25,024	39.10
8	3020201020030	5,316	8.31
9	3020201020040	15,683	24.50
9A	20040A	10,439	16.31
9B	20040B	5,244	8.19
10	3020201030010	17,122	26.75
11	3020201030020	25,176	39.34
11A	30020A	21,191	33.11
11B	30020B	3,985	6.23
12	3020201030030	30,651	47.89
13	3020201030040	18,061	28.22
14	3020201030050	8,327	13.01
15	3020201040010	18,302	28.60
16	3020201040020	11,475	17.93
17	3020201050010	23,528	36.76
18	3020201050020	14,327	22.39
19	3020201050030	14,096	22.02
20	3020201050040	3,291	5.14
21	3020201060010	30,194	47.18
21A	60010A	11,125	17.38
21B	60010B	19,069	29.80
22	3020201060020	33,315	52.05
23	3020201060030	3,733	5.83
24	3020201065010	17,343	27.10
25	3020201065020	15,202	23.75
26	3020201065030	19,042	29.75
27	3020201065040	8,516	13.31
28	3020201065050	2,677	4.18
TOTAL:		493,663	771.34
AVERAGE/14 DIGIT WATERSHED:		17,631 acres	27.55 mi <sup>2</sup>

Source: NRCS Hydrologic Unit Coverage

Prepared By TJCOG (8/24/98)

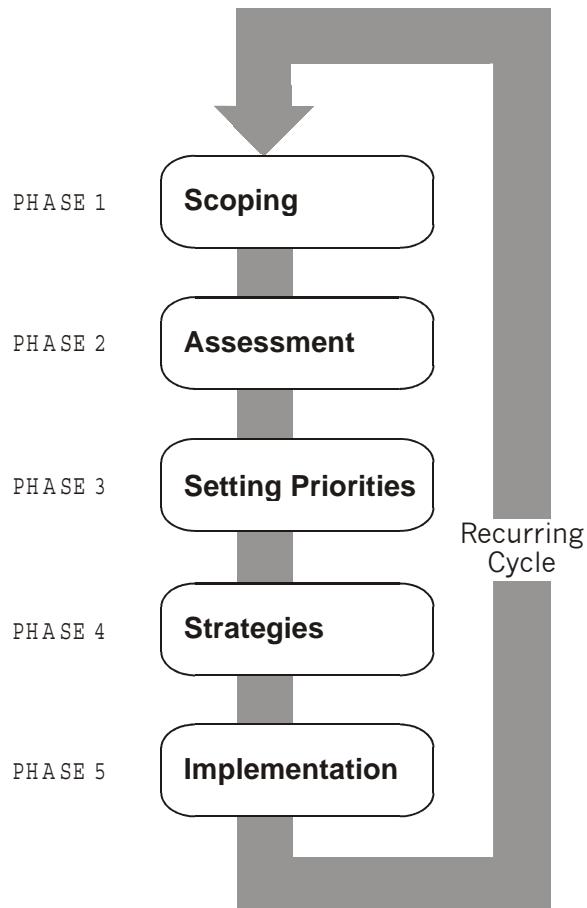
**Table 1. Upper Neuse Watershed Management Units--14-Digit Watersheds and Proposed UNRBA Subwatersheds**

## CORNERSTONE #2: Watershed Management Cycle

While the Upper Neuse Watershed and subwatersheds provide the spatial basis for coordination, the watershed management cycle and related schedule provide the temporal component for coordination. The cycle provides a time frame for a series of activities to occur, thus focusing efforts more effectively and facilitating cooperation among multiple stakeholders by enabling them to know when and how to participate in watershed management efforts.

Since 1991, the North Carolina Division of Water Quality (NC DWQ) has implemented basinwide planning for the Neuse River Basin on recurring 5-year cycles. The Upper Neuse watershed management cycle has five activity phases that are sequenced and repeated at recurring intervals (Figure 4). The cycle phases are designed to ensure that management goals, priorities, and actions are routinely updated and designed to link with the state's Neuse basinwide cycle at key points. Generally, the links are at decision points on priorities, management strategies, and resource allocation and at critical information exchange points (Figure 5). The five phases are described in more detail in Chapter 3.

Planning and implementation are not one-time activities. The repeating management cycle reflects the Upper Neuse partners' understanding that the nature of watershed management is dynamic and that the Approach must provide a systematic yet flexible way to respond to changing conditions.

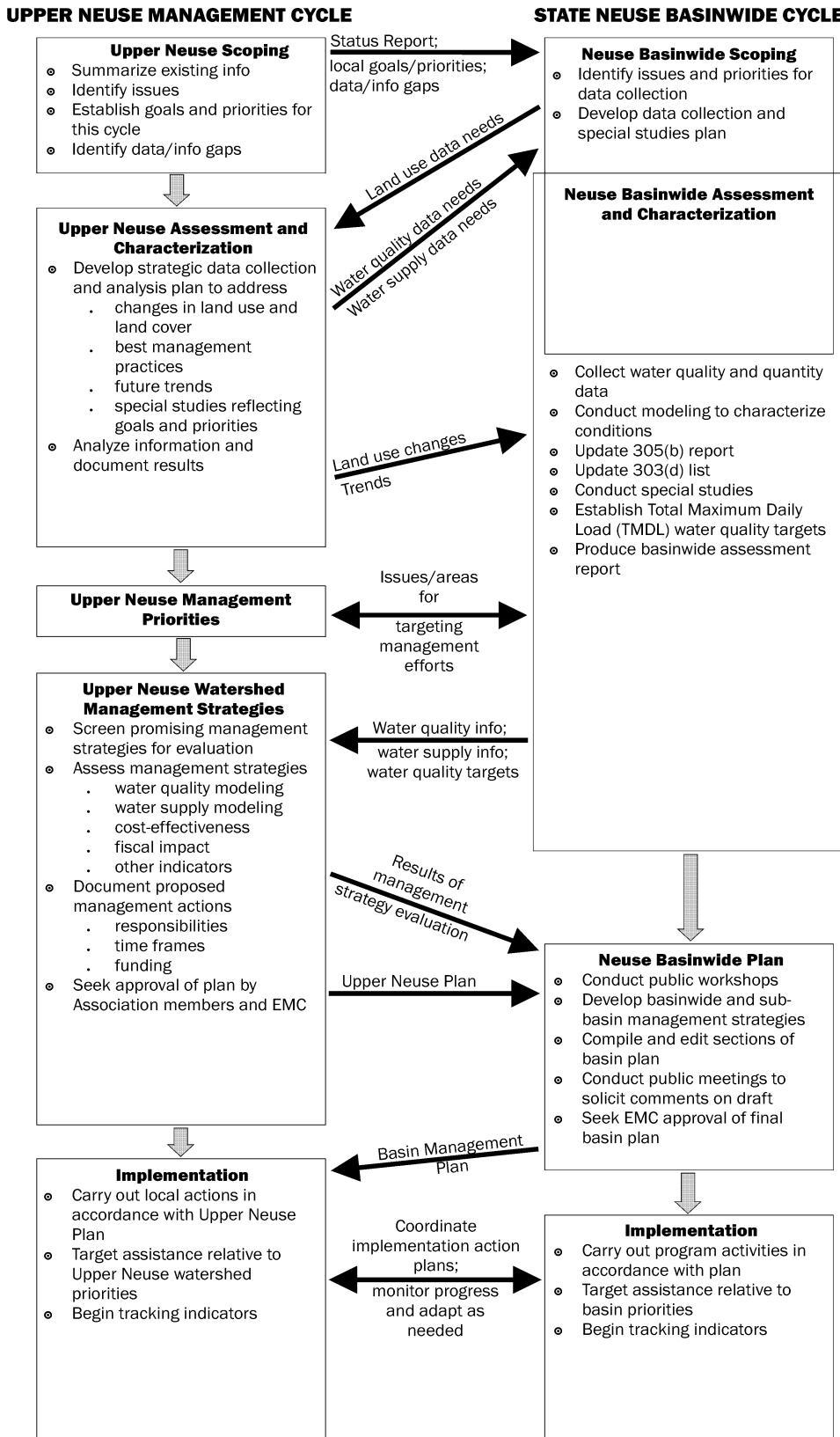


**Figure 4. Five activity phases**

## CORNERSTONE #3: Coordinated Stakeholder Involvement

### What Is a Stakeholder?

A stakeholder is any individual or organization involved in or affected by watershed management activities. The protection and restoration of the Upper Neuse Watershed's rivers, streams, and lakes depends on the collective efforts of citizens, businesses, and governmental agencies. This process was designed to establish and support a strong partnership among those organizations which have significant authority or resources for managing the Upper Neuse. It is also intended to ensure meaningful public participation in the decision-making process.

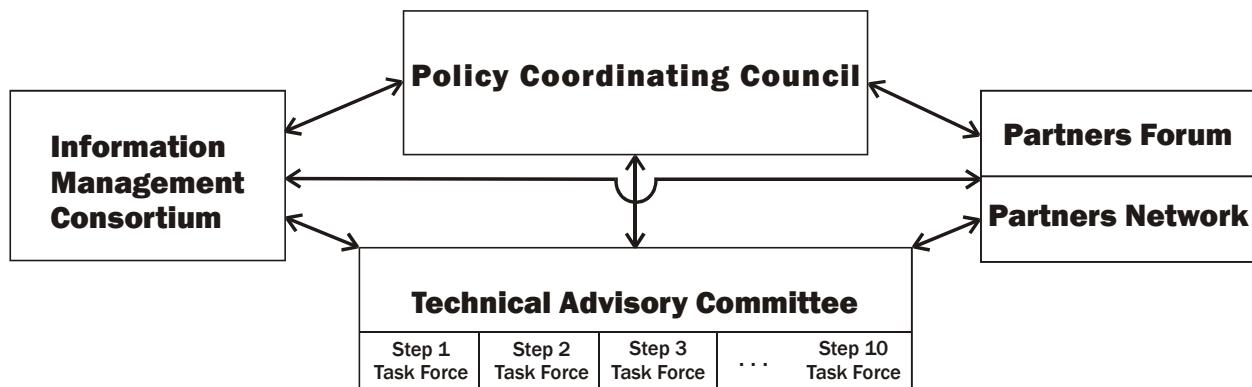
**Figure 5. Connecting Local and State Efforts**

The term **stakeholder** covers a broad range of people and organizations, which can be grouped into two general categories:

- **government:** city, county, regional, state, and federal government agencies.
- **the public:** individual residents and landowners; schools; commercial and industrial establishments; agricultural, mining, and forestry operations; utilities; environmental, consumer, and community groups.

### **Forums to Support Stakeholder Involvement**

The Upper Neuse Watershed Management Approach includes multiple coordinating forums to support stakeholder involvement (Figure 6). The strategy, outlined below, provides an opportunity for everyone to participate according to the level of effort they want to contribute. Importantly, it provides a known place to “plug in.”



**FIGURE 6. Multiple coordinating forums**

*Policy Coordinating Council.* The purpose of the policy Coordinating Council (PCC) is to coordinate policy and resource allocation and to provide sustained leadership, ensuring the Approach partnership is strong and the Approach structure is updated as needed. Members will brief and solicit input and action from their respective boards. This group should comprise chief executive officers from partners that have significant authority and/or resources to manage the Upper Neuse, including:

- the UNRBA officers.
- a representative from a Soil and Water Conservation District.
- a representative from the NC Environmental Management Commission.
- a representative from the NC Department of Environment and Natural Resources.
- a representative from the NC Department of Transportation.
- a representative from the NC Department of Commerce.

*Technical Advisory Committee.* The Technical Advisory Committee (TAC) is to include staff representatives from governmental agencies working on water resource management issues in the Upper Neuse. The purpose of the Committee is to carry out the activities of the watershed management cycle and report recommendations to the PCC. Table 2 lists proposed members of

the TAC . The Committee will form task forces to oversee and carry out each step of the Upper Neuse management cycle. (See Chapter 3 for more details about the management cycle.)

<b><u>Local Governments with Planning and Zoning Jurisdiction</u></b>	
<i>Counties</i>	<i>Municipalities</i>
Durham County	Town of Creedmoor
Franklin County	City of Durham
Granville County	Town of Hillsborough
Orange County	City of Raleigh
Person County	Town of Roxboro
Wake County	Town of Stem Town of Wake Forest Butner (State-run)
<b><u>Soil and Water Conservation Districts/Cooperative Extension Service</u></b>	
Durham County	Franklin County
Granville County	Orange County
Person County	Wake County
<b><u>Regional Planning Agencies</u></b>	
Triangle J Council of Governments	
Kerr-Tar Council of Governments	
<b><u>State Government</u></b>	
Department of Environment and Natural Resources	
Division of Water Quality	
Division of Land Resources	
Division of Soil and Water Conservation	
Division of Water Resources	
Public Water Supply Section	
Department of Commerce	
Department of Transportation	
Office of State Planning	
<b><u>Federal Government</u></b>	
US Geological Survey	
USDA Natural Resources Conservation Service	
<b><u>University Resources, e.g.</u></b>	
North Carolina State University - Cooperative Extension	

**Table 2. Recommended Members of the Upper Neuse Technical Advisory Committee**

*Partner Network/Partners Forum.* Public participation efforts will be supported by two structures:

- *Partner Network.* This network will include public, private, and nonprofit group contacts that are willing to conduct outreach and solicit participation from their respective constituency groups. Table 3 lists potential members of the Partner Network.
- *Partner Forum.* The purpose of this structure is to provide a discussion forum for diverse interests throughout the management cycle. All interested parties may participate.

The Upper Neuse partners' public participation goal is to provide for coordinated, forward-looking, and meaningful involvement and support of the public throughout all phases of Upper Neuse watershed management planning and decision-making process, for the purpose of plan development, adoption, and implementation.

Specific objectives of public outreach include the following:

- Increase public awareness and understanding of
  - The carrying capacity of the watershed's water resources and the need for and benefits of protecting those resources.
  - Water resource planning, management, and protection issues and information in the Upper Neuse River Watershed.
  - The sources and risks of water quality contamination.
  - Specific actions/measures that stakeholders can take to protect water resources.
- Establish water resources goals and objectives for the watershed.
- Increase decision-makers' and technical staff's understanding of the public's concerns, perceptions and knowledge about water resources issues and conditions in the Upper Neuse Watershed.
- Evaluate alternative management strategies to accomplish stated goals and objectives;
- Select workable management strategies.
- Obtain stakeholder support for and commitment to implementation of the Upper Neuse Watershed Management Plan, so that there is community ownership of water resources conditions and solutions.
- Increase consumer confidence in the quality of local and regional drinking water supplies and services.
- Identify, secure and pool financial resources, expertise, and materials available to implement a public education and awareness program that supports local and regional watershed management efforts.

The Technical Advisory Committee that an Upper Neuse Watershed web site be developed to support these public participation goals and objectives.

*Information Management Consortium.* The purpose of the Consortium is to coordinate information and data management, including public relations, to support all phases of Upper Neuse planning and management. Members will include geographic information systems (GIS), database, public relations, and information management specialists from partner agencies.

One of the six goals of the Approach is to improve the information base for decision making. To meet this goal, an adequate system to support information exchange and management throughout the management cycle is essential. Coordination among watershed management partners requires that information be accessible, reliable, understandable, and periodically updated. The Watershed Management Approach will require refinement of procedures to ensure that appropriate types of information are compiled, checked for quality, and accessible for analysis and presentation at appropriate times.

This strategy for supporting stakeholder involvement provides opportunities for people to participate according to the level of effort they wish or are able to contribute.

**City and County School Districts**

Durham County Schools  
Franklin County School District  
Granville County School District

Orange County School District  
Person County School District  
Wake County School District

**Private Sector Business/Industry Groups**

NPDES Dischargers—Major Facilities, Minor Facilities  
Farm Bureau  
Durham Chamber of Commerce  
Raleigh Chamber of Commerce  
Granville County Chamber of Commerce  
Granville County Committee of 100  
Roxboro Area Chamber of Commerce  
Hillsborough-Orange County Chamber of Commerce  
Chapel Hill Board of Realtors  
Durham Association of Realtors  
Raleigh Board of Realtors  
Homebuilders Association of Durham and Chapel Hill  
Homebuilders Association of Raleigh and Wake County  
Homebuilders Association of Roxboro and Person County  
Engineering Firms  
Others...

**Non-Profit Groups/Citizens Groups**

Eno River Preservation Society  
Triangle Land Conservancy  
Save The Water, Inc.  
Clean Water Fund of North Carolina  
Neuse River Foundation  
Environmental Defense Fund  
Property owners associations  
Homeowners associations  
Neighborhood associations

Sierra Club  
League of Women Voters  
Neuse River Basin Regional Council  
Falls Lake Watershed Council  
Professional associations  
Environmental affairs boards  
Civic groups  
Others...

**Table 3. Potential Members of Partner Network**

***CORNERSTONE #4: Existing Authorities and Programs***

Currently there are a number of local, state, and federal water resource-related planning, regulatory, and financial and technical assistance programs applicable to the Upper Neuse Watershed. Table 4 provides examples of such programs.

Authorities for the water quality and quantity programs and responsibilities carried out by the Department of Environment and Natural Resources are derived from numerous state and federal legislative mandates requiring specific regulatory and management actions. State and federal laws also enable staff to give broad financial and technical assistance to protect or restore water quality. Generally, the federal Clean Water Act and Safe Drinking Water Act set up goals and minimum nationwide standards. The state passes enabling legislation to allow the state to meet

these goals and to establish specific water quality standards. Local governments, businesses, and industries are responsible for meeting these state standards.

Water quality standards provide the basis for determining acceptable conditions for the Upper Neuse Watershed's water resources. For water quality, the state defines standards to include designated use categories and use standards. Waterbodies, including streams, rivers, lakes, groundwater aquifers, and portions of such waterbodies, are categorized based on their intended uses. Once a waterbody has been designated for a use, a specific set of standards come into play to protect that use. A stream segment may have multiple uses with multiple associated water quality standards. Classifications and standards provide the basis for protecting designated uses from both point and nonpoint source pollution and are key in interpreting data and prioritizing management actions by agencies involved in environmental management.

Local communities may establish other water resource goals that reflect local concerns and values. For example, a local government might establish a goal of nondegradation of its drinking water source; this benchmark may exceed or supplement existing state standards. These local goals also are key in interpreting data and prioritizing management actions.

Finally, state, local, and federal permitting, land use, and assistance authorities are leveraged to meet resource protection goals.

	Management Agencies		
	Local	State	Federal
<u>PLANNING</u>			
Basinwide Water Quality Management Plan		DENR (DWQ)	
State Water Supply Planning		DENR (DWR)	
Upper Neuse River Basin Association	Cities, Counties		
Neuse River Basin Regional Council		DENR (DWQ)	
Upper Neuse Nonpoint Source Team		DENR (DWQ)	
<u>REGULATORY</u>			
Water Supply Watershed Protection Program	Compliance	DENR (DWQ)	
Stormwater Management Program	Compliance	DENR (DWQ)	
NPDES Program		DENR (DWQ)	
Non-Discharge Wastewater Systems	Counties	DENR (DEH)	
Clean Water Act- Sections 404 and 401		DENR (DWQ)	USACE
Rivers and Harbors Act of 1899			USACE
Dam Safety Permit		DENR (DLR)	
Sedimentation Pollution Control Act	Cities, Counties	DENR (DLR), DOT	
NC Pesticide Law of 1971		NCDA	
Pesticide Disposal Program		NCDA	
Animal Waste Management		DENR (DWQ)	
Local Water Supply Plan Development	Compliance	DENR (DWR)	
ORW, HQW, NSW Management Strategies		DENR (DWQ)	
Resource Conservation and Recovery Act			EPA
Solid Waste Management Act of 1989	Counties	DENR (DWM)	
NC Mining Act of 1971		DENR (DLR)	
Wellhead Protection Program		DENR (DWQ, DEH)	
Safe Drinking Water Act	Compliance	DENR (DEH)	EPA
<u>TECHNICAL ASSISTANCE</u>			
Animal Waste Management		CES, DENR (DSWC)	NRCS
Forest Practice Guidelines/Stewardship Program		DENR (DFR)	
National Forest Management Act			NFS
Laboratory Testing Services		NCDA	
Water Supply/Wastewater Systems Assistance		DENR (DWR,PWS,DWQ)	
<u>FUNDING</u>			
NC Clean Water Management Trust Fund		CWMT Fund	
Clean Water Act Section 205(j) and 319		DENR (DWQ)	
NC Revolving Loan/Grant for Water Systems		DENR (DEH)	
NC Revolving Loan/Grant for Sewer Systems		DENR (DWQ)	
NC Wetlands Restoration Program		DENR (DWQ)	
USGS Cost Share Program			USGS
Agricultural Cost Share Program	SWCD	SWCC, DNER (DSWC)	
Watershed Protection- PL 566			NRCS
Wetland Reserve Program			USDA
1985 and 1990 Farm Bills			USDA
- Conservation Reserve Program			
- Conservation Compliance			
- Sodbuster			
- Swampbuster			
- Conservation Easement			
- Wetland Reserve			
- Water Quality Incentive Program			
<u>MONITORING, REPORTING AND FLOW GAGING</u>			
Flow Gaging Stations			USGS
State Ambient Water Quality Monitoring		DENR (DWQ)	
Water Quality Monitoring	Cities, Counties		USGS
Safe Drinking Water Act Monitoring	Water Supply Systems	DENR (DEH)	
NPDES Compliance Monitoring	NPDES Dischargers	DENR (DWQ)	
Federal Community Right-to-Know Act	Compliance		EPA
Phase I Stormwater Program Monitoring	Phase I Municipalities	DENR (DWQ)	

**Table 4. Example Programs to Coordinate**

## *Chapter 3*

# **THE UPPER NEUSE WATERSHED MANAGEMENT CYCLE**

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## **Cycle Phases**

The Upper Neuse Watershed management cycle has three components that create an orderly system for focusing and coordinating management activities on a continuous basis:

- **Agreed-to management activities:** a common series of steps or activities that partners agree to use for watershed planning and implementation.
- **Length of cycle:** a specified length of time to complete each iteration of watershed planning and to begin implementation of strategies.
- **Schedule of management activities:** a schedule for management activities in the Upper Neuse.

The agreed-to management activities are summarized in Figure 7.

Described in more detail below, the management cycle is designed to balance workloads, to focus efforts more effectively, and to facilitate cooperation among multiple stakeholders by enabling them to know when and how to participate.

### **Phase 1- Scoping**

The first phase of the watershed management cycle has two purposes:

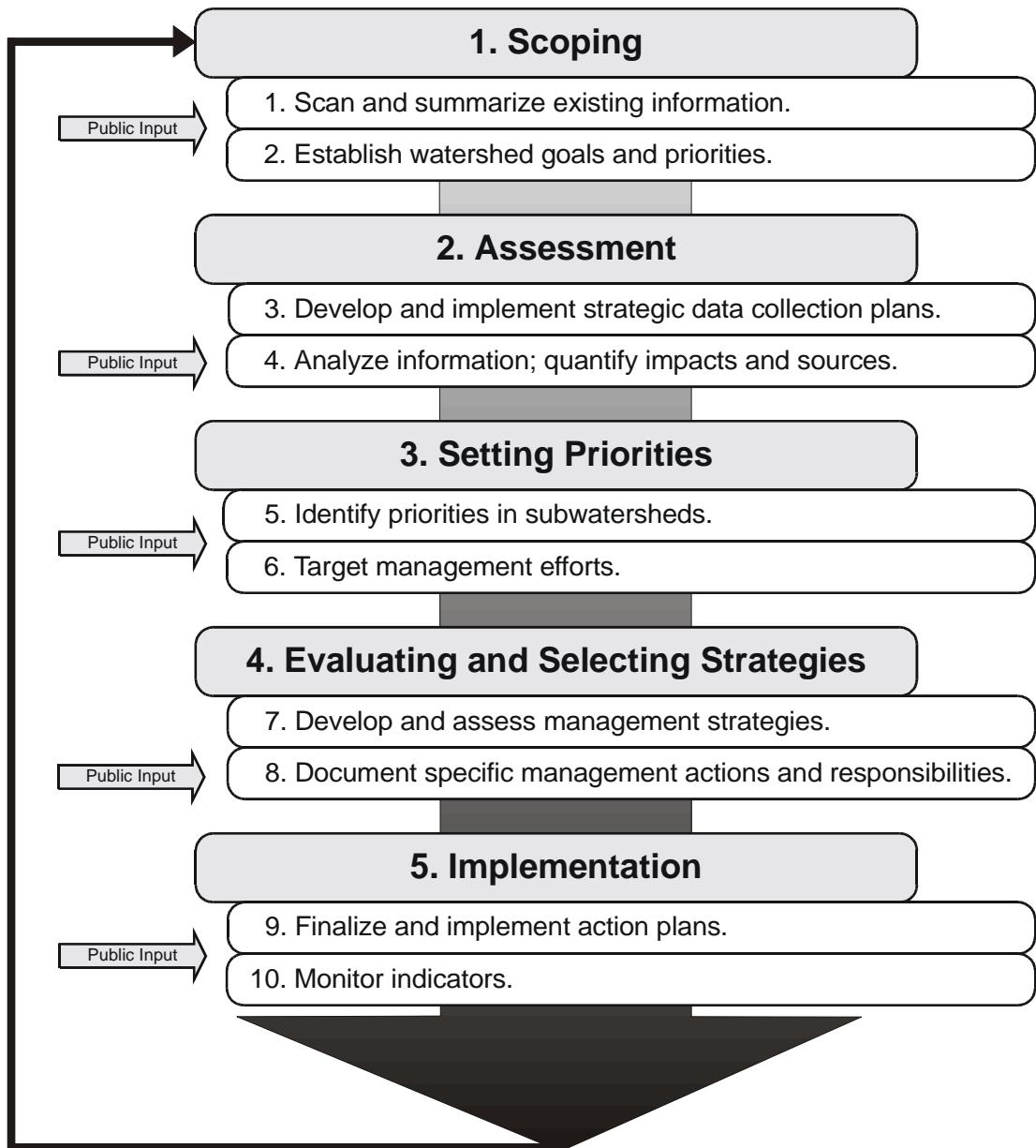
1. To scan and summarize existing information about watershed conditions; and
2. To establish Upper Neuse Watershed goals and priorities.

The Technical Advisory Committee will begin scoping and data gathering and will prepare a Status Report that clearly communicates watershed conditions and trends, apparent problems (existing or potential), and sources of these problems. In addition, to spur community dialog, the Status Report will outline draft goals and priorities, key information or data gaps, and actions that can be undertaken immediately. The Status Report is to be communicated through existing forums and followed up by compiling comments to refine the draft goals and priorities. Appendix B provides a detailed outline for the Upper Neuse Watershed Status Report.

### **Upper Neuse Watershed Status Report**

The purposes of the Status Report are to orient people to the watershed, including current conditions and key issues; to explain why watershed management is important; to stimulate a dialog about key issues as a basis for setting priorities; and to recommend what can be done immediately. The audience for the Status Reports includes policy makers in the partner agencies, as well as groups in the Partner Network.

Generally, the Status Report will orient people to the watershed, including current conditions and key issues; explain why watershed management is important; and stimulate a dialog about key issues as a basis for the second key activity in Phase 1, setting priorities.



**Figure 7. Upper Neuse Cycle of Management Activities**

After the Status Report has been reviewed, partners will establish the Upper Neuse Watershed goals and priorities. The Technical Advisory Committee provided the following guidance for designing and testing the prioritization method in the coming months.

### **Guidance for Designing a Prioritization Process**

- Screen for issues from a wide range of stakeholders when developing and getting input on the Status Report.
  - Develop a method that combines three consensus-building tools:
    1. GIS data layers of water resources and stressors to help screen for areas that are heavily impacted or high-quality areas with threats of impacts.
    2. A numeric index system that yields scores for a waterbody or an issue depending on the degree of impairment or threat.
- The two tools above would incorporate the state's use support ratings for waterbodies in the Upper Neuse. Based on the GIS screening and numeric index scores, a draft list of priorities would be developed as a basis for discussion.
- 3. Water resource protection and restoration criteria, which will be used to guide discussion and help reach consensus on priority issues or priority "problemsheds" (i.e., watershed areas above and including a problem area).
  - Keep the above system as simple and efficient as possible. Set a specific time limit for reaching consensus.
  - To be able to make sense of and trust the GIS screening tool, there should be meaningful layers and associated factors as well as a clear description of "what's behind" the GIS data overlays. For example, do not just show all NPDES discharges as "stressors." Distinguish between dischargers by severity of permit violations or some other factor that indicates stress.
  - The process should have clear instructions about who develops the initial draft list; whether the list is to reflect priority issues (e.g., eutrophication), priority waterbodies (e.g., Ellerbe Creek) or both; and who is to participate in the consensus discussion to generate a list for public review.

The Status Report and the stakeholders' priorities will help focus strategic data collection and assessment in Phase 2.

### **Phase 2- Assessment**

During the Assessment Phase, partners

- Develop and implement strategic data collection plans.
- Analyze the data to quantify the severity and extent of water resource impacts and the sources of those impacts.

Building on the Phase 1 Status Report, which summarizes readily available information about the Upper Neuse and key information gaps, the Strategic Data Collection Plan should

- Clarify the issues in the Upper Neuse that require further study (issues to be addressed and study areas).

- Identify and evaluate existing sources of data or information that can be obtained to help characterize those issues.
- Evaluate and select appropriate models that will be used to assess data.
- Evaluate and select key assessment indicators that will be used. See Appendix C for a discussion of the importance of indicators, potential indicators for the Upper Neuse, and considerations for selecting indicators and establishing their target values.
- Specify new data to be obtained through expanded or revised monitoring activities.
- Provide a rationale for selecting sampling sites, monitoring frequencies, and other important data collection procedures.
- List sampling procedures, including methods, parameters, and frequencies.
- Document a quality assurance/quality control mini-plan.
- Identify resources that can be devoted to compiling existing data or carrying out new monitoring activities.
- Document partner agency roles.
- Provide an implementation schedule.
- Identify resources that can be devoted to existing data compilation or new monitoring activities.
- Outline complementary roles and responsibilities.

After collecting information, the second key activity in Phase 2 is interpreting and analyzing the data to quantify the severity and extent of water resource impacts and the sources of those impacts. A key product of this phase is the Assessment Report, which summarizes methods used and findings.

In developing and implementing the Strategic Data Collection Plan, as well as in conducting assessment of the data and writing the Assessment Report, partners will assume responsibilities according to their expertise, available resources, and willingness to participate. For example, it is envisioned that the Upper Neuse River Basin Association will analyze land use trends, the Soil and Water Conservation Districts will analyze implementation of agricultural BMPs, and the State will assess water quality conditions and use attainment.

The Assessment Report, which contains more complete data and more detailed evaluation than the Status Report, provides the basis for a second round of prioritization in Phase 3.

### **Phase 3- Setting Priorities**

Phase 3 has two purposes:

1. To identify priorities in subwatersheds.
2. To target management efforts.

In the third phase of the management cycle, Approach partners and interested stakeholders will work together to establish a priority ranking of subwatersheds or problemsheds within the Upper

Neuse Watershed, using 14-digit watersheds and their stream or lake segments as a basis for discussion. The initial effort to rank waterbodies or issues will be based solely on technical factors related to human health or ecological impairment, using the same prioritization method outlined for Phase 1. At this point, partners will ask, “Based on new assessment information, has the priority list changed?” Once this second screening or ranking of waterbodies has been established, it will be presented for public review. The list will then be adjusted as necessary to incorporate stakeholders’ concerns.

After priority waterbodies have been identified, another process, referred to as targeting, must take place. Through the targeting process, partners and stakeholders can evaluate the feasibility and advisability of allocating limited resources to address particular issues. Some issues may be so difficult to deal with that they might not be cost-effectively solvable , given that human and financial resources are not unlimited.

The following criteria are recommended as a basis for negotiating which priority waterbodies or issues should be addressed through joint efforts:

- **Priority ranking:** Is it high relative to other concerns in the Upper Neuse Watershed?
- **Technical feasibility:** Can the problem be solved through available means?
- **Political feasibility:** Are stakeholders willing, ready, and interested in doing something?
- **Cost-effectiveness:** How much benefit is expected per dollar spent relative to other possible management options/measures?
- **Programmatic feasibility:** Are the needed staff and financial resources available?
- **Legal mandates:** Does this meet a legal mandate?
- **Geographic balance:** Are we meeting the concerns of different partners over time?

At this point, partners will select priority issues or problemsheds on which to focus their integrated management efforts. In practice, targeting requires identifying stakeholders associated with issues. Partners can then identify issues requiring broad participation and distinguish them from issues with a smaller subset of stakeholders. Targeting can occur among a broad-based coalition of partners or among smaller subsets.

Through the steps described above, stakeholders will know which problems pose the greatest risk, where groups are able and willing to work together to solve the problems, and whether problems appear to have feasible solutions. Partners will use this information to select specific issues for which management plans will be developed.

#### **Phase 4 - Evaluating and Selecting Strategies**

Solutions in many priority problemsheds will likely be complex and undoubtedly will require the efforts of many stakeholders. The following steps are recommended to develop integrated management strategies and action plans for the Upper Neuse.

1. *Clarify watershed-specific management goals and objectives:* Local, regional, and state stakeholders gather in the Partners Forum to clarify watershed-specific goals and

objectives. This meeting is hosted by the Policy Coordinating Council. Watershed objectives include, for example, the amount of pollution control or reduction needed to meet intended uses of the waterbody.

Stakeholders use technical expertise provided by local, regional, state, and federal entities and private consultants to identify indicators that link management alternatives to management objectives. Indicators are specific parameters associated with water resources that are meaningful to decision-makers, are measurable, or can be ranked subjectively, and can be predicted in response to management actions.

2. *Identify most promising management alternatives:* Based on the analysis and ranking performed during the targeting process, watershed stakeholders choose promising management options or scenarios (combinations of management options).
3. *Evaluate alternatives:* Future conditions in the watershed are evaluated under different management alternatives. Results for key indicators are compared across scenarios to determine which alternative or combination of alternatives best meets the management goals and objectives. For watershed pollution reduction, this means identifying point source and/or nonpoint source management strategies—or Total Maximum Daily Loads—estimated to best meet the needed reduction.
4. *Select optimal management strategies:* Stakeholders consider results from the evaluation of alternatives and other key decision criteria (e.g., degree of uncertainty in achieving results, potential for unintended consequences, and ability to develop additional or retrofit solutions when unexpected conditions occur) and then select the optimal management strategies.
5. *Draft management plan:* Partners prepare a management plan describing the management actions, stakeholders' roles and responsibilities, funding, and timetables for implementation.
6. *Finalize and implement action plan:* Partners circulate the draft management plans among the watershed stakeholders to raise awareness and fine-tune recommendations. After finalization, implementation begins. (It should be noted that implementation may begin at any point in the management cycle when issues have straightforward, relatively easy solutions.)

It is envisioned that the Upper Neuse River Basin Association will take the lead in carrying out these steps, with strong participation and support from the partners' Policy Coordinating Council and the Technical Advisory Committee.

As noted, an important product in this phase is the Draft Upper Neuse Watershed Management Plan. The purposes of the plan are to

- Describe water quality and quantity goals and priorities adopted by watershed partners.
- Convey the scope and magnitude of water quality or quantity problems that have been identified as priority issues.
- Convey the sources of impacts and their relative contribution to the problem.

- Link management strategies to goals.
- Describe integrated management strategies and document the outcome or result of a coordinated effort (including assessment of expected change in water quality or quantity, fiscal impact, and cost-effectiveness of alternative management strategies).
- Provide innovative, cost-effective solutions to enhance watershed management.
- Guide resource allocations for implementation.
- Build strong working relationships.

Appendix D provides a recommended outline or table of contents for future Upper Neuse management plans. The Technical Advisory Committee recommends that the contents of the plan be compiled in a user-friendly notebook format and reported such that each jurisdiction or partner agency is easily able to see what it has committed to do and such that it is possible to see how collective partners' efforts are addressing the problems.

### **Phase 5 - Implementation**

Implementation may begin at any point in the management cycle when issues have straightforward, relatively easy solutions. When issues require more complex analysis and multiple solutions, implementation begins after the Watershed Management Plan has been finalized. The Implementation Phase includes completing applications for NPDES and other permits, public notices of and hearings for permits, and issuance of permits. It is also the time for public notices of possible action on ordinance changes. Design and installation of best management practices and other approaches to specific water quality or quantity problems will also take place during Phase 5. A critical part of implementation is securing funding and resources for carrying out

- Actions partners committed to in the Management Plan.
- Special studies, as needed.
- Recurring annual activities of the management cycle.

Implementation is the culmination—the aim—of the planning process. It is important that partners and the general public know and understand the goals of the Management Plan, as well as how they can participate in implementing it. The Upper Neuse River Basin Association staff and the Information Management Consortium will be responsible for developing informative materials that communicate this message effectively. The Association Executive Director and the Partner Network will use these materials to conduct extensive public outreach.

The success of the Upper Neuse Watershed Management Plan will ultimately be measured in terms of improvements in water quality and habitat, and restoration or protection of waterbody uses. Indicators of such improvements in water quality and functions will be incorporated into the Strategic Data Collection Plan. (Appendix C, Indicators Toolbox, outlines potential indicators for tracking success.) Watershed partners will assume responsibility for tracking individual indicators according to their expertise, program areas, and resources. These responsibilities will be documented in the Strategic Data Collection Plan.

In the near term, however, the effectiveness of the Watershed Management Plan will be measured in terms of achievement of critical milestones. The Upper Neuse River Basin Association staff will track these milestones and take the lead in assessing the status of watershed management implementation.

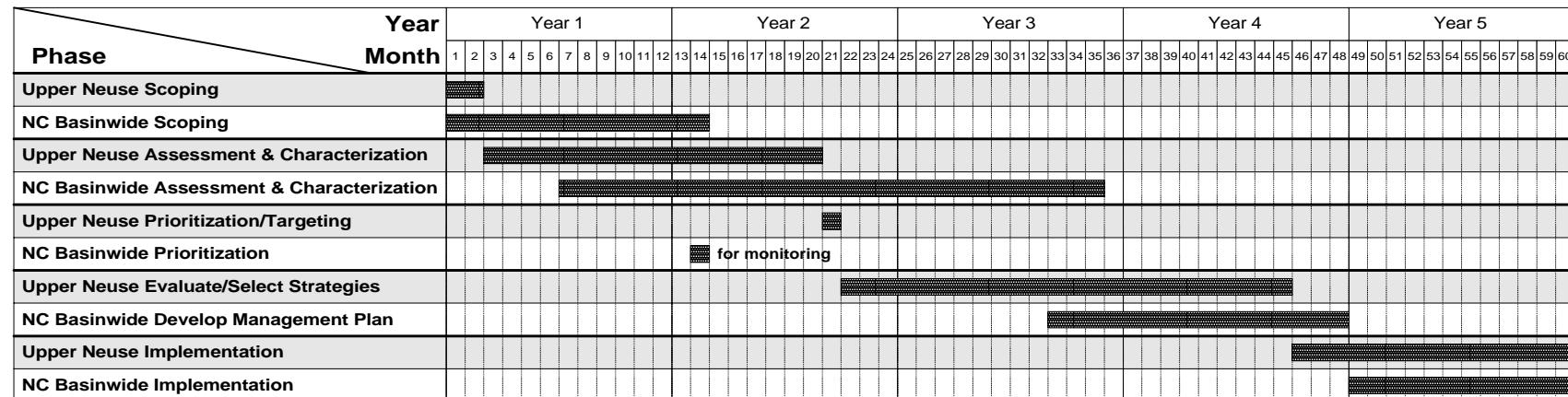
If the Association staff, working with the Technical Advisory Committee, identifies a need for additional support to achieve a critical milestone, the Policy Coordinating Council will serve as a forum for responding to those needs. If additional support is not available, the Association staff will document the shortfall in achieving the Watershed Management Plan milestone so that future planning activities within the Upper Neuse can anticipate and account for the shortfall.

## **Schedules of Management Activities**

The Upper Neuse Watershed's cycle and the state's Neuse basinwide 5-year cycle work in tandem. Although the phases have different durations and emphases for each cycle, the output of one is critical input to the other. For example, the Upper Neuse Status Report provides key information to the DENR on local issues and priorities as well as monitoring needs. Figure 5 in Chapter 2 highlights these critical links. The timing and synchronization of efforts is key in making these links as meaningful and efficient as possible. Table 5 and Figure 8 summarize the schedules of the two cycles.

<b>PHASE</b>	<b>UPPER NEUSE TIME FRAME</b>	<b>NC BASINWIDE TIME FRAME</b>
<b><i>Scoping</i></b>	months 1 to 2 (2 months)	months 1 to 14 (14 months)
<b><i>Assessment and Characterization</i></b>	months 3 to 20 (18 months)	months 6 to 35 (30 months)
<b><i>Setting Management Priorities and Targeting Issues/Areas</i></b>	month 21 (1 month)	month 14 (priorities for monitoring) (1 month)
<b><i>Evaluating and Selecting Strategies</i></b>	months 22 to 45 (24 months)	months 33 to 48 (15 months)
<b><i>Implementation</i></b>	months 46 to 60 (15 months and ongoing)	months 49 to 60 (12 months and ongoing)

**Table 5. Upper Neuse and North Carolina Basinwide Schedules**



## **Figure 8. Upper Neuse and North Carolina Basinwide Schedules**

## *Chapter 4*

# **PARTNER ROLES AND RESPONSIBILITIES**

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The Upper Neuse Watershed Management Approach does not supersede any agency or program components. Rather, it establishes an approach to more effectively leverage existing authorities and to more efficiently coordinate programs that influence the supply and quality of water. This chapter summarizes the envisioned roles of each partner in the Approach, including those activities in which all partners participate, and each partner's leadership roles. Also indicated are the cycle phases when the task will occur. A more detailed Watershed Management Program Activity Guide is provided in Appendix E. The Guide should be used in refining work plans during the transition to this coordinated approach and used as a reference by agency staff as they track who is responsible for what during each step of the management cycle.

### **Cycle Phases**

- Phase 1: Scoping
- Phase 2: Assessment
- Phase 3: Setting Priorities
- Phase 4: Evaluating and Selecting Strategies
- Phase 5: Implementation

## **Activities All Partners Participate In**

The following are activities all agency partners participate in.

<u>Activity</u>	<u>Cycle Phase</u>
- Scan for existing, readily available watershed information.	1
- Identify data gaps.	1
- Assist in developing and implementing Strategic Data Collection Plans.	2
- Help set goals and priorities and target management efforts.	1, 3
- Assist in screening promising strategies to evaluate.	4
- Review and comment on draft management plan.	4
- Assist in soliciting public input on status report, draft priorities, and draft plan.	1, 3, 4
- Implement the management plan.	5

## **Partner Leadership Roles**

Each partner assumes leadership in certain activities according to its expertise and available resources. Based on the Program Activity Guide, it is envisioned that partners will take the lead and assume primary responsibility for watershed management tasks as follows.

## **Upper Neuse River Basin Association**

<u>Association Board</u>	<u>Cycle Phase</u>
- Coordinate all partner efforts.	all
- Keep local elected officials informed.	all
- Coordinate public input.	all
- Write grants, raise funds for Upper Neuse planning and management activities.	all
- Develop Upper Neuse Status Report.	1
- Develop Upper Neuse Management Plan.	4
- Track implementation of the plan.	5

### Local Governments

- Provide information on local land use conditions and trends.	1, 2
- Document and assess effectiveness of local stormwater and erosion control best management practices.	2
- Conduct special studies.	2
- Share consultant services and analyses.	2, 4
- Adopt ordinances and implement local management programs.	5

### Soil and Water Conservation Districts

- Summarize agricultural activities and conservation plans.	1
- Assess and characterize potential pollutant reductions from farmland.	2
- Identify rural areas with highest potential for water quality impacts.	2
- Assess and characterize streambank stabilization/erosion problems.	2
- Assist in writing agriculture portion of management plan.	4
- Provide technical assistance to implement local programs.	5

## **Councils of Government**

(COGs will take the lead on the following tasks as resources are available.)

	<u>Cycle Phase</u>
- Provide geographic information system (GIS) support.	all
- Serve as a data/information clearinghouse.	all
- Apply prioritization method to develop draft list.	1, 3
- Compile and summarize public input.	all
- Develop indicators and performance benchmarks to measure success in meeting partner goals.	2
- Provide quality assurance and quality control (QA/QC) on planning and data management activities.	all
- Provide technical assistance in drafting revisions to local ordinances and on nonregulatory actions.	5

**Department of Environment and Natural Resources**

(as a part of Neuse basinwide efforts)

Cycle Phase

- Scan for readily available watershed information on water quality, water supply, and wetlands. 1
- Provide context of existing or pending federal or state regulatory requirements. all
- Provide standardized methods for partners to use for monitoring and assessment. 2, 4
- Collect and assess water quality, stream habitat, and wetlands data. 2
- Conduct special studies. 2
- Develop and apply water quality models or other assessment tools. 2
- Establish water quality targets (Total Maximum Daily Loads) as required. 2
- Identify federal and state funding to help implement management strategies. 4, 5
- Issue permits. 5

**Cooperative Extension**Cycle Phase

- Analyze agricultural inputs and practices. 1, 2
- Evaluate septic tank inputs. 2
- Evaluate the ability of buffers to “treat” runoff and capture sediment. 2
- Evaluate nitrogen movement. 2
- Create a survey tool for evaluating the draft priority list. 1, 3
- Help write management plan. 4
- Establish demonstration sites to teach the effectiveness of management activities. 5

**Department of Transportation**Cycle Phase

- Provide information on existing and planned roads and corridors. 1
- Implement transportation-related components of management plan. 5
- Demonstrate useful practices of the program. 5

**Opportunities for Other Partners**

Additional partnerships with other state or federal organizations are likely to emerge as a result of this watershed management approach. Participants in this approach will encourage such partnerships and collaborate with all interested parties. The roles and responsibilities of partners will evolve over time depending on new authorities, expertise, and resources.

## *Chapter 5*

# **MAKING THE TRANSITION**

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## **Progressive Management Approach Implementation**

Transition to this watershed management approach will begin with getting organized and developing the first management plan over the next two years. As outlined previously, the short-term goal of the partners is to develop an integrated management plan pursuant to SB114, which also helps address issues and requirements of the Nutrient Sensitive Water Rules. In the year 2001, partners will initiate their first full five-year cycle and begin to synchronize the Upper Neuse Watershed's cycle and the state's Neuse basinwide cycle as envisioned in the Management Approach.

## **Keys to Success**

### **Leadership**

Successful implementation of the Upper Neuse Watershed Management Approach will depend on effective, consistent leadership throughout the transition and the five-phase cycle. With the adoption of the Watershed Management Approach, the Department of Environment and Natural Resources and the local governments within the Upper Neuse Watershed have evolved from their traditional roles to assume leadership in promoting watershed management partnership and in helping interested parties join or synchronize their efforts with the watershed management cycle. It will be key for members of the Upper Neuse Watershed Policy Coordinating Council, NC DENR, NC DOT, UNRBA, NC EMC, and NC DOC to provide strong and consistent leadership in maintaining the viability of the partnership.

### **Commitment**

The Upper Neuse Watershed Management Approach is not mandated by statute or regulation. Therefore, neither program-based incentives that would help ensure compliance nor regulatory penalties that could enforce solutions exist. The long-term success of implementing the Watershed Management Approach derives from partners' commitment to the following tasks:

1. Incorporating the guidance summarized in this document into their standard operating procedures.
2. Adjusting program work plans to accommodate the watershed management cycle and the public outreach process.
3. Developing rules, guidance, by-laws, etc. to refine and formalize the functions and responsibilities of the Upper Neuse Watershed Policy Coordinating Council, Technical Advisory Committee, Information Management Consortium, and Partner Network. This includes empowering the Committee representatives to get input from and make decisions on behalf of their respective agencies or programs.

4. Adjusting budget allocations, to the extent possible, to reflect priorities identified in the Upper Neuse Watershed Management Plan, and recurring activities of the management cycle.
5. Instituting management strategies in a spirit of cooperation.

## Interim Tasks

The following are tasks that should be undertaken in the near term to begin the transition. These tasks include getting organized and starting the first plan.

### **Schedule for Getting Organized**

- Circulate Upper Neuse Watershed Management Approach document to governing boards for discussion and action. Time frame: Nov.1998-Feb.1999.
- Develop Technical Advisory Committee Recruitment Strategy. Time frame: Nov 1998-Feb 1999.
- Develop Information Management Consortium Recruitment Strategy. Time frame: Nov 1998-Feb 1999.
- Design Prioritization Method. Time frame: Nov 1998-Feb 1999.
- Develop Partner Network Recruitment and Orientation Strategy. Time frame: Nov 1998-Feb 1999.
- Complete formal adoption of Approach and signing of Resolution of Intent. Time frame: Feb 1999.
- Appoint members of Policy Coordinating Council, Technical Advisory Committee, and Information Management Consortium. Time frame: Feb 1999.

### **Starting the First Plan**

- Conduct scoping. Develop Status Report and the Technical Advisory Committee's draft list of priorities and issues. The Status Report should outline what can be done immediately. Time frame: Oct-Nov 1998.
- Obtain public input on draft issues/priorities. Time frame: Dec 1998-May 1999.
- Select indicators, develop assessment tools, conduct assessments, and update list of priorities and targeted areas for management. Time frame: Jan.1999-Oct 1999.
- Obtain public input on updated priorities and targeted areas. Time frame: Nov-Dec 1999.
- Evaluate and select management strategies. This task includes using the assessment tools developed earlier to evaluate the effectiveness of alternative management strategies, selecting preferred strategies, documenting responsibilities for implementing strategies, outlining performance measures which will be used to track success, and listing issues to address in the next management cycle. Time frame: Jan 2000-Dec 2000.

## Issues to Address in the Transition

Several issues regarding transition to the new approach should be addressed immediately to help ensure greater success, and other longer-term approach refinement issues should be addressed in the near future. Management Approach coordinators and members of the Policy Coordinating Council should track actions to address these issues and should periodically evaluate their effectiveness and overall impact on achieving the goals and objectives of the new approach.

### **Issues for Immediate Attention**

- *Helping Partners and Stakeholders “Think” Watersheds:* Working under the new approach will frequently require partners and stakeholders to think outside more traditional planning lines (e.g., political or organizational boundaries) so that problems that cross those lines can be dealt with effectively. Potential solutions include emphasizing the regional community by demonstrating how partners and jurisdictions are connected regionally through the boundaries of the watershed and how the resources of the watershed are critical to people’s everyday lives. Outreach messages should be kept simple and clear using, for example, a watershed map to orient everyone and brief bullets that explain how this approach is different from past approaches while highlighting the benefits of the new approach.
- *Understanding and Demonstrating Commitment:* Partners need to understand up front what they are committing to and then be able to follow through. Each partner decides what it can offer to this new approach, but once a commitment has been made, follow-through is critical. As is the case with any successful joint effort, partners must be able to depend on one another. Members of the Policy Coordinating Council have a critical role in this regard. As the forum responsible for addressing resource allocation issues, PCC members will be expected to work within their organizations to ensure that resource allocation decisions are communicated and acted upon appropriately. Additionally, partners could establish expectations and benchmarks of what they expect from the Approach and measure progress as a demonstration of commitment. Achieving strong public awareness and support will also provide an incentive for maintaining commitment.
- *Raising Public Awareness and Participation:* Many of the goals of the Upper Neuse Watershed Management Approach depend on achieving buy-in and support from the public. Many of the problems or threats to water resources in the watershed can be handled effectively only if the citizens are aware of the need and support management through their own actions. Engaging the public successfully might be achieved through communicating clearly the implications of potential management decisions (including no action) and identifying where and how the public can plug into the process to help influence decisions before they are made. Building and advertising the Partner Network and Partner Forum are critical to addressing this issue, because they go beyond the public meeting/hearing method to engage people where they live and work.
- *Streamlining Committees to Reduce Meeting Time:* Because of the scope of the partnerships that compose the Upper Neuse Watershed Management Approach, the Approach’s forums provide a consistent means for addressing many interrelated resource management issues in a

way not usually achievable within specialty committees or workgroups. Although it will take time for the Upper Neuse Watershed forums to prove themselves, partners would be wise to review the reasons why other forums exist and decide whether objectives overlap sufficiently to streamline and reduce the number of forums. These solutions will happen over time, but addressing this issue explicitly might help reduce the number of forums and meetings that people feel obligated to attend.

- *Avoiding and Managing Participant Burnout:* Holding too many meetings and not showing enough progress or results are sure ways to burn out the people participating in the management process. Approach coordinators are advised to make strategic use of the forums, holding large meetings only when necessary. Additionally, when meetings are held, they should be as brief as possible and have targeted, action-oriented agendas. E-mail, newsletters, surveys, and other means of communicating can provide ways to handle business that does not need to be conducted face-to-face. Turnover in staff and participants is unavoidable, however, and the partners and coordinators should be prepared with means to quickly orient and engage new participants effectively. Keeping the Management Approach document up-to-date and providing access to other important information (e.g., through a well-maintained web site) will help address this issue.

### **Refining the Approach**

Time constraints prevented the Technical Advisory Committee from completing design of some of the Approach's components. Updating the Management Approach with additional guidance in these areas will ensure partner consensus and save time in the future by guiding efforts more efficiently. Although the areas documented below as needing refinement reflect areas already identified by the TAC, it should be recognized that other refinement needs are likely to arise as the new approach is implemented. Adapting to lessons learned will help keep the approach fresh, relevant, and ultimately most useful.

- *Priority Setting and Targeting Methods:* Although guiding principles have been established for the priority setting and targeting steps of the watershed management cycle, specific methods still need to be worked out. Clarifying methods and criteria before the methods are to be applied will help avoid unnecessary confrontations when implementing these steps.
- *Information Management Consortium:* Much of what is accomplished under the watershed management cycle will require strong information management. Therefore, inventorying partner capabilities and designing standards and protocols for the consortium will be critical to enhancing the process.

## **APPENDICES**

*Appendix A*

## **RESOLUTION OF INTENT**

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**RESOLUTION OF MUTUAL INTENT BETWEEN  
UPPER NEUSE RIVER BASIN ASSOCIATION  
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL  
RESOURCES  
NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
TRIANGLE J COUNCIL OF GOVERNMENTS  
KERR TAR COUNCIL OF GOVERNMENTS  
NORTH CAROLINA COOPERATIVE EXTENSION**

### **PARTNERSHIP FOR MANAGING THE UPPER NEUSE WATERSHED**

**WHEREAS** a watershed management approach is used to coordinate operations of existing water resource programs and activities to better achieve shared water resource management goals and objectives; and

**WHEREAS** from June 1998 through October 1998, key water resource agencies, at the invitation of the Upper Neuse Basin Association, participated in developing an approach for innovative, integrated management and protection of water resources in the Upper Neuse Watershed; and

**WHEREAS** the Upper Neuse Watershed Management Approach is a *voluntary* partnership for effectively and efficiently protecting water resources and does not alter the statutory or regulatory authority and responsibility of participating agencies; and

**WHEREAS** the Upper Neuse partners recognize that the collective communities in the basin have their own unique character and concerns and that they are part of a larger region and that their efforts must address localized needs while helping to meet basinwide objectives; and

**WHEREAS** key to the success of this management approach is for program and agency partners to build on and integrate their planning and resource management efforts, jointly working toward common goals.

**BE IT THEREFORE RESOLVED** that the undersigned partners intend to work in a cooperative spirit in implementing the *Upper Neuse Watershed Management Approach*; and

**BE IT FURTHER RESOLVED** that, to the extent feasible, the undersigned partners intend to carry out their roles and responsibilities detailed in the *Upper Neuse Watershed Management Approach* and *Program Activity Guide*, including appointing representatives from participating

programs to the Policy Coordinating Council and Technical Advisory Committee and intend to expand the Management Approach as new partners wish to participate.

Partners in designing and implementing this watershed management approach are:

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Tom Fetzer, Chair, Upper Neuse River Basin Association (local government representative)

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Ed Harrison, Upper Neuse River Basin Association (Soil and Water Conservation District representative)

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Bill Holman, Assistant Secretary for Environmental Protection, North Carolina Department of Environment and Natural Resources

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David Moreau, Chairman, North Carolina Environmental Management Commission

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David King, Deputy Secretary, North Carolina Department of Transportation

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Donald Cobb, District Director, North Carolina Cooperative Extension

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Charles Krautler, President, Triangle J Council of Governments

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Neil Mallory, Executive Director, Kerr Tar Council of Governments

## *Appendix B*

# **UPPER NEUSE STATUS REPORT OUTLINE**

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The purposes of the status report are to orient people to the basin, including current conditions and key issues; to explain why watershed management is important; and to stimulate a dialog about key issues as a basis for setting priorities. The audience for the status reports includes policy makers in the partner agencies as well as groups in the Partner Network such as local watershed associations; trade associations; League of Women Voters; and others.

## **Contents**

### **Forward**

What is the watershed planning process about?

Why is it important?

### **Upper Neuse Description**

Introduction of subwatershed units

Describe relationship of Upper Neuse to the overall basin, including its position at the headwaters

Describe the physical and natural setting (including conditions at relatively undisturbed or reference sites)

Describe population and demographics, including land use and economy

### **Water Resources/Water Use**

Use

Conditions and trends

### **Factors Affecting Water Resources (overview of key stressors and trends)**

Examples might include:

Economic trends

Population growth

Decline in agriculture

Impervious surface

Water demand

### **Regulatory Environment**

### **What's Next (Overview of next steps)**

Identifying issues and information gaps

Draft issues/priorities

Recommended immediate actions

Community dialogue to clarify issues, goals, and priorities

## *Appendix C*

# **INDICATORS TOOLBOX**

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### **What are indicators and how are they used?**

SB114 requires that performance indicators or benchmarks be established as a part of a watershed management plan. What are indicators and why are they important?

Indicators are measurable surrogates that relate actions to consequences. Here, “measurable” means both quantitative measures and qualitative measures that can be subjectively ranked. Indicators are important because it is difficult to *directly* assess or predict the consequences of actions on complex systems. Indicators can make the task more manageable. Also, indicators yield more scientifically-valid, defensible, and resource-based decisions. Finally, indicators make action and follow up more meaningful to a wide range of stakeholders.

In watershed management, indicators can play several important roles:

- **Assessment.** In assessing and communicating resource conditions, indicators link stressors to valued characteristics of the water resource.
- **Decision-making.** In evaluating and communicating management strategies, indicators link management options to management objectives.
- **Measuring success.** In tracking and communicating the effectiveness of decisions, indicators link management actions to conditions and objectives.

### **Use of this Toolbox**

Indicators are key to each of the Upper Neuse Watershed Management Goals and are intended to be used throughout the management cycle. The purposes of this Toolbox are to

- explain what indicators are, how they are used, and why they are important;
- outline considerations and a process for selecting indicators and establishing performance targets;
- provide examples of issues and their related indicators.

During the piloting of this approach in the coming months, indicators should be selected to measure the success of the Upper Neuse Watershed Management partnership. This toolbox can be used as a starting point in selecting both programmatic and environmental indicators.

### **Selecting Indicators - Considerations**

Many factors must be considered when developing and selecting indicators for the Upper Neuse Watershed Management Plan.

### *Big Picture*

- What is the purpose of the management plan?
- What geographic scales are you evaluating (site specific, stream reach, lake, whole watershed, basin, ecoregion)?
- What audiences are interested in your evaluation? What issues do they care about?
- What are your evaluation timeframes ( current, retrospective, predictive)?
- What are your constraints (e.g., budgets)?
- How will this evaluation relate to other evaluation efforts?

### *Scientific/Technical*

- Indicators should provide a quantitative estimate of use support.
- Different indicators may be needed for different uses of concern.
- Indicators should be sensitive to the location and timing of pollutant sources or stressors.
- The response of the indicator to pollutant loads or other stressors should be understood.

### *Practical*

- Indicator measurement should be cost effective while meeting other requirements
- Monitoring should minimize stress on the use of concern.
- If possible, select indicators that are consistent with existing data.
- Select indicators that the public can understand. Target values should be accepted as ensuring desired levels of water quality or quantity.

## **Establishing Target Conditions**

An indicator's target value is a criterion for assessing attainment of uses. For example, if chlorophyll a is the indicator, what level constitutes a problem and what level reflects that water quality can support uses or goals?

There are several ways to establish target values, including

- comparison to numeric criteria in water quality standards
- comparison to an appropriate reference site or natural (baseline) conditions
- using existing classification systems
- conducting user surveys
- comparison to benchmarks
- comparison to professional standards
- establishing program evaluation criteria

## Potential Indicators for the Upper Neuse Basin

The following issues and indicators are used as examples for illustration. It is not intended to be a complete set of issues or indicators.

### **Examples of Potential Resource Management Indicators for the Upper Neuse Basin**

**The potential resource management indicators are based on identified causes of use impairment in the Draft Neuse Basinwide Water Quality Management Plan, DENR, September 1998, which is currently under public review.** The indicators, which range from biological indicators closely related to use support, to numeric indicators associated with water quality standards (WQS), to programmatic indicators, address various resource goals or issues. These general resource management goals include:

- Protection or restoration of aquatic habitat.
- Protection of human health.
- Water supply storage capacity.
- Recreation.
- Aesthetics (general and drinking water).
- Provision of adequate water supply.

Listed for each water resource problem are the general resource goals (specific objectives, or target values, should be determined by stakeholders), the Upper Neuse impaired waterbody indicators, and potential indicators to use in evaluating the effectiveness of management strategies in meeting established goals and targets.

### **Upper Neuse Issues**

#### **Issue #1: Poor habitat, severe bank erosion, poor substrate**

**Related Goals:** Aquatic Habitat; Recreation; and General Aesthetics

**Waterbody Reference:** Ellerbe Creek, Little Lick Creek, Lick Creek

**Potential Indicators:**

- benthic macroinvertebrate ratings: target improving trend, supplement DWQ monitoring
- turbidity
- fish community indices: target improving trend
- survey of miles of failing stream banks, status of riparian buffers
- stream miles of BMPs instituted
- status of sediment/erosion control inspection and enforcement
- percent imperviousness in watershed not subject to stormwater detention (particularly useful for preliminary assessment of unmonitored streams)
- acres of wetlands restored or preserved

#### **Issue #2: Low Dissolved Oxygen (DO)**

**Related Goals:** Aquatic Habitat

**Waterbody Reference:** Ellerbe Creek, Flat River below Lake Michie due to dam releases, Knap of Reeds, Little Lick Creek, Lick Creek

**Potential Indicators:**

- DO concentrations; percent of DO standard violations
- biotic indices of use support (benthic, fish)
- in urban streams, high temperatures (due to runoff from pavement and lack of shading) likely plays an important role in depressing DO. Water temperature could be used as a subsidiary indicator

**Issue #3: Extreme low flows****Related Goals:** Aquatic Habitat

**Waterbody Reference:** Ellerbe Creek, S. Flat River, Knap of Reeds Creek, Flat River below Dam

**Potential Indicators:**

- habitat/biota indices of use support
- where continuous flow gaging is available, set target minimum flow
- acres of wetlands restored or preserved could be used as a subsidiary indicator

**Issue #4: Metals****Related Goal:** Aquatic Habitat

**Waterbody Reference:** copper in Knap of Reeds Creek

**Potential Indicators:**

- percent violations of water quality standard in self- and DWQ monitoring
- fish community indices (since many fish species are sensitive to copper)

**Issue #5: Eutrophication**

**Related Goals:** Human Health, Aquatic Habitat, Recreation, Aesthetics (general and drinking water)

**Waterbody Reference:** Falls Lake, Lake Rogers

**Potential Indicators:**

- chlorophyll *a* concentrations
- algal bloom frequency, including frequency of blue-green algal blooms
- phosphorus concentration
- NC Trophic State Index (combines chlorophyll *a*, nitrogen, and phosphorus concentrations)
- hydrilla cover in Lake Rogers
- land use changes in watershed, particularly ratio of areas in protective land uses (forest, agricultural land with BMPs, etc.) versus land use stressors (row crops without erosion control BMPs, dense residential/commercial development without stream buffers and stormwater detention, land area under active construction)

- summary and trends of point source load component on an annual basis
- acres of wetlands restored or preserved

The following issues, which were not in the Draft Neuse Basinwide Water Quality Management Plan, may also be important to local stakeholders.

**Issue #6: Taste, odor, and staining due to algae, manganese, turbidity, anoxic water**

**Related Goal:** Aesthetics of water supply

**Waterbody Reference:**

**Potential Indicators:**

- track any exceedances of Drinking Water Standards in water supply
- get reporting on any WTPs extraordinary actions needed to address poor source water conditions
- track customer complaints
- status of source water protection plan implementation

**Issue #7: Storage volume**

**Related Goal:** Water Supply Storage Capacity

**Waterbody Reference:** All water supply reservoirs

**Potential Indicators:**

- regular tracking of loss of storage volume (depth soundings?)
- annual sediment load

**Issue #8: Fecal Coliform**

**Related Goal:** Human Health, Recreation

**Waterbody Reference:**

**Potential Indicators:**

- exceedances of EPA criteria

**Issue #9: Toxic Organics**

**Related Goal:** Aquatic Habitat

**Waterbody Reference:** None known to date

**Potential Indicators:**

- uncontained spills
- fish tissue analysis should also be tracked to provide a summary indicator of status of bioaccumulative pollutants (organics, mercury) in the watershed.

**Issue #10: Water-linked Recreational and Resource Issues**

**Related Goals:** Recreation, General Aesthetics

**Waterbody Reference:**

**Potential Indicators:**

- acres of wetlands restored or preserved

### **Issue #11: Water Supply Issues**

**Related Goals:** Adequate Water Supply, Affordable Water Supply, Efficient Use of Available Supply

**Waterbody Reference:**

**Potential Indicators:**

- to be added

### ***Basinwide Issues Related to the Upper Neuse***

### **Issue #12: Nutrient Management (related to Pfiesteria and algal blooms)**

**Related Goals:** Aquatic Habitat and Human Health

**Waterbody Reference:** estuary

**Potential Indicator**

- reduction of nitrogen released from Falls Dam which is delivered to the estuary

### **Potential Approach Partnership Indicators**

The following are potential indicators to evaluate the success of the Upper Neuse Watershed Management Approach. These indicators are linked to the six approach goals.

#### **Goal #1. Address established water quality and water quantity issues and provide basis for setting priorities.**

**Potential Indicators:**

- indicators for issues 1-12 above

#### **Goal #2. Meet localized needs and basinwide objectives.**

**Potential Indicators:**

- indicators for issues 1-12 above
- percentage of local governments actively participating in the UNRBA

#### **Goal #3. Build a strong watershed management partnership through a consensus process.**

**Potential Indicators:**

- creation and use of the Technical Advisory Committee and Policy Coordinating Council (also relates to goal #4)
- creation and use of Partner Network and Partner Forum (also relates to goal #4)
- agreement on priority issues to work on together
- adoption of integrated management plan for the Upper Neuse
- degree of implementation of management plan

- percent impaired waters with TMDL strategies implemented
- number of contested permits
- number of litigated cases

**Goal #4. Improve the information base for decision making****Potential Indicators:**

- development and distribution of status report
- development of georeferenced data bases for the Upper Neuse
- development and application of water quality assessment tools
- development and application of tools to evaluate fiscal impact of different management strategies
- development and application of tools to measure cost-effectiveness of different management strategies
- percentage of stream miles and of lakes monitored and assessed
- percentage of water quality agency programs submitting information to the Upper Neuse Watershed Information Management Consortium

**Goal #5: Achieve long-term environmental and economic sustainability****Potential Indicators:**

- percentage of stream miles/lakes/aquifers supporting fully supporting use
- percentage of stream miles/lakes/aquifers with use threatened
- percentage of stream miles/lakes/aquifers not supporting use
- percentage of agricultural land with best management practices
- percentage of urbanized area with stormwater best management practices
- adequate water supply
- adequate wastewater treatment, discharge, and reuse capacity
- funding from local partners
- supplemental funding support

**Goal #6: Produce rational and achievable management strategies****Potential Indicators:**

- indicators for goal # 4
- degree of implementation of management plan

## *Appendix D*

# **UPPER NEUSE MANAGEMENT PLAN OUTLINE**

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### **Purpose and Audience**

The purposes of the watershed management plan are to:

- describe water quality and quantity goals and priorities adopted by watershed partners
- convey the scope and magnitude of water quality or quantity problems that have been identified as priority issues
- convey the sources of impacts and their relative contribution to the problem
- link management strategies to goals
- describe integrated management strategies and document the outcome or result of a coordinated effort (including assessment of expected change in water quality or quantity, fiscal impact and cost-effectiveness of alternative management strategies)
- provide innovative, cost-effective solutions to enhance watershed management.
- guide resources resource allocations for implementation
- build strong working relationships.

### **Contents**

(the following will be compiled in a user-friendly notebook format, and reported such that each jurisdiction or partner agency is able to easily see what it has committed to do and such that it is able to see how collective partners efforts are addressing the problems).

### **Introduction**

- Partners that developed the plan
- Purpose of the plan (include an explanation of the relationship of Upper Neuse Watershed planning to the state's basinwide planning process)
- Overview of the Upper Neuse Management Cycle (summary of steps taken to date and the cycle schedule for the future)
- What happens next

### **Upper Neuse Watershed Description**

- Brief description of Upper Neuse Watershed and its subwatersheds and a description of how the Upper Neuse relates to the Neuse basin.
- Description of local jurisdictions in the Upper Neuse
- Summary of water use classifications in the Upper Neuse
- What's wrong with the watershed: Brief overview of problemsheds in the Upper Neuse (including those unique to the Upper Neuse and those contributing to basinwide problems). Problems could include
  - human health
  - ecological health
  - recreation
  - non-drinking water supply uses

- Broad goals of the management plan (approach goals and broad resource protection and restoration goals). [The TAC recommends that the initial plan focus on the stakeholders' top three to five priorities.]
- What will happen if we do nothing? Why prepare a management plan.

## Upper Neuse Watershed Management Plan

- What are we trying to achieve?
  - Specific goals and objectives. Introduce indicators or measures of success in meeting goals.
- What are the options?
  - Description of ongoing management efforts and their relative effectiveness at reaching management goals and objectives.
  - Evaluation of alternative management strategies. Evaluation will include criteria established in the management approach, including but not limited to effectiveness in addressing water quality and water quantity priority problems; cost-effectiveness; fiscal impact; and overall feasibility to implement.
  - What's the best option and how can you help? Management strategies will be divided into general strategies that apply throughout the Upper Neuse watershed and targeted strategies which apply to local problemsheds within the Upper Neuse. For targeted areas, document
    - problem or issue statement
    - applicable goals and objectives
    - description of ongoing efforts
    - identified gaps and needs
    - action strategies including key participants
    - indicators and methods for tracking success
    - Who's going to do it (specifically)?
    - How will this be funded?
    - When will it be done? (Schedule for implementation)

## How Is this Different than Business as Usual?

### Future Issues and Challenges for the Upper Neuse

- Summarize issues not yet addressed or that partners anticipate addressing in the next iteration of the management cycle.
- Outline priorities for additional information collection during the next iteration.
- Describe challenges posed by continued population growth and land development.
- Describe (and encourage) ways to strengthen the planning and implementation capabilities in the next iteration.

## Appendices

- Data collection plan
- Detailed problem descriptions and characterizations
- Detailed assessment results

*Appendix E*

## **PROGRAM ACTIVITY GUIDE**

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**PHASE 1 - SCOPING**  
**Step 1 - Scan and summarize existing information**

Agency	Capabilities / Resources	Specific Roles / Activities	Products
<b>Upper Neuse River Basin Association</b>			
Association Board	<ul style="list-style-type: none"> <li>- coordination of local government scoping efforts</li> <li>- grant writing/funding</li> </ul>	<ul style="list-style-type: none"> <li>- bring local elected officials together</li> <li>- coordinate Technical Advisory Committee and technical consultants' scoping efforts</li> <li>- develop and provide interactive website</li> <li>- (Maybe) secure money for production and distribution of the Status Report</li> </ul>	<ul style="list-style-type: none"> <li>- list (bibliography) of available information</li> <li>- compilation of draft list of local government and SWCD issues</li> <li>- draft list of data/information gaps</li> <li>- funding</li> </ul>
Local governments	<ul style="list-style-type: none"> <li>· water and wastewater facilities planning documents</li> <li>· building permit activity/development trends</li> <li>· GIS data</li> <li>· report writing/editing</li> <li>· administration of local environmental advisory committees</li> </ul>	<ul style="list-style-type: none"> <li>· provide information about current land use and development trends</li> <li>· provide information from recent strategic plans and small area plans</li> <li>· provide water and wastewater facilities information</li> <li>· provide summaries of local monitoring assessments</li> </ul>	<ul style="list-style-type: none"> <li>· summary of existing land use</li> <li>· summary of individual local governments' monitoring assessments</li> <li>· summary of existing infrastructure management and needs</li> <li>· summary of trends and major plans for the area</li> </ul>

**PHASE 1 - SCOPING**  
**Step 1 - Scan and summarize existing information**

		<ul style="list-style-type: none"> <li>· identify issues</li> <li>· identify data/information gaps</li> </ul>	<ul style="list-style-type: none"> <li>· draft list of issues</li> <li>· description of areas where additional monitoring or data collection are needed</li> </ul>
Soil and Water Conservation Districts	<ul style="list-style-type: none"> <li>· knowledge of existing agricultural activities and best management practices</li> </ul>	<ul style="list-style-type: none"> <li>· summarize agricultural activities and conservation plans</li> <li>· identify issues</li> <li>· identify data/information gaps</li> </ul>	<ul style="list-style-type: none"> <li>· summary of agricultural activities and conservation plans</li> <li>· draft list of issues</li> <li>· description of areas where additional monitoring or data collection are needed</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· Geographic Information System</li> <li>· information collection/clearinghouse</li> <li>· technical support in land use planning and water resource management</li> <li>· cooperative relationship with local governments</li> </ul>	<ul style="list-style-type: none"> <li>· provide Upper Neuse River Basin base map</li> <li>· summarize information from available, in-house materials           <ul style="list-style-type: none"> <li>- Triangle Area Water Supply Monitoring Project summaries</li> <li>- wastewater discharges and NPDES limits</li> <li>- water supplies</li> <li>- water use</li> <li>- collection and</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>· base map</li> <li>· summary of existing water quality and consolidated land use</li> <li>· summary of consolidated land use plans</li> <li>· description of areas where additional monitoring or data collection are needed</li> </ul>

**PHASE 1 - SCOPING**  
**Step 1 - Scan and summarize existing information**

		<p>distribution systems</p> <ul style="list-style-type: none"> <li>- land use and land cover</li> <li>- land use plans</li> </ul> <ul style="list-style-type: none"> <li>· provide GIS support service for the Status Report</li> <li>· identify data/information gaps</li> </ul>	
Kerr Tar	<ul style="list-style-type: none"> <li>· interpretation of technical information for policy makers</li> </ul>	<ul style="list-style-type: none"> <li>· summarize information from available, in-house materials</li> <li>· identify issues</li> <li>· identify data/information gaps</li> </ul>	<ul style="list-style-type: none"> <li>· list of issues</li> <li>· description of areas where additional monitoring or data collection are needed</li> </ul>
<b>NC Division of Water Quality</b>	<ul style="list-style-type: none"> <li>· 305(b) reports of water quality conditions and use support ratings and 303(d) listing of impaired waters</li> <li>· 401 wetlands reports</li> <li>· most recent basinwide plan</li> <li>· state and federal regulatory and non-regulatory initiatives to protect water quality</li> <li>· natural resource GIS based information</li> </ul>	<ul style="list-style-type: none"> <li>· inventory existing DWQ assessed data/information</li> <li>· summarize 401 wetlands reports, where information is available</li> <li>· provide information</li> <li>· review status report</li> <li>· identify issues</li> <li>· identify data/information gaps</li> </ul>	<ul style="list-style-type: none"> <li>· description of areas where additional monitoring or data collection are needed</li> <li>· comments on draft Status Report to reflect DWQ issues and priorities</li> </ul>

**PHASE 1 - SCOPING**  
**Step 1 - Scan and summarize existing information**

	<ul style="list-style-type: none"> <li>- land cover such as forests and wetlands</li> <li>- Natural Heritage sites</li> </ul>		
<b>NC Public Water Supply</b>	<ul style="list-style-type: none"> <li>· source water assessment information (future)</li> </ul>	<ul style="list-style-type: none"> <li>· review status report</li> <li>· identify issues</li> <li>· identify data/information gaps</li> </ul>	<ul style="list-style-type: none"> <li>· description of areas where additional monitoring or data collection are needed</li> <li>· comments on draft Status Report to reflect PWS issues and priorities</li> </ul>
<b>NC Department of Transportation</b>	<ul style="list-style-type: none"> <li>· GIS data related to transportation projects</li> </ul>	<ul style="list-style-type: none"> <li>· provide GIS data layers for various aspects of transportation program</li> </ul>	<ul style="list-style-type: none"> <li>· GIS data of existing and planned roads and corridors</li> </ul>
<b>Cooperative Extension</b>	<ul style="list-style-type: none"> <li>· information about what citizens know and think about status of the Neuse Basin</li> <li>· facilitation</li> <li>· information about agricultural inputs and practices</li> </ul>	<ul style="list-style-type: none"> <li>· summarize agricultural inputs per acre</li> </ul>	<ul style="list-style-type: none"> <li>· summarize statements of public perceptions</li> <li>· summarize agricultural input in upper basin</li> </ul>
<b>Homebuilders Association, Neuse River Foundation, and other interest groups</b>		<ul style="list-style-type: none"> <li>· participate in public discussion of basin status, issues, and information gaps</li> </ul>	

**PHASE 1 - SCOPING**  
**Step 2 - Establish basin goals and priorities**

Agency	Capabilities / Resources	Specific Roles / Activities	Products
<b>Upper Neuse River Basin Association</b>			
Association Board	<ul style="list-style-type: none"> <li>· local government outreach</li> <li>· public outreach</li> </ul>	<ul style="list-style-type: none"> <li>· provide forum for local officials</li> <li>· conduct educational programs and workshops</li> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· summary of local official priority list</li> <li>· priority list</li> </ul>
Local governments	<ul style="list-style-type: none"> <li>· support public meeting facilitation</li> <li>· </li> </ul>	<ul style="list-style-type: none"> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
Soil and Water Conservation Districts		<ul style="list-style-type: none"> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· facilitation</li> <li>· meeting space</li> </ul>	<ul style="list-style-type: none"> <li>· support public input and meeting facilitation</li> <li>· compile and summarize public prioritization input solicited from partner agencies</li> <li>· participate in issue</li> </ul>	<ul style="list-style-type: none"> <li>· summary of public input/priorities</li> <li>· priority list</li> </ul>

**PHASE 1 - SCOPING**  
**Step 2 - Establish basin goals and priorities**

		review/ranking process	
Kerr Tar	<ul style="list-style-type: none"> <li>· facilitation</li> </ul>	<ul style="list-style-type: none"> <li>· support public input and meeting facilitation</li> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
<b>NC Division of Water Quality</b>		<ul style="list-style-type: none"> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
<b>NC Public Water Supply</b>		<ul style="list-style-type: none"> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
<b>NC Department of Transportation</b>		<ul style="list-style-type: none"> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
<b>Cooperative Extension</b>		<ul style="list-style-type: none"> <li>· participate in issue review/ranking process</li> </ul>	<ul style="list-style-type: none"> <li>· priority list</li> </ul>
<b>Homebuilders Association, Neuse River Foundation, and other interest groups</b>		<ul style="list-style-type: none"> <li>· support public input</li> <li>· participate in public discussion of basin status, issues, and information gaps</li> </ul>	

**PHASE 2 - ASSESSMENT**  
**Step 3 - Develop and implement strategic data collection plans**

Agency	Capabilities / Resources	Specific Roles / Objectives	Products
<b>Upper Neuse River Basin Association</b>			
Association Board		<ul style="list-style-type: none"> <li>· coordinate development of strategic data collection plan</li> </ul>	<ul style="list-style-type: none"> <li>· strategic data collection plan</li> </ul>
Local governments	<ul style="list-style-type: none"> <li>· monitoring plan design</li> </ul>	<ul style="list-style-type: none"> <li>· assist in developing and implementing strategic information collection plans</li> </ul>	<ul style="list-style-type: none"> <li>· data/information regarding land use</li> </ul>
Soil and Water Conservation Districts	<ul style="list-style-type: none"> <li>· information on agricultural practices</li> <li>· identification of rural areas with highest potential for water quality impacts</li> </ul>	<ul style="list-style-type: none"> <li>· survey agricultural activities</li> <li>· identify streambank problems</li> </ul>	<ul style="list-style-type: none"> <li>· listing/mapping of agricultural activities</li> <li>· description of streambank problem areas</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· examples of other areas' monitoring plans</li> <li>· compiled information about ongoing monitoring programs in the Upper Neuse</li> <li>· hardware and software for</li> </ul>	<ul style="list-style-type: none"> <li>· serve as clearinghouse on existing monitoring activities in the Upper Neuse Basin</li> </ul>	

**PHASE 2 - ASSESSMENT**  
**Step 3 - Develop and implement strategic data collection plans**

	<ul style="list-style-type: none"> <li>· data management</li> <li>· technical assistance</li> </ul>		
Kerr Tar	<ul style="list-style-type: none"> <li>· benchmark design and assessment</li> </ul>	<ul style="list-style-type: none"> <li>· develop benchmarks</li> </ul>	<ul style="list-style-type: none"> <li>· growth and development benchmarks</li> </ul>
NC Division of Water Quality	<ul style="list-style-type: none"> <li>· expertise in monitoring plan design</li> <li>· methodology for identification of “streams”</li> <li>· expertise in assessing riparian and wetlands data for identification of degraded areas</li> </ul>	<ul style="list-style-type: none"> <li>· provide standardized assessment methodologies</li> <li>· assist in designing monitoring plan</li> <li>· collect water quality data (physical, chemical, biological) as part of basinwide assessment</li> <li>· collect, compile, and summarize riparian and wetlands data, including identifying degraded areas and impacts</li> <li>· assist in compiling existing GIS resource coverages and digitize other available natural resource data</li> <li>· use GIS to evaluate land use/land cover, current uses of degraded wetlands, use support ratings</li> </ul>	<ul style="list-style-type: none"> <li>· standardized protocols for monitoring and assessment</li> </ul>

**PHASE 2 - ASSESSMENT**  
**Step 3 - Develop and implement strategic data collection plans**

<b>NC Public Water Supply</b>			
<b>NC Department of Transportation</b>		<ul style="list-style-type: none"><li>· assist in developing strategic data collection plan</li></ul>	
<b>Cooperative Extension</b>		<ul style="list-style-type: none"><li>· assist in developing strategic data/information collection plan</li></ul>	

**PHASE 2 - ASSESSMENT**  
**Step 4 - Analyze information; quantify impacts and sources**

Agency	Capabilities / Resources	Specific Roles / Objectives	Products
<b>Upper Neuse River Basin Association</b>			
Association Board			
Local governments	<ul style="list-style-type: none"> <li>· land use statistics</li> <li>· census information analysis</li> <li>· population and employment projections</li> <li>· population/growth trend analysis</li> <li>· Monitoring and Data Analysis (lake and stream ambient water quality)</li> <li>· Triangle Transit Authority regional growth projections</li> <li>· water sampling</li> <li>· field technicians</li> <li>· database management</li> <li>· consultant services</li> </ul>	<ul style="list-style-type: none"> <li>· assess changes in land use and land cover</li> <li>· assess effectiveness of local sedimentation and erosion control programs</li> <li>· assess effectiveness of local stormwater management practices</li> <li>· conduct special studies</li> <li>· limited sharing of consultant services/analysis</li> </ul>	<ul style="list-style-type: none"> <li>· document summarizing land use changes, trends, adoption and effectiveness of local best management practices</li> </ul>
Soil and Water Conservation Districts	<ul style="list-style-type: none"> <li>· evaluation of agricultural practices</li> <li>· evaluation of rural areas with highest potential for</li> </ul>	<ul style="list-style-type: none"> <li>· assess and characterize agricultural activities</li> <li>· assess potential for reduction in pollutants from</li> </ul>	<ul style="list-style-type: none"> <li>· report on agricultural activities and potential for pollutant reduction</li> <li>· inventory of stream</li> </ul>

**PHASE 2 - ASSESSMENT**  
**Step 4 - Analyze information; quantify impacts and sources**

	water quality impacts	agricultural sources <ul style="list-style-type: none"> <li>· assess and characterize farms with adequate buffers and adoption of adequate best management practices (and farms which may be affected by rules)</li> <li>· identify areas with highest potential for water quality impacts</li> </ul>	buffer/problem needs in rural areas
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· historical comparisons</li> <li>· GIS system/coverages for evaluation land use data</li> </ul>	<ul style="list-style-type: none"> <li>· serve as information resource for assessment of impacts and sources of impacts</li> <li>· provide GIS support</li> <li>· assist in quality assurance/quality control of assessment</li> </ul>	
Kerr Tar	<ul style="list-style-type: none"> <li>· land use evaluation</li> <li>· growth trends</li> <li>· economic development projections</li> <li>· benchmark assessment</li> </ul>	<ul style="list-style-type: none"> <li>· assist in gauging benchmarks regarding growth and development trends</li> <li>· assist in conducting</li> </ul>	

**PHASE 2 - ASSESSMENT**  
**Step 4 - Analyze information; quantify impacts and sources**

		economic development analysis and projections	
<b>NC Division of Water Quality</b>	<ul style="list-style-type: none"> <li>· water quality assessment</li> <li>· habitat assessment</li> <li>· development and application of water quality modeling tools</li> </ul>	<ul style="list-style-type: none"> <li>· conduct assessments of water quality data, stream habitat and wetlands data as a part of basinwide assessment</li> <li>· analyze riparian and wetland data to identify degraded areas</li> <li>· update 305(b) report on water quality conditions</li> <li>· update 303(d) list on impaired waters</li> <li>· conduct modeling to characterize conditions</li> <li>· conduct special studies</li> <li>· establish Total Maximum Daily Load (TMDL) water quality targets</li> <li>· produce basin wide assessment report</li> <li>· assist in quality assurance/quality control</li> </ul>	<ul style="list-style-type: none"> <li>· 305(b) report</li> <li>· 303(d) list</li> <li>· Neuse Basinwide Assessment Report</li> </ul>
<b>NC Public Water Supply</b>			

**PHASE 2 - ASSESSMENT**  
**Step 4 - Analyze information; quantify impacts and sources**

<b>NC Department of Transportation</b>			
<b>Cooperative Extension</b>	<ul style="list-style-type: none"><li>· design and hosting of focus group meetings to gauge public perceptions</li><li>· evaluation of nonpoint sources and of best management practice</li></ul>	<ul style="list-style-type: none"><li>· analysis of agricultural inputs and practices</li><li>· possible on-site septic impacts investigations</li><li>· evaluation of no-till/conservation field demonstration projects (buffer treatment of runoff and soil loss)</li><li>· evaluation of agricultural inputs/acres</li><li>· evaluation of nitrogen movement</li></ul>	<ul style="list-style-type: none"><li>· summary of agricultural inputs</li><li>· report on BMP effectiveness for agriculture and stormwater</li><li>· explanation of nitrogen movement</li></ul>

**PHASE 3 - SETTING PRIORITIES**  
**Step 5 - Identify priorities in subwatersheds and Step 6 - Target management efforts**

Agency	Capabilities / Resources	Specific Roles / Activities	Products
<b>Upper Neuse River Basin Association</b>			
Association Board	<ul style="list-style-type: none"> <li>· facilitation</li> <li>· coordination of local efforts</li> </ul>	<ul style="list-style-type: none"> <li>· solicit input on draft priority list from local government officials and the Policy Coordinating Council</li> <li>· assist in conducting public meetings to get feedback on draft priority list</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· compilation of responses</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>
Local governments	<ul style="list-style-type: none"> <li>· facilitation of public meeting to review draft priority list</li> <li>· survey design</li> <li>· group contacts</li> </ul>	<ul style="list-style-type: none"> <li>· assist in conducting public meetings to solicit input on draft priority problem/issue list</li> <li>· assist in designing and conducting surveys</li> <li>· work to develop subwatershed or area agreement on problem priorities</li> <li>· participate in selection of areas to jointly target</li> </ul>	<ul style="list-style-type: none"> <li>· feedback on problem/issue priorities for Upper Neuse Basin and its subwatersheds</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>

## **PHASE 3 - SETTING PRIORITIES**

### **Step 5 - Identify priorities in subwatersheds and Step 6 - Target management efforts**

		management efforts	
Soil and Water Conservation Districts	<ul style="list-style-type: none"> <li>· contacts in farm community</li> </ul>	<ul style="list-style-type: none"> <li>· solicit input from the farm community on the draft priority list (for Ag BMP implementation)</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· compilation of public responses</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· report preparation</li> <li>· facilitation support</li> <li>· meeting space</li> <li>· survey design</li> </ul>	<ul style="list-style-type: none"> <li>· apply prioritization method to develop draft list</li> <li>· design and help conduct survey to get input on draft list</li> <li>· provide facilitation support at meetings to solicit input</li> <li>· provide meeting space</li> <li>· summarize compiled survey results in report</li> <li>· provide information from other areas to refine prioritization method/criteria as needed</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· draft list of priority issues and areas</li> <li>· survey instrument</li> <li>· survey findings report</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>

## **PHASE 3 - SETTING PRIORITIES**

### **Step 5 - Identify priorities in subwatersheds and Step 6 - Target management efforts**

Kerr Tar	<ul style="list-style-type: none"> <li>· facilitation</li> </ul>	<ul style="list-style-type: none"> <li>· conduct focus group meetings</li> <li>· assist in conducting survey</li> <li>· compile survey results</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· compilation of public responses</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>
NC Division of Water Quality	<ul style="list-style-type: none"> <li>· information about state and federal regulatory and nonregulatory priorities and initiatives</li> <li>· contacts with numerous groups working in the basin</li> <li>· criteria for prioritizing wetlands and riparian areas for restoration</li> <li>· methodology for assessing water quality functions in the Piedmont through interpretation of landsat, soils, and hydrology data</li> <li>· methodology for assessing the status of stream habitat</li> </ul>	<ul style="list-style-type: none"> <li>· survey various appropriate units within DWQ</li> <li>· survey Upper Neuse Nonpoint Source Workgroup and Team, Neuse Stormwater Team</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· compilation of responses</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>
NC Public Water Supply	<ul style="list-style-type: none"> <li>· information on state or federal regulatory requirements or initiatives</li> </ul>	<ul style="list-style-type: none"> <li>· support public review of draft priority list</li> <li>· participate in selection of areas to jointly target</li> </ul>	<ul style="list-style-type: none"> <li>· issues/areas for jointly targeting management efforts</li> </ul>

## **PHASE 3 - SETTING PRIORITIES**

### **Step 5 - Identify priorities in subwatersheds and Step 6 - Target management efforts**

		management efforts	
<b>NC Department of Transportation</b>		<ul style="list-style-type: none"> <li>· assist in applying prioritization method/criteria to develop draft priority list</li> <li>· solicit input on draft list from the Statewide planning &amp; Environmental Branches (of DOT) as related to transportation issues in the basin</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· draft priority list</li> <li>· compilation of DOT responses to draft list</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>
<b>Cooperative Extension</b>	<ul style="list-style-type: none"> <li>· survey design</li> <li>· facilitation</li> </ul>	<ul style="list-style-type: none"> <li>· create survey tool for evaluating draft priority list</li> <li>· facilitate meetings among local stakeholders</li> <li>· participate in selection of areas to jointly target management efforts</li> </ul>	<ul style="list-style-type: none"> <li>· survey instrument</li> <li>· compilation of survey responses/results</li> <li>· issues/areas for jointly targeting management efforts</li> </ul>
<b>Homebuilders Association, Neuse River Foundation, and other interest groups</b>		<ul style="list-style-type: none"> <li>· participate in discussions and surveys about priorities</li> </ul>	

**PHASE 4 - EVALUATING AND SELECTING STRATEGIES**  
**Step 7 - Develop and assess management strategies**

Agency	Capabilities / Resources	Specific Roles / Objectives	Products
<b>Upper Neuse River Basin Association</b>			
Association Board	<ul style="list-style-type: none"> <li>· funding for assessment</li> </ul>	<ul style="list-style-type: none"> <li>· assist in creating scope of assessment</li> <li>· assist in screening strategies to assess</li> </ul>	<ul style="list-style-type: none"> <li>· scope of work</li> <li>· list of high priority strategies to assess</li> </ul>
Local governments		<ul style="list-style-type: none"> <li>· assist in screening strategies to assess</li> <li>· review draft assessments; provide technical assistance</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> </ul>
Soil and Water Conservation Districts	<ul style="list-style-type: none"> <li>· technical assistance</li> <li>· cost share</li> <li>· contacts with farmers</li> <li>· existing conservation plans</li> </ul>	<ul style="list-style-type: none"> <li>· assist in screening agricultural and erosion control best management practices to assess</li> <li>· assist in conducting assessment</li> <li>· review draft assessments</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> <li>· portions of assessment report</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· knowledge of professional planning principles and techniques</li> <li>· technical assistance</li> </ul>	<ul style="list-style-type: none"> <li>· assist in screening strategies to assess</li> <li>· provide technical assistance in conducting</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> </ul>

**PHASE 4 - EVALUATING AND SELECTING STRATEGIES**  
**Step 7 - Develop and assess management strategies**

resources)	<ul style="list-style-type: none"> <li>· GIS analysis and mapping</li> <li>· information/data support for assessing strategies</li> </ul>	<ul style="list-style-type: none"> <li>assessment</li> <li>· provide GIS support and mapping</li> <li>· serve as information source in assessment of effectiveness of alternative management strategies</li> <li>· provide quality assurance/quality control of assessment report</li> </ul>	
Kerr Tar	<ul style="list-style-type: none"> <li>· knowledge of professional planning principles and techniques</li> </ul>	<ul style="list-style-type: none"> <li>· assist in screening strategies to assess</li> <li>· provide quality assurance/quality control regarding professional planning principles</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> </ul>
<b>NC Division of Water Quality</b>	<ul style="list-style-type: none"> <li>· information about existing state and federal requirements that will serve as the EMC's minimum standard</li> <li>· information about effectiveness of approaches tried by state</li> <li>· model plans (e.g., for achieving N reductions in</li> </ul>	<ul style="list-style-type: none"> <li>· help ensure that strategies meet existing regulatory requirements</li> <li>· assist in quality assurance/quality control of strategy assessment report</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> <li>· comments on strategies assessment report</li> </ul>

**PHASE 4 - EVALUATING AND SELECTING STRATEGIES**  
**Step 7 - Develop and assess management strategies**

	urban areas)		
<b>NC Public Water Supply</b>	<ul style="list-style-type: none"> <li>· knowledge of large scale source water protection strategies</li> </ul>	<ul style="list-style-type: none"> <li>· assist in screening source water protection strategies to assess</li> <li>· assist in providing qualitative assessment</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> <li>· comments on strategies assessment report</li> </ul>
<b>NC Department of Transportation</b>		<ul style="list-style-type: none"> <li>· help screen potential strategies for manageability and effectiveness</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> <li>· comments on strategy assessment report</li> </ul>
<b>Cooperative Extension</b>		<ul style="list-style-type: none"> <li>· assist in screening strategies to assess</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority strategies to assess</li> </ul>
<b>Homebuilders Association, Neuse River Foundation, and other interest groups</b>		<ul style="list-style-type: none"> <li>· participate in discussions which screen management strategies to assess</li> <li>· comment on strategies assessment report</li> </ul>	<ul style="list-style-type: none"> <li>· list of high priority management strategies to assess</li> <li>· compiled comments on strategies assessment report</li> </ul>

**PHASE 4 - EVALUATING AND SELECTING STRATEGIES**  
**Step 8 - Document specific management actions and responsibilities**

Agency	Capabilities / Resources	Specific Roles / Objectives	Products
<b>Upper Neuse River Basin Association</b>			
Association Board	<ul style="list-style-type: none"> <li>· coordination</li> <li>· outreach</li> <li>· funding</li> </ul>	<ul style="list-style-type: none"> <li>· assist in creating scope of management plan</li> <li>· use existing funds and secure additional funds for plan development</li> <li>· work with consultants to keep efforts focused on scope and priorities</li> <li>· coordinate input from public agencies</li> <li>· coordinate public input</li> <li>· brief elected officials</li> <li>· support efforts to local and state adoption of plan</li> </ul>	<ul style="list-style-type: none"> <li>· scope of work</li> <li>· funding</li> <li>· draft plan</li> <li>· compiled comments</li> <li>· final plan</li> </ul>
Local governments		<ul style="list-style-type: none"> <li>· provide comments on draft plan</li> <li>· soliciting public input on draft plan</li> <li>· briefing of and soliciting comments from local boards and commissions</li> </ul>	<ul style="list-style-type: none"> <li>· summary of comments</li> </ul>

**PHASE 4 - EVALUATING AND SELECTING STRATEGIES**  
**Step 8 - Document specific management actions and responsibilities**

		<ul style="list-style-type: none"> <li>· seek local board plan approval</li> </ul>	
Soil and Water Conservation Districts		<ul style="list-style-type: none"> <li>· involve Districts in developing action plan strategy</li> <li>· help develop agricultural portion of the plan</li> </ul>	<ul style="list-style-type: none"> <li>· targeted activities and areas</li> <li>· agricultural action plan strategies</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· technical assistance</li> <li>· GIS support (mapping and analysis)</li> <li>· information resource</li> <li>· public outreach</li> <li>· knowledge of professional planning principles</li> </ul>	<ul style="list-style-type: none"> <li>· assist in drafting plan</li> <li>· provide GIS support</li> <li>· provide quality assurance/quality control during plan development</li> <li>· solicit public input</li> </ul>	
Kerr Tar	<ul style="list-style-type: none"> <li>· public outreach</li> <li>· facilitation</li> <li>· knowledge of professional planning principles</li> </ul>	<ul style="list-style-type: none"> <li>· facilitate public meetings to solicit public input</li> <li>· support efforts for local adoption of plan</li> </ul>	
<b>NC Division of Water Quality</b>	<ul style="list-style-type: none"> <li>· access to state and federal grants and funding</li> </ul>	<ul style="list-style-type: none"> <li>· participate in drafting plan to ensure that it meets all existing regulatory requirements</li> <li>· identify and coordinate</li> </ul>	<ul style="list-style-type: none"> <li>· comments on draft plan</li> <li>· Upper Neuse Plan which is approved by the EMC and incorporated into basinwide plan</li> </ul>

**PHASE 4 - EVALUATING AND SELECTING STRATEGIES**  
**Step 8 - Document specific management actions and responsibilities**

		<p>funding opportunities that may help fund implementation of management actions</p> <ul style="list-style-type: none"> <li>· upon local and state adoption of plan, incorporate into Neuse Basinwide Plan</li> </ul>	
NC Public Water Supply		<ul style="list-style-type: none"> <li>· comment on draft plan</li> </ul>	
NC Department of Transportation		<ul style="list-style-type: none"> <li>· comment on draft plan</li> </ul>	
Cooperative Extension	<ul style="list-style-type: none"> <li>· public outreach</li> <li>· meeting space</li> </ul>	<ul style="list-style-type: none"> <li>· host meetings and workshops to present information and collect input</li> </ul>	<ul style="list-style-type: none"> <li>· compiled public comments</li> </ul>
Homebuilders Association, Upper Neuse Foundation, and other interest groups		<ul style="list-style-type: none"> <li>· participate in plan development</li> <li>· participate in discussions about draft plan</li> </ul>	

**PHASE 5 - IMPLEMENTATION**  
**Step 9 - Finalize and implement action plans**

Agency	Capabilities / Resources	Specific Roles / Activities	Products
<b>Upper Neuse River Basin Association</b>			
Association Board	<ul style="list-style-type: none"> <li>· public education</li> <li>· elected officials' briefings</li> <li>· grant writing/funding</li> </ul>	<ul style="list-style-type: none"> <li>· keep elected officials informed</li> <li>· conduct public outreach efforts to maximize citizens' and business involvement in plan implementation</li> <li>· assist in securing funding for restoration and protection projects</li> </ul>	
Local governments	<ul style="list-style-type: none"> <li>· land use regulations (e.g., zoning)</li> <li>· local stormwater management programs</li> <li>· development guidelines and policies</li> <li>· site design review</li> <li>· sedimentation and erosion control programs</li> <li>· local funding (Capitol Improvements Program Plan, potential funding for</li> </ul>	<ul style="list-style-type: none"> <li>· modify local land use regulations to reflect adopted plan</li> <li>· administer development and design policies to reflect adopted plan</li> <li>· eliminate illicit discharges and illegal disposal</li> <li>· conduct industrial stormwater inspections</li> <li>· modify local stormwater program or plan to reflect</li> </ul>	Indicators Report

**PHASE 5 - IMPLEMENTATION**  
**Step 9 - Finalize and implement action plans**

	<p>Ag BMPs)</p> <ul style="list-style-type: none"> <li>· grant writing</li> <li>· education</li> </ul>	<p>adopted UNRB plan</p> <ul style="list-style-type: none"> <li>· develop annual budgets and CIPs to reflect commitments in adopted plan</li> <li>· write grants to secure funds for protection and restoration projects</li> <li>· provide local assistance and outreach to groups not involved in plan development process</li> </ul>	
Soil and Water Conservation Districts	<ul style="list-style-type: none"> <li>· technical assistance</li> <li>· contracts with farmers</li> <li>· conservation plans</li> <li>· cost share funds</li> </ul>	<ul style="list-style-type: none"> <li>· implement program in local farm communities</li> <li>· target cost share funds to plan's priority areas</li> </ul>	<ul style="list-style-type: none"> <li>· Indicators Report</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· technical assistance</li> </ul>	<ul style="list-style-type: none"> <li>· assist in developing grant proposals for restoration or protection projects</li> <li>· provide technical assistance in drafting or revising local ordinances</li> <li>· provide assistance in non-regulatory action plan components</li> </ul>	

**PHASE 5 - IMPLEMENTATION**  
**Step 9 - Finalize and implement action plans**

Kerr Tar	<ul style="list-style-type: none"> <li>· technical assistance</li> <li>· data collection and interpretation</li> </ul>	<ul style="list-style-type: none"> <li>· if funded, could provide technical assistance to local governments and local groups</li> <li>· if funded, could collect and interpret data</li> </ul>	
<b>NC Division of Water Quality</b>	<ul style="list-style-type: none"> <li>· wetlands and riparian area restoration</li> <li>· access to state and federal grants and funding</li> </ul>	<ul style="list-style-type: none"> <li>· assist in implementing cost-effective wetland/riparian restoration in areas of high priority to UNRB partners priorities</li> <li>· identify and coordinate funding opportunities to help implement management plan</li> <li>· assist in developing grants for wetlands and riparian restoration</li> <li>· work with UNRB partners to find best ways to meet any future federal/state water quality mandates</li> </ul>	
<b>NC Public Water Supply</b>			
<b>NC Department of Transportation</b>		<ul style="list-style-type: none"> <li>· take lead role in effective implementation related to</li> </ul>	

**PHASE 5 - IMPLEMENTATION**  
**Step 9 - Finalize and implement action plans**

		transportation program · demonstrate useful practices of the program	
<b>Cooperative Extension</b>	· outreach and education · network of local contacts	· disseminate information to affected parties (farmers, landscape contractors, grounds crews, etc.) and the general public · establish demonstration sites to teach effectiveness of management activities	
<b>Homebuilders Association, Neuse River Foundation, and other interest groups</b>		· help disseminate information to maximize citizens' and business involvement in plan implementation	

**PHASE 5 - IMPLEMENTATION**  
**Step 10 - Monitor indicators**

Agency	Capabilities / Resources	Specific Roles / Objectives	Products
<b>Upper Neuse River Basin Association</b>			
Association Board		<ul style="list-style-type: none"> <li>· begin evaluating plan and suggesting revisions or gaps to address in next five year cycle</li> </ul>	<ul style="list-style-type: none"> <li>· portions of Indicators Report</li> </ul>
Local governments	<ul style="list-style-type: none"> <li>· water quality monitoring (chemical, physical, and biological)</li> <li>· database management</li> </ul>	<ul style="list-style-type: none"> <li>· develop tracking system to monitoring implementation of plan and indicators</li> <li>· monitor plan adoption and water resource indicators tied to management actions</li> </ul>	<ul style="list-style-type: none"> <li>· portions of Indicators Report</li> </ul>
Soil and Water Conservation Districts		<ul style="list-style-type: none"> <li>· measure adoption by farm communities</li> </ul>	<ul style="list-style-type: none"> <li>· portions of Indicators Report</li> </ul>
<b>Councils of Government</b>			
Triangle J (some activities listed would require additional resources)	<ul style="list-style-type: none"> <li>· information management services</li> </ul>	<ul style="list-style-type: none"> <li>· track indicators</li> <li>· track baseline information</li> <li>· examine land use and water quality/quantity management strategy efforts</li> </ul>	<ul style="list-style-type: none"> <li>· portions of Indicators Report</li> </ul>

**PHASE 5 - IMPLEMENTATION**  
**Step 10 - Monitor indicators**

Kerr Tar		<ul style="list-style-type: none"> <li>· assist in tracking local compliance with adopted plan</li> </ul>	
NC Division of Water Quality		<ul style="list-style-type: none"> <li>· assist in monitoring implementation activities</li> </ul>	
NC Public Water Supply			
NC Department of Transportation		<ul style="list-style-type: none"> <li>· monitor implementation of transportation aspects of plan</li> </ul>	
Cooperative Extension	<ul style="list-style-type: none"> <li>· outreach and education</li> <li>· network of local contacts</li> </ul>	<ul style="list-style-type: none"> <li>· disseminate information to affected parties (farmers, landscape contractors, grounds crews, etc.) and the general public</li> </ul>	
Homebuilders Association, Neuse River Foundation, and other interest groups		<ul style="list-style-type: none"> <li>· help disseminate information about the Indicator Report</li> </ul>	