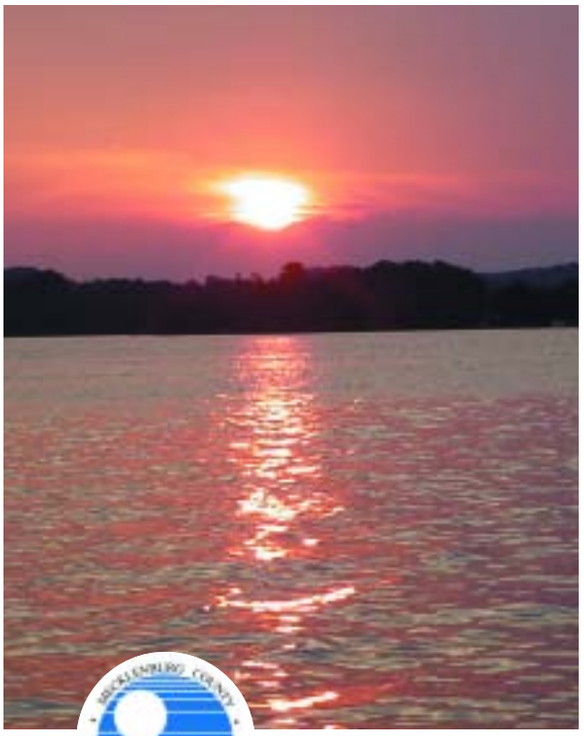

# Protecting Water Quality In Our Lakes

**Mecklenburg County, North Carolina**

**A Practical Guide For Protecting Water Quality Conditions In Our Lakes**

2005

# Protecting Water Quality In Our Lakes

A practical guide for protecting water quality conditions in our lakes and related regulations for homeowners in Mecklenburg County, N.C.

*Construction of Mountain Island Dam, September 12, 1923.*

*Prepared by:*

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Photos on cover and back depict scenery along the Catawba River.

Photos by David Buetow, The Trust For Public Land, Steve Jadlocki, Rusty Rozzelle and Duke Power.

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"Treat the earth well. It was not given to you by your parents. It was loaned to you by your children." Kenyan Proverb

Lakes have a special allure that draw people to their shores. They provide beautiful scenery and wonderful recreational opportunities like boating, fishing and swimming. In the past decade, Mecklenburg County has experienced an escalated demand for property near and along our lakes. As people have relocated to the area, businesses have flourished and infrastructure has been built to support the development boom. All of this growth has led to increased pressure on the quality of water in our lakes and their connecting creeks. Proximity to our precious waters gives lake residents a special opportunity, if not responsibility, to have a positive impact on water quality. Accepting this responsibility helps protect the water and adjacent land for your enjoyment as well as that of other residents and future generations.

This booklet is intended for residents who own property and/or live within a lake watershed in Mecklenburg County. It provides valuable information about laws and regulations pertinent to lake-area living. In addition, it gives advice on how to maintain a lifestyle that has a low impact on the water and the environment in general. Take the time to read through this booklet and you may find the answers to some of your questions and perhaps learn something you did not know.

# Protecting Water Quality... What's In It For You?

Consider some of the important reasons to help protect the quality of our lakes and creeks in Mecklenburg County:

### Your Health

- With Lake Norman and Mountain Island Lake being the sources for our drinking water, we do not want to ever run the risk of producing more contamination than the water treatment technology can handle.
- High bacteria levels put swimmers and other lake recreationists at risk of eye and ear infections. Children and elderly are especially susceptible to bacterial infections.

### Your Quality Of Life

An attractive lake offering an assortment of recreational activities improves our quality of life. Without clean, healthy waters, lake residents and visitors alike cannot enjoy these activities to the fullest. Protecting our lakes maintains our quality of life.

### Economics

- Let's face it: poor water quality affects your wallet (or purse). People are drawn to live near beautiful, clean lakes and creeks - not unsightly, dirty waters. For obvious reasons, property values are higher in areas in high demand. Polluted waters can quickly ruin an area's appeal.
- Polluted water is more expensive to treat and may result in an increased water bill.
- Recreational water opportunities attract visitors and residents to lake amenities, contributing to the local economy.

### Fish And Wildlife

Given that fish and other aquatic wildlife spend all (or most) of their time in the water, pollution has a great impact on their health. Most organisms are adapted to a particular habitat and water quality level, so even small amounts of pollution or changes in the surrounding environment can have a negative effect.

*Canoeing is a favorite recreational activity enjoyed on Mountain Island Lake.*

### We're All Downstream

Lake Norman, Mountain Island Lake and Lake Wylie, are all part of the Catawba River system (see page 19). As with any waterway, what happens upstream in the system impacts the water and people downstream. The Catawba River system is comprised of 11 hydropower reservoirs, starting with Lake James at the foot of the Blue Ridge Mountains and leading down to Lake Wateree in central South Carolina. Smaller rivers and creeks also flow into the river's main stem.

Altogether, the Catawba River basin covers over 4,750 square miles in 12 counties and has nearly 3,100 miles of free-flowing rivers and creeks. With over 1.5 million residents living within this basin, it is one of the most densely populated river basins in North Carolina. Just as those who live upstream of Mecklenburg County impact the water quality flowing into our area, we impact the water quality flowing out of our area. This is the same water that downstream residents rely on for drinking, swimming, fishing, and a variety of other uses.

Quite naturally, families and businesses located directly along the Catawba River lakes and creeks have the greatest potential for impacting the water supply given their proximity. For this reason, lakeshore and creekside residents must be especially mindful of how they can affect the water nearby...and downstream.

*Lake Norman is the largest man-made lake in North Carolina.*

## Watershed Management

Past efforts to reduce pollution have focused more on factories than subdivisions. After all, it is easier to regulate an industrial site than to track down the neighbor whose excessively applied fertilizer washed off into the lake. That is why for years, regulations were directed more at "point source" pollution, meaning the pollutant discharges into the water by a direct route from an identifiable source, like industrial plants and wastewater treatment facilities. Yet we now know that land development activities (subdivisions, apartment complexes, shopping malls, etc.) account for a great deal of water pollution, too. Fertilizers and pesticides applied to lawns, oil, antifreeze and other chemicals dripped onto parking lots, and metals deposited along roadways from tire and automobile wear are picked up by storm water runoff and carried to nearby streams and lakes causing water quality degradation. Nationwide it is estimated that 50% of water quality degradation is caused by pollution carried by storm water runoff from developed areas, which is called "non-point source" pollution because it does not originate from a fixed location. Much of today's focus is on managing or controlling this non-point source pollution through a concept called watershed management.

For a particular body of water, a watershed (or drainage basin) is the surrounding land area that drains into that body of water. For a lake, rain water may first drain to a stream within a watershed that then flows into the lake. On its way, water travels across farm fields, forested land, suburban lawns, parking lots and city streets and picks up a variety of non-point source pollutants. Reducing the non-point source pollutants by addressing individual behaviors that impact the environment is a vital aspect of watershed management. Later in this booklet, you will find tips on what you can do to help.

## Mecklenburg County Lake Watersheds

The entire western border of Mecklenburg County is comprised of 194 miles of shoreline in three (3) of the 11 lakes in the Catawba River system, including Lake Norman, Mountain Island Lake and Lake Wylie. Provided below is general information concerning these lakes.

### Lake Norman Watershed

- Lake Norman is located along the northwestern border of Mecklenburg County.
- Largest man-made lake in North Carolina.
- Drinking water source for Mooresville, Mecklenburg County and Lincoln County.
- Approximately 20 million gallons of water are withdrawn daily to serve Mecklenburg County.
- Supports a wide variety of aquatic life, including large fish populations.
- Total surface area of 32,510 acres.
- Individual watershed encompasses 340 square miles.
- Total drainage area including all lake and river watersheds upstream is 1,790 square miles.
- Approximately 520 miles of shoreline, with an estimated 90 miles in Mecklenburg County.

Currently, Lake Norman has the best water quality of the three lakes in Mecklenburg County. In the past, the watershed had a fairly low population density and a large percentage of wooded and open space, which are significant factors contributing toward its good quality. However, this has changed. Growth pressures within Lake Norman's watershed continue to threaten the water quality and the lake's main uses such as drinking water and recreation.

*Charlotte-Mecklenburg Utilities' water intake on Mountain Island Lake.*

## Mountain Island Lake Watershed

- Smallest of the three (3) lakes bordering Mecklenburg County.
- Drinking water source for Mecklenburg County, Gastonia and Mount Holly.
- Approximately 80 million gallons of water are withdrawn daily to serve Charlotte-Mecklenburg residents.
- Mecklenburg County's McDowell, Torrence and Gar Creeks flow into Mountain Island Lake.
- Total surface area of 2,788 acres.
- Individual watershed encompasses 70 square miles.
- Total watershed drains 1,860 square miles.
- Approximately 61 miles of shoreline, with an estimated 37 miles in Mecklenburg County.

Currently, Mountain Island Lake has good to excellent water quality. However, streams that flow into the lake are declining in terms of water quality, particularly McDowell Creek that winds through the Town of Huntersville. McDowell Creek flows to McDowell Creek Cove which has experienced a significant decline in water quality conditions due to increased land development in the watershed. Its water quality is among the poorest in Mecklenburg County due to increased sediment and nutrient levels. Of particular concern is that McDowell Creek Cove is located upstream of Charlotte-Mecklenburg's drinking water intake on Mountain Island Lake. Significant efforts are being undertaken by the Mecklenburg County Water Quality Program and Town of Huntersville to reduce pollutants discharged to this cove and restore water quality conditions to ensure protection of our drinking water supply.

## Lake Wylie Watershed

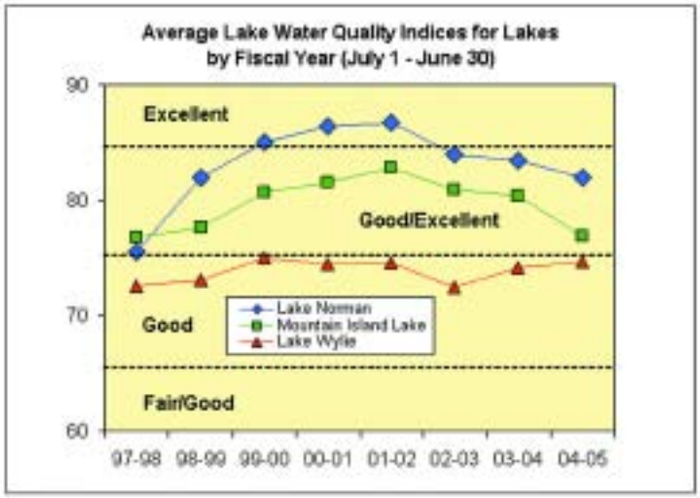
- Very long lake with a surface area of 12,139 acres.
- Largest individual watershed along the Catawba River, encompassing 1,160 square miles.
- Total drainage area is 3,020 square miles.
- Drinking water source for Belmont and Rock Hill.
- Long and Paw Creeks flow into this watershed in Mecklenburg County.
- Approximately 327 miles of shoreline, with an estimated 67 miles located in Mecklenburg County.

Overall, Lake Wylie has good water quality. However, its uses are currently threatened. Numerous point and non-point pollution sources have contributed to water quality degradation in its embayments and tributary arms. High nutrient levels have been linked to algae blooms and fish kills in warmer months. The primary sources of pollution are urban runoff and wastewater treatment plant discharges. Over 100 wastewater treatment plants are located along tributaries to Lake Wylie in Gaston and Lincoln counties. Urban runoff from Mecklenburg County and agricultural runoff from Gaston and Lincoln counties are also significant problems.

In addition, Lake Wylie is becoming more developed. In 1995, the population density within Mecklenburg County's portion of the Lake Wylie watershed was 134 persons per square mile, which is low compared to the Mecklenburg County average of 876 persons per square mile. The percentage of open space was also the highest in the county. However, the population is increasing and the open space is decreasing, as there is a greater desire to live along Lake Wylie's shores. As previously discussed, this leads to increasing non-point source pollution and water quality degradation.

## Water Quality Conditions In Mecklenburg County Lakes

The following graph provides an average for the water quality conditions in Lake Norman, Mountain Island Lake and Lake Wylie from July 1997 to June 2005. The data is provided in a Water Quality Index, which is a mathematical means of transforming large quantities of water quality data into a single number. The water quality index is comprised of nine water quality parameters including Chlorophyll *a*, pH, Dissolved Oxygen, Secchi Disk Depth, Specific Conductivity, Temperature, Total Alkalinity, Nitrate and Total Phosphorus.



*Water running over Mountain Island Dam following heavy rains in September 2004.*

# Buffers And Their Importance

## What Is A Buffer And How Does It Function?

Buffers are natural, vegetated areas (preferably forested) adjacent to lakes and creeks. These buffers serve to filter pollutants from storm water, absorb runoff and reduce the volume of runoff, thereby reducing erosion and pollutants.

In order for buffers to provide an effective filter, storm water must sheet flow across the buffer and the buffer must be of sufficient width. In North Carolina, the recently adopted Catawba Buffer Rules require a 50-foot minimum buffer width for new development along the Catawba River. Wider buffers may be necessary for steeper slopes, areas downstream of intense development, or for extra protection of highly valued uses such as drinking water.

A well-established buffer is generally self-perpetuating and requires little maintenance. Native trees and shrubs are recommended for their hardiness, effective canopy and root structure. Buffer canopies intercept rainfall, thereby minimizing soil disturbance. Buffers also improve water quality by providing shade, which lowers water temperature. Cool water carries more dissolved oxygen than warmer water and is essential to the survival of fish and other aquatic wildlife species that are sensitive to changes in temperature. Buffers also provide woody debris for fish habitat.

## Buffer Regulations

In 1992, North Carolina passed a law requiring local governments to develop watershed regulations aimed at protecting water quality in lakes classified as drinking water supplies. Minimum standards were established by the state, and local governments were required to pass regulations for their jurisdictions. Most jurisdictions in Mecklenburg County adopted more stringent watershed regulations and incorporated them into subdivision, land development, and/or zoning ordinances. A majority of these regulations address the following three issues: (1) development density (amount of built-upon or impervious area), (2) buffer widths and (3) land use. Those who live within a lake watershed should be most familiar with buffer requirements in their area. A map (page 17 thru 18) is provided to help determine which rules apply to where you live. General buffer requirements and guidelines for all lake watersheds are summarized in Appendix A (*Watershed Buffer Guidelines for Mecklenburg County, NC*). Other pertinent information, such as suggested tree plantings for buffer areas and guidelines for stepping stone pathways, can be found in the appendix as well.

## Buffer Requirements

Undisturbed buffers required along the shoreline of all Mecklenburg County lakes are measured from the full pond elevation:

- Lake Norman - 760 feet
- Mountain Island Lake - 648 feet
- Lake Wylie - 569.4 feet

Along all perennial streams, undisturbed buffers are measured from the top of the bank on each side of the stream. Critical Areas (CA) are generally located in close proximity to surface waters. Such areas are protected by higher standards because of the greater risk of water quality degradation from pollution. Protected Areas (PA) are located beyond the CA in the watershed. Fewer restrictions apply to the PA because the risk of water quality degradation from pollution is less. Development density is typically addressed by either a low-density option, (single-family detached dwellings) or a high-density option, (multi-family dwellings or commercial development). There are separate watershed regulations and buffer requirements for each of the three (3) lakes. Refer to Appendix A for more information about specific buffer and watershed requirements.

*A natural forested area adjacent to surface water body is called a buffer.*

### Buffer Violations And Restoration

Where a buffer area has been found to be disturbed, a Notice Of Violation (NOV) may be issued to the property owner by the local zoning department or their designee. The violation requires that the property owner restore the buffer to a condition acceptable under the *Watershed Buffer Guidelines for Mecklenburg County, NC* (Appendix A). Monetary penalties may also be assessed. Restoration involves replanting trees and shrubs to a certain density in the buffer, which is given in the guidelines. A restoration plan must be submitted and approved by the Mecklenburg County Water Quality Program.

An appeal of the violation may be submitted to the Zoning Department. If the violation is not corrected or no appeal is made within 60 days of the date of the NOV, the Zoning Department may (1) revoke the certification of occupancy, making continued occupancy unlawful; (2) issue a citation and, if unpaid, a judgment could become a lien on the property; (3) seek an injunction; or (4) issue a criminal summons.

### Special Permits

A permit is required when conducting certain activities near a lakeshore in Mecklenburg County. Duke Power's Lake Management Division has the following six (6) permitting programs: (1) commercial facilities (boat slips at condominiums, campgrounds, marinas, etc.), (2) private single-family (boat docks or piers at a single-family residence), (3) conveyance (water intakes, bridges, and road crossings), (4) shoreline stabilization (rip-rapping and seawall construction), (5) excavation or dredging, and (6) miscellaneous uses for activities such as installing heat coils or withdrawing greater than one million gallons of water per day. Withdrawal of less than this amount for domestic purposes does not require a permit, but does require a letter of intent to the Duke Power Lake Management Office. Contact their office at 1-800-443-5193 if you think you might need a permit.

Any activity that could potentially disturb the buffer requires the submittal of an **Application for Temporary Buffer Disturbance** to the Mecklenburg County Water Quality Program. Disturbed areas would include all areas of the buffer where the natural ground cover has been graded, removed or altered. For your convenience, an **Application For Temporary Buffer Disturbance** has been included in Appendix A.

*Building boat slips and stabilizing shorelines on lakes in Mecklenburg County require a special permit.*

## Impervious Surfaces Limitations

One component of the watershed protection regulations is built-upon area (BUA) or impervious surfaces. The watershed regulations define BUA as "impervious or partially impervious material." BUA includes but is not limited to asphalt, concrete, stone, brick, terrazzo, roofing, ceramic, buildings, pavement, recreational facilities, gravel areas, metal, wood, plastic, rubber, pervious asphalt, pervious pavers, and outdoor turf/carpet. Pervious surfaces include grass, sand, soil, pine straw, mulch, wooden slated decks, surface water and the water area of a swimming pool. Limitations on the amount of BUA within a drinking water supply watershed are critical to protecting water quality. Research has shown that there is a direct correlation between the amount of impervious surfaces in a watershed and that watershed's water quality conditions. Generally, the more impervious surface coverage, the more polluted the water body. Impervious surfaces have many negative effects on water quality:

- Reduce the amount of pervious ground cover, which prevents storm water from infiltrating into the ground and replenishing the groundwater.
- Act as a direct conduit for non-point source pollutants to wash into nearby water bodies from parking lots, roads, lawns, etc.
- Cause increased runoff volume and velocity resulting in excessive erosion in buffers and streambeds.
- Linked to thermal pollution in water bodies, which can deplete oxygen levels and stress aquatic life.
- Increase downstream flooding due to the loss of permeable areas for soaking up storm water.

BUA limitations for each watershed protection district within Mecklenburg County are provided in the chart on pages 2 through 4 of Appendix A. Every development within a drinking water supply watershed must show that it is in compliance with the BUA limitations during the design phase. The developer of a project must allocate a maximum amount of BUA to each lot within a development to ensure that the development as a whole does not exceed the maximum allowed. Single-family residents will often find this allocated amount on their deed and/or plat. BUA is tracked for every property in Mecklenburg County by the Zoning Department. Homeowners and potential home buyers in the watershed protection area should be aware of these restrictions and research their individual BUA limitations. These restrictions may prohibit a home addition, sidewalk, out building or driveway expansion.

When the BUA of a development exceeds the established threshold, best management practices or BMPs must be installed by the developer as per the watershed regulations to collect and treat storm water runoff for removal of non-point source pollutants prior to discharge to surface waters. Wet ponds, the most commonly used BMP around the lakes, function by detaining storm water long enough for pollutants to settle out resulting in the discharge of cleaner water to the lake.

*Increased impervious cover leads to increased non-point source pollution that can be controlled using wet ponds.*

# Other Ways To Protect Water Quality

### Fueling Your Boat

Petroleum contains toxic compounds that are harmful to fish and shellfish. Under federal law, it is illegal to discharge oil or oily waste into U.S. waters. Violators are subject to substantial civil penalties and/or criminal sanctions, including fines of up to $5,000 per violation and imprisonment.

### What you can do to help:

- Avoid "topping off" your gas tank when refueling.
- Install a fuel/air separator to prevent accidental overflows from the tank vent line.
- Ask your fuel dock to install automatic cutoff nozzles or alarms.
- Report spills to the Mecklenburg County Water Quality Program at (704) 336-5500.
- Do not apply soap or detergents to the water when a spill occurs. Doing so causes the petroleum to sink into the water column instead of staying on the surface where it can be contained and removed.

### Sewage From Your Boat

Sewage contains disease-causing pathogens that are harmful to humans and aquatic life. It also contains large amounts of nutrients that can stimulate algae growth and deplete oxygen in the water. Discharging sewage into waters of the U.S. is illegal and subject to civil penalties and/or criminal sanctions.

### What you can do to help:

- Install a Type III Marine Sanitation Device (MSD) such as a holding tank on your boat. These can be emptied at an onshore pump-out station. Please be aware that MSDs designed to treat and discharge waste into the lake are illegal.
- Encourage your marina to install a pump-out station. Federal funds for pump out stations are available under the Clean Vessel Act. The following marinas currently have public pump-outs:

### Lake Norman

**Boat Rack Marina**

**Holiday Harbor Marina**

**Inland Sea Marina**

**Kings Point Marina**

**Lake Norman Marina**

**Midtown Sundries Restaurant**

**Harborside Marina**

**North Bridge Marina**

**Westport Marina**

### Lake Wylie

**Harbortowne Marina**

**River Hills Marina**

**Tega Cay Marina**

- To minimize the need to pump out your system, use onshore rest room facilities when possible.
- Keep your MSD properly maintained.

### Litter

Plastic and litter not only ruin the natural beauty of the water, they can also injure aquatic life, clog water intakes and damage boat propellers. Dumping garbage into the water is illegal and subject to civil penalties and/or criminal sanctions.

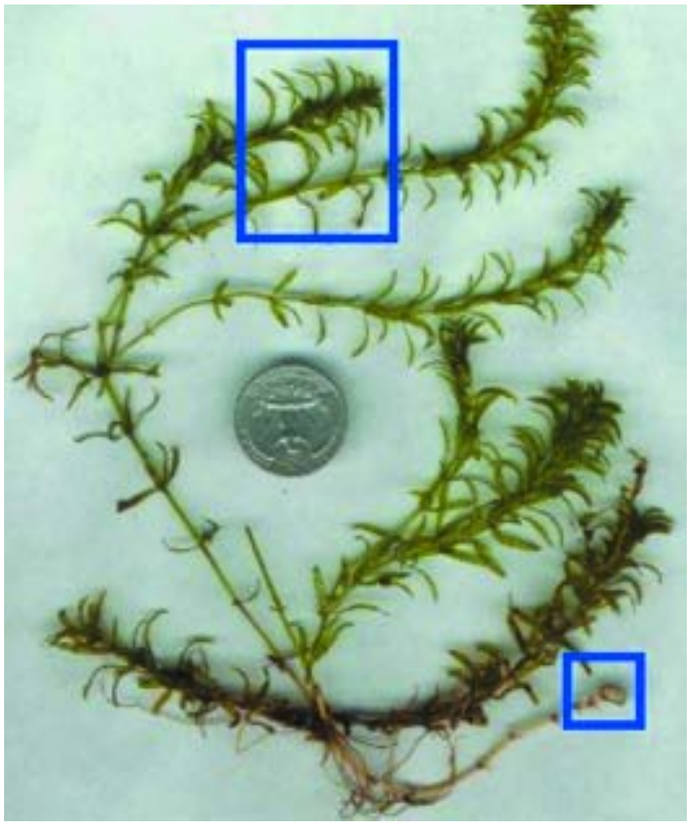
### What you can do to help:

- Do not throw any litter overboard. If the wind causes something to blow overboard, go back and pick it up.
- Install a garbage can on your boat.
- If you see litter in the water, pick it up and bring it back to shore for proper disposal.

### Exotic Species

Exotic species are plants or animals living in an area which is not their native territory. Aquatic exotic species are spread from one water body to another mainly by boats and humans. Exotics often flourish and out-compete native species because there are no natural predators or diseases to control the population.

Exotic plants can especially become a nuisance to boaters and swimmers. Hydrilla is one type of exotic plant that has been found in area lakes. The plant has become a nuisance in Mountain Island Lake and Lake Norman. Hydrilla forms nearly impenetrable mats of stems and leaves at the surface of the water. A few of the problems it may cause are crowding of beneficial native vegetation, interference with public water supplies, and blocking of docks, marinas and boat launching sites. Asiatic clams and zebra mussels are two exotic animals that have caused extensive damage to aquatic ecosystems. Asiatic clams have been found in area lakes, while zebra mussels have not yet made it into the Catawba River system.



*Hydrilla has two highly reproductive structures at the end of its stems and roots (highlighted above).*

### What you can do to help:

- Remove all plant material from boats, trailers and vehicles. Plants can survive two to three days out of water and as long as two weeks in a bilge.
- Drain your livewells, bilge water and transom wells before leaving the boat landing.
- Do not dump aquatic plants from your aquarium or garden ponds into a lake or stream.
- Do not remove Grass Carp from the lakes. Grass Carp are often released into lakes by state and local agencies to feed on Hydrilla.

*The Grass Carp can eat several times its body weight in plant material each day.*

### Fertilizers and Pesticides

Fertilizers contain large amounts of nutrients like nitrogen and phosphorus, which stimulate plant growth. When improperly or excessively applied, fertilizer can be transported by storm water runoff and deposited into our lakes and creeks. In the water, fertilizer stimulates algae growth. Excessive algae growth or "algae blooms" often occur in the summer. These blooms can cause fish kills by depleting the water of its oxygen supply.

Many pesticides and herbicides contain a variety of toxic compounds and heavy metals, which are harmful to the environment. When applied improperly or in excess, these compounds can enter our lakes and creeks where they can kill fish and other aquatic life and contaminate drinking water supplies.

Making good decisions and following a few easy guidelines can minimize the adverse effects fertilizers, pesticides, and herbicides have on our environment.

### What you can do to help:

- Always follow label directions. Make sure the product is appropriate for your intended use.
- Never apply when heavy rain is expected within 12 hours.
- Do not apply within 50 feet of lakes, creeks or near storm drains and ditches.
- Test your soil to determine what, if any, nutrients your lawn needs. Contact Mecklenburg County's Cooperative Extension Service for a free test kit and assistance at (704) 336-2561.
- Use alternatives that are less harmful to the environment. These are often available at your local hardware or lawn and garden store.
- Spot spray pest and weed problems whenever possible.
- Store fertilizers, pesticides and herbicides in a locked, dry place safe from flooding and accidental spillage.
- Use native trees and shrubs for landscaping. They typically have fewer pest problems and require less water.
- Utilize natural areas for landscaping instead of planting turf grass. This will reduce the need for fertilizers.

## More Environmentally-Friendly Ideas For The Homeowner

### Vehicle Maintenance

Have you ever looked at the parking lot at your favorite mall? Virtually every space is stained with drippings from cars. When it rains, this accumulated oil, antifreeze and other harmful fluids enter nearby storm drains and eventually end up in local surface waters. All storm drains in Charlotte-Mecklenburg drain directly into creeks and lakes.

Proper vehicle maintenance can not only prevent such contamination, but also can increase gas mileage and reduce airborne pollutants. If you wash your car at home, wash it on the grass to prevent harmful soaps and detergents from running off into nearby storm drains. In addition, use biodegradable detergent and recycle used antifreeze and motor oil.

*It is illegal to dump, blow or sweep grass clippings into storm drain.*

### Yard Waste

Dumping yard waste such as grass clippings, leaves and branches into creeks or lakes can block the natural flow of water and consume the water's precious oxygen needed by fish and other aquatic life.

Leave grass clippings on the lawn to serve as a natural fertilizer or utilize them as mulch around trees and shrubs. Leaves can be easily composted and used in gardens, flowerbeds and plant pots. If you are served by the City of Charlotte's Solid Waste Services, you can have yard waste collected. Place leaves and grass clippings in separate clear plastic bags and place at the curbside with your regular trash.

### Recycling

There is more to recycling than just throwing your bottles and cans in a recycling bin. Many other products could be recycled but often end up being thrown away or dumped where they have a potential to contaminate our water. Mecklenburg County's full service recycling centers accept all types of leftover products such as used motor oil and filters, antifreeze, paint, and tires. For directions and a list of what each site accepts go to *www.wipeoutwaste.com*. The following are full service recycling centers.

- **Foxhole Recycling Center**
  17131 Lancaster Highway
  (704) 341-4962
- **Hickory Grove Recycling Center**
  8007 Pence Road
  (704) 535-3781
- **North Mecklenburg Recycling Center**
  12300 North Statesville Road
  (704) 875-1563
- **West Mecklenburg Recycling Center**
  8440 Byrum Drive
  (704) 357-1473

## Common Water Quality Problems

### Sewage

Raw sewage discharged to lakes and streams is the number one pollutant in Mecklenburg County. Many of the sanitary sewer lines run along creeks, so when lines break or overflows from man-holes occur, the sewage immediately flows into surface waters. Sewage is often grey in color, but the impacted surface waters may also appear white, black or a variety of other colors following a sewer spill. A strong sewage odor is another indication of a problem. Such problems should be reported immediately to the Mecklenburg County Water Quality Program at (704) 336-5500. Staff will follow up on the report, identify the source of pollution and make sure it is eliminated.

Sewage pump stations and wastewater treatment plants have malfunctioned in the past and caused sewage discharges to surface waters. When impacts to swimmable waters occur, swimming advisories are posted until safe conditions are met.

### Illicit Discharges

Storm water drains and pipes carry precipitation to creeks, ponds and lakes. The sanitary sewer system, on the other hand, carries polluted waste water to wastewater treatment plants where pollutants are removed and the water is eventually discharged into surface waters. Sometimes people and businesses illegally dispose of polluted waste by having pipes discharge straight into the storm drain system when the waste should be going into the sanitary sewer system. Illicit discharges carried by pipes into creeks and lakes are a common problem. Steady flow through a storm water pipe during or shortly after a rain event is natural. However, dry-weather flow is unnatural, and may indicate an illegal hookup from a residence or business. Any suspected illicit discharge should be reported immediately to the Mecklenburg County Water Quality Program at (704) 336-5500. Staff will follow up on the report, identify the source of discharge and make sure it is eliminated.

*Cooking grease poured down sinks is one of the leading causes of sanitary sewer overflows.*

*A turbid McDowell Creek flows into Mountain Island Lake after a rainstorm.*

*No swimming advisories are issued when bacteria levels are high.*

## Sedimentation

Another large pollution problem that many people overlook is sedimentation resulting from soil erosion upstream. According to a study conducted by the North Carolina Department of Environment and Natural Resources, sediment is the most widespread cause of stream and river impairment. Land development activities can cause significant erosion and sedimentation problems. Erosion and sedimentation problems at construction sites should be reported to the Mecklenburg County Water Quality Program at (704) 336-5500. Staff will ensure the enforcement of the regulations necessary to control erosion and sedimentation.

Tree roots bind soil particles together and their leaves provide a protective barrier from heavy rains. When trees are removed, soil is exposed to precipitation that can carry the sediment in suspended form. Without proper runoff control structures at construction sites, this sediment flows into creeks and lakes where it clogs fish gills and destroys habitat essential to aquatic life survival.

*An algae bloom observed on a private pond.*

## Algae Blooms

Excessive algae is a good indicator of a pollution problem. Algae growth, especially in the summer, is natural to a certain degree and forms the base of the aquatic food chain. The combination of sunlight, water, nutrients and warmer temperatures produces growth. However, when nutrients such as phosphorus and nitrogen are present in large amounts, dense algae blooms can form. These algae blooms can deplete the supply of oxygen available to aquatic life, resulting in a fish kill. Common sources of excessive nutrient runoff are over application of fertilizers, raw sewage discharges and wastewater treatment plant effluent.

## Dumping

Illegal dumping is a significant pollution source in our surface waters. Dumping activities range from a neighbor pouring used oil onto the ground to a carpet cleaning business emptying waste into a storm drain. Dumping any potential pollutant is illegal. Some people dump materials into storm water drains (located on the sides of roads and in parking lots) not realizing that these drains flow directly to creeks or lakes. Illegal dumping should be reported immediately to the Mecklenburg County Water Quality Program at (704) 336-5500. Staff will follow up on the report and ensure that all pollution sources are eliminated.

# What's Already Being Done To Protect Lake Water Quality?

Lakes and creeks have played a vital role in attracting people to our area. Protecting these waters is important to sustaining a healthy local economy and livable community. the Mecklenburg County Water Quality Program conducts numerous activities for the purpose of lake and stream water quality protection.

## Monitoring

Mecklenburg County has 25 monitoring sites on the lakes and 58 sites along the creeks. The goal of the monitoring program is to identify and eliminate sources of water pollution and protect and restore water quality conditions. The monitoring sites were selected to provide an overall representation of water quality conditions throughout Mecklenburg County. The data collected gives a sense of the overall water quality conditions, helps track water quality trends and helps pinpoint specific water pollution problems. Monitoring on the 25 sites on Lake Norman, Mountain Island Lake and Lake Wylie are conducted monthly during the summer (May through September) when there is increased recreation and bimonthly from October to April. Monitoring of Lake Davidson and Lake Cornelius is performed monthly during the summer. Monitoring activities include collecting and analyzing samples for pollution indicators such as fecal coliform bacteria, phosphorus, nitrogen, chlorophyll a, turbidity and solids. Field tests are also conducted for temperature, pH, conductivity, dissolved oxygen and other parameters.

Between May and September, 23 additional sites are monitored monthly for fecal colifom bacteria mainly around swimming areas and marinas on the lakes. If elevated bacteria levels are detected, a "No Swimming" advisory is issued and affected areas are posted with buoys and signs. These areas are monitored daily until bacteria levels return to normal at which time the No Swimming advisory is lifted and the buoys and signs are removed.

## Plan Review

Plans for development within Mecklenburg County lake watersheds are reviewed by City of Charlotte and Mecklenburg County agencies to ensure that all watershed protection regulations are being followed. Additional concerns and recommendations regarding water quality protection are also addressed.

## Service Requests

Citizens call in over 900 requests each year concerning possible threats to water quality. When citizens report discolored creeks, possible sewage spills or someone dumping a substance in a creek or storm drain, the Mecklenburg County Water Quality Program investigates the possible pollution problem, determines the cause and ensures the problem is repaired. If you suspect a potential water pollution problem, call and report it at (704) 336-5500.

## Public And Private Land Acquisition

Purchase of lands adjacent to lakes is another method both public and private entities have used to protect lake water quality. Currently in Mecklenburg County, public land is owned along all three lakes. Some of this land is managed as parks and wildlife refuges, while the rest is protected as nature preserves. On Mountain Island Lake over 5,918 acres of land or 13.4% of the watershed is publicly owned and controlled for protection of water quality.

## Public Education And Awareness

The Mecklenburg County Water Quality Program works to educate the public about the surface waters of Mecklenburg County and get them involved in activities to restore water quality conditions through volunteer initiatives such as the Storm Drain Marking and Adopt-A-Stream Programs. Presentations are given by staff to homeowner's associations, homebuilders and other public groups and organizations to help educate the public. A great deal of literature is also available for public distribution. Contact staff with questions or concerns Monday-Friday, 8:00 a.m. to 5:00 p.m., at (704) 336-5500.

*Environmental Hygienists with the Water Quality Program conduct routine monthly monitoring on our lakes.*

# Frequently Asked Questions

### Is it legal to withdraw water for irrigation from a lake or stream without a permit?

Yes, according to riparian ownership rights, the use of waters for domestic purposes, such as watering a garden, is legal without a permit. A riparian owner is a waterfront property owner. Duke Power Lake Management must be notified in writing, however, if any amount of water will be withdrawn from any of the lakes. Withdrawal of greater than one million gallons per day from a lake for commercial or industrial purposes must be permitted.

### Is it safe to eat the fish from Mecklenburg County lakes?

Currently there are no fish consumption advisories on any of our lakes. If you catch a fish that appears sick, do not eat it. Fish can get sick just as humans do.

### As a waterfront property owner, what is the one thing I can do that will benefit water quality the most?

Leaving your property as natural as possible will benefit water quality the most by providing a buffer area between your activities and the water.

### Who owns the lakes and creeks of Mecklenburg County?

Naturally occurring inland water bodies are held in trust by the State for public use. Property owners on rivers and creeks (dammed rivers excluded) generally own the bed of the waterway to its center. Federal, state, and local laws, however, restrict activities on the water.

### What's the biggest threat to our lakes?

Nonpoint source pollution is the biggest threat overall. This is pollution that is picked up by storm water as it flows over streets, lawns, and parking lots, etc. This type of pollution increases as population and impervious surfaces increase.

### How do I know when and where it's safe to swim?

The Mecklenburg County Water Quality Program increases monitoring efforts in lakes during summer months due to increased recreation. If high levels of pollutants are observed and it is determined that lake areas are unsafe for swimming, a "No Swimming" sign will be posted. It's recommended that you not swim in any of Mecklenburg County's streams.

### Where can I get information on boat safety, rules, and regulations?

Contact the Lake Wylie, Mountain Island Lake or Lake Norman Marine Commissions. They offer classes on boat safety and have information about rules and regulations for distribution. Refer to page 15 for a list of phone numbers.

### Who do I contact about shoreline stabilization, dredging, or building a pier?

Contact Duke Power Lake Management at 1-800-443-5193. You will be asked to complete a permit, which will be reviewed, by Duke Power and the Mecklenburg County Water Quality Program.

### How should I remove dead or diseased trees from the buffer? Do I need to call someone first?

Dead or diseased trees may be removed from the buffer, however, it is always a good idea to call the Mecklenburg County Water Quality Program at (704) 336-5500 before disturbing any vegetation in the buffer.

### Can I have a fence in the buffer?

Fences may be installed if no trees, roots or vegetation are disturbed in the buffer. Call the Mecklenburg County Water Quality Program at (704) 336-5500 before starting any projects in the buffer.

# Glossary

**100-year floodplain -** lowland area bordering a stream which is impacted by flood waters associated with a 100-year flood event

**algae bloom -** excessive algae growth in a water body caused by an overload of nutrients; may cause oxygen depletion

**best management practice -** measures developed to improve storm water quality through pollutant removal

**biological oxygen demand -** a measure of the amount of oxygen consumed during biological and chemical processes that break down organic matter in water

**built-upon area -** includes the portion of a development project covered by impervious or partially impervious cover (e.g. pavement, gravel, buildings, etc.)

**chlorophyll a -** pigment present in all algae types; concentration increases with higher algae biomass

**critical area -** land with the highest degree of development restrictions due to its proximity to a protected water source and the greater risk of water quality degradation from pollution

**dissolved oxygen -** measure of the amount of oxygen present in a water body; important for survival of aquatic life

**erosion -** wearing away of soil particles from the land surface by water, wind, ice, gravity, or other force

**fecal coliform -** bacteria present in fecal matter; high levels in surface water sometimes indicate a discharge of sewage

**groundwater -** water below the land surface which is held up in soil layers and rock formations

**impervious surface -** surface area which does not allow infiltration of water (e.g. pavement, rooftops, gravel, etc.)

**high-density development -** development with a high density of structures and built-upon areas within a particular land area (e.g. condominiums, apartments, etc.)

**macroinvertebrates -** small aquatic animals that live mostly on stream and lake bottoms or attached to substrate material; their diversity and abundance indicate water quality conditions

**low-density option -** development with a low density of structures within a particular land area (e.g. one structure per acre)

**normal pool elevation -** the average land elevation above sea level reached by a body of water

**nutrients -** substances necessary for growth and reproduction of organisms; in water, mainly nitrates and phosphates

**perennial stream -** a stream that maintains water in its channel throughout the year

**phytoplankton -** microscopic free-floating aquatic plants

**protected area -** land area subject to development restrictions which are not as stringent as in the critical area due to their further distance from the water body

**runoff -** rainfall that flows over the land surface into adjacent water bodies, picking up pollutants along the way; also known as storm water

**storm drain system -** system of drains, pipes, and outfalls that allows storm water, surface drainage, street wash, and other wash waters to be transported quickly from the land surface to nearby water bodies

**turbidity -** measure of a water body's clarity; caused by suspended matter such as clay, silt, organic and inorganic matter, and/or microscopic organisms such as phytoplankton

**zooplankton -** microscopic and macroscopic animals existing as free-swimming or suspended in the water

# Contact Directory

**Audubon Society of Mecklenburg County**
(704) 537-8181
*www.meckbirds.org*

**Catawba Lands Conservancy**
(704) 342-3330
*www.catawbalands.org*

**Catawba River Foundation/ River Keeper**
(704) 373-1916
*www.catawbariverkeeper.org*

**Ducks Unlimited of North Carolina**
(919) 847-0116
*http://nc.ducks.org*

**Duke Power Lake Management**
1-800-443-5193
*www.dukepower.com*

**Katawba Valley Land Trust**
(803) 285-9455
*www.kvlt.org*

**Lake Norman, Lake Wylie, & Mountain Island Lake Marine Commission**
(704) 372-2416
*www.marinecommission.com*

**Mecklenburg County Park & Recreation Department**
(704) 336-3854
www.parkandrec.com

**Mecklenburg County Soil & Water Conservation**
(704) 336-2455
www.mecklenburgconservation.com

**Mecklenburg County Solid Waste**
(704) 336-4304
*www.wipeoutwaste.com*

**Mecklenburg County Water Quality Program**
(704) 336-5500
*http://waterquality.charmeck.org*

**Mecklenburg County Zoning Department**
(704) 336-3569
*www.charmeck.org/Departments/Home.htm*
(click on Zoning)

**North American Lake Management Society/SE**
(828) 254-5644
*www.nalms.org*

**N.C. Department of Environment & Natural Resources Mooresville Regional Office**
(704) 663-1699
*www.mro.ehnr.state.nc.us*

**North Carolina Wildlife Federation**
(704) 377-4696
*www.ncwf.org*

**N.C. Wildlife Resources Commission**
(704) 986-6109
*www.ncwildlife.org*

**Open Space Institute of the Carolinas**
(704)687-2767
*www.uncc.edu/urbinst/land_use_and_environmental_planning.asp*

**Sierra Club - Central Piedmont Group**
(704) 527-5035
*www.sierraclub.org*

**South Carolina Dept. of Health and Environmental Control**
(803) 898-3609
*www.scdhec.net*

**The Trust for Public Land**
(704) 376-1839
*www.tpl.org*

## Neighboring Governments:

**Lincoln County**
(704) 736-8432
*www.co.lincoln.nc.us*

**Iredell County**
(704) 878-3050
*www.co.iredell.nc.us*

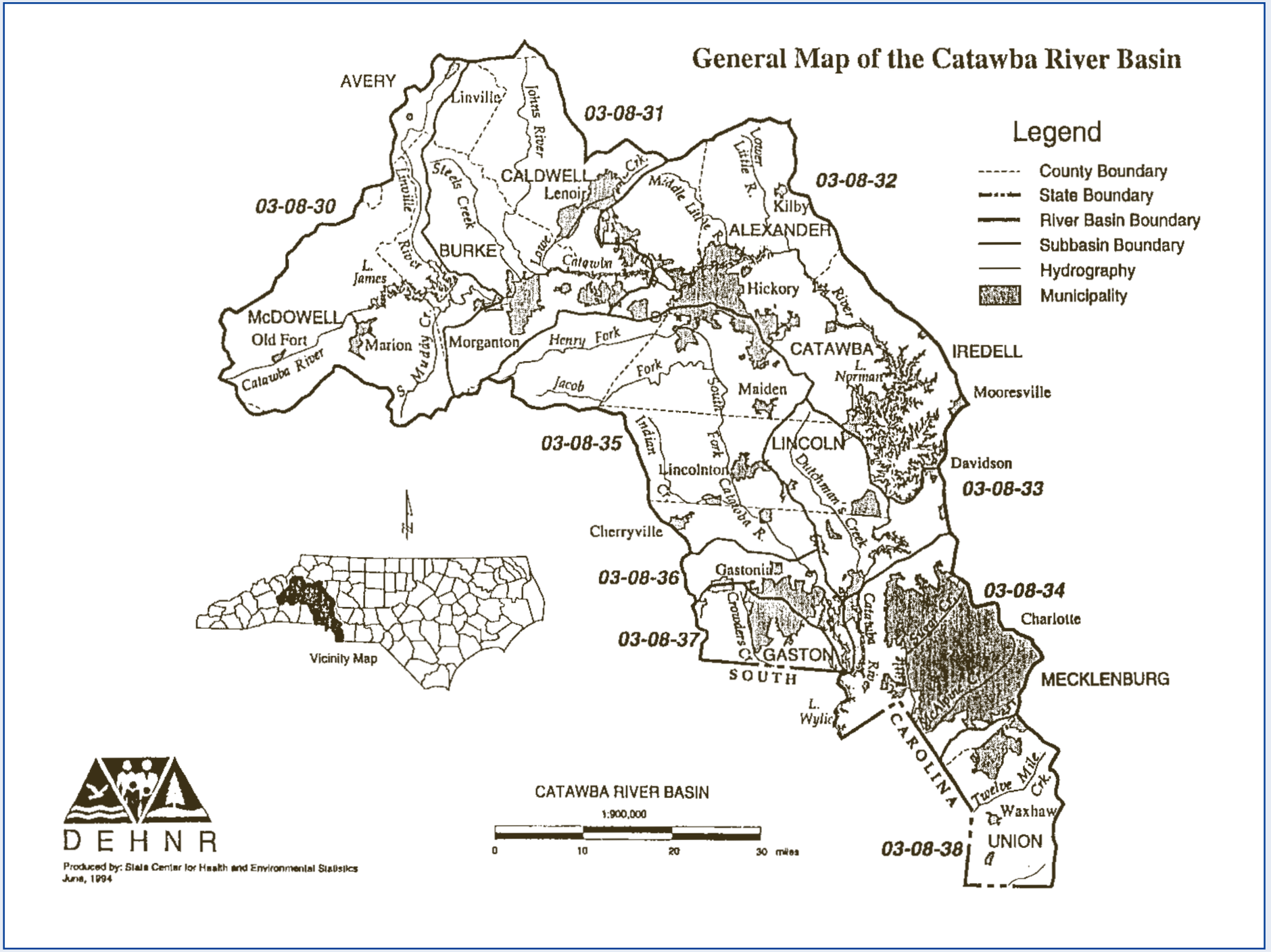
**Gaston County**
(704) 866-3100
*www.co.gaston.nc.us*

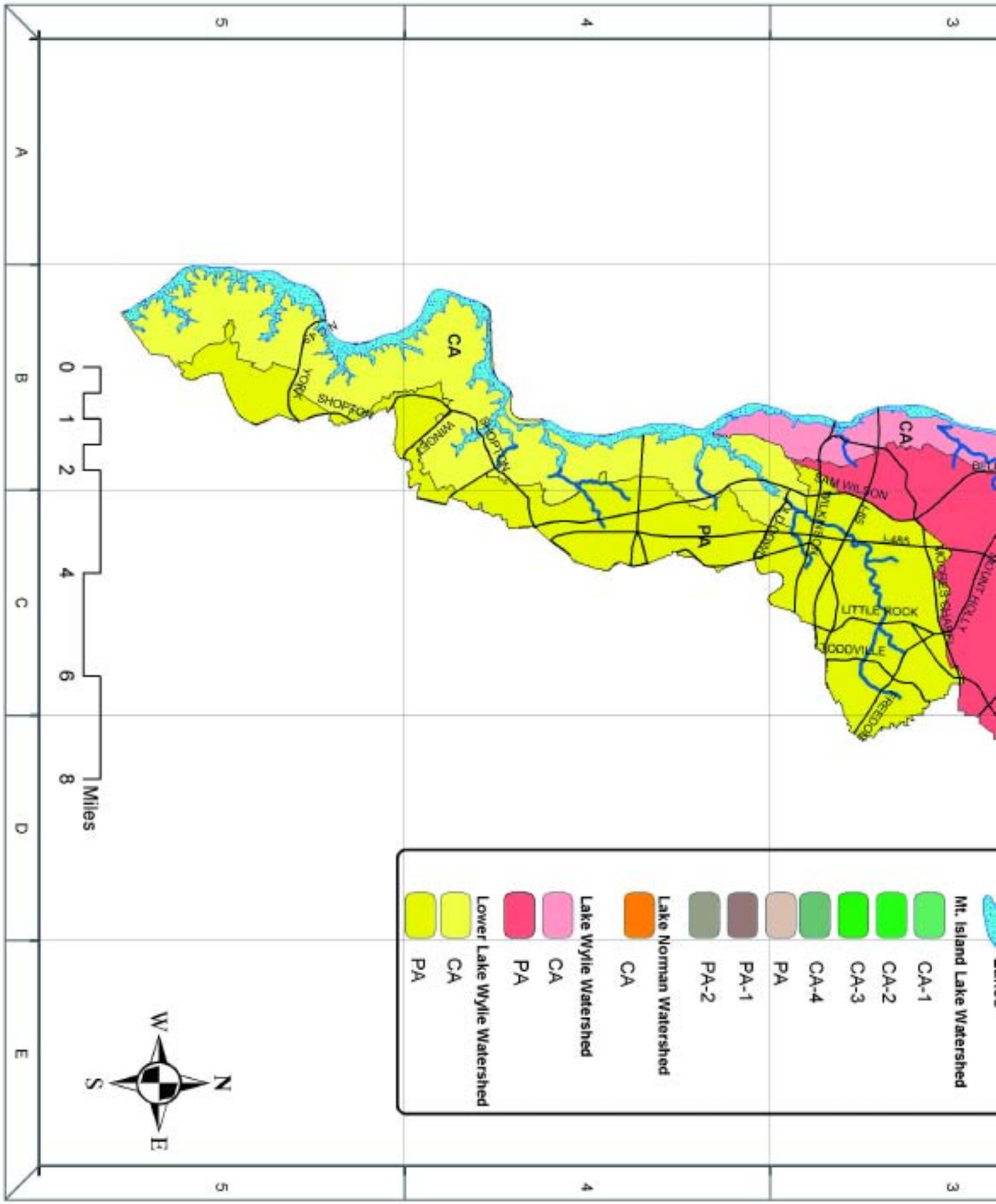
**York County**
(803) 684-8511 *www.yorkcountygov.com*

**Town of Cornelius**
(704) 892-6031
*www.cornelius.org*

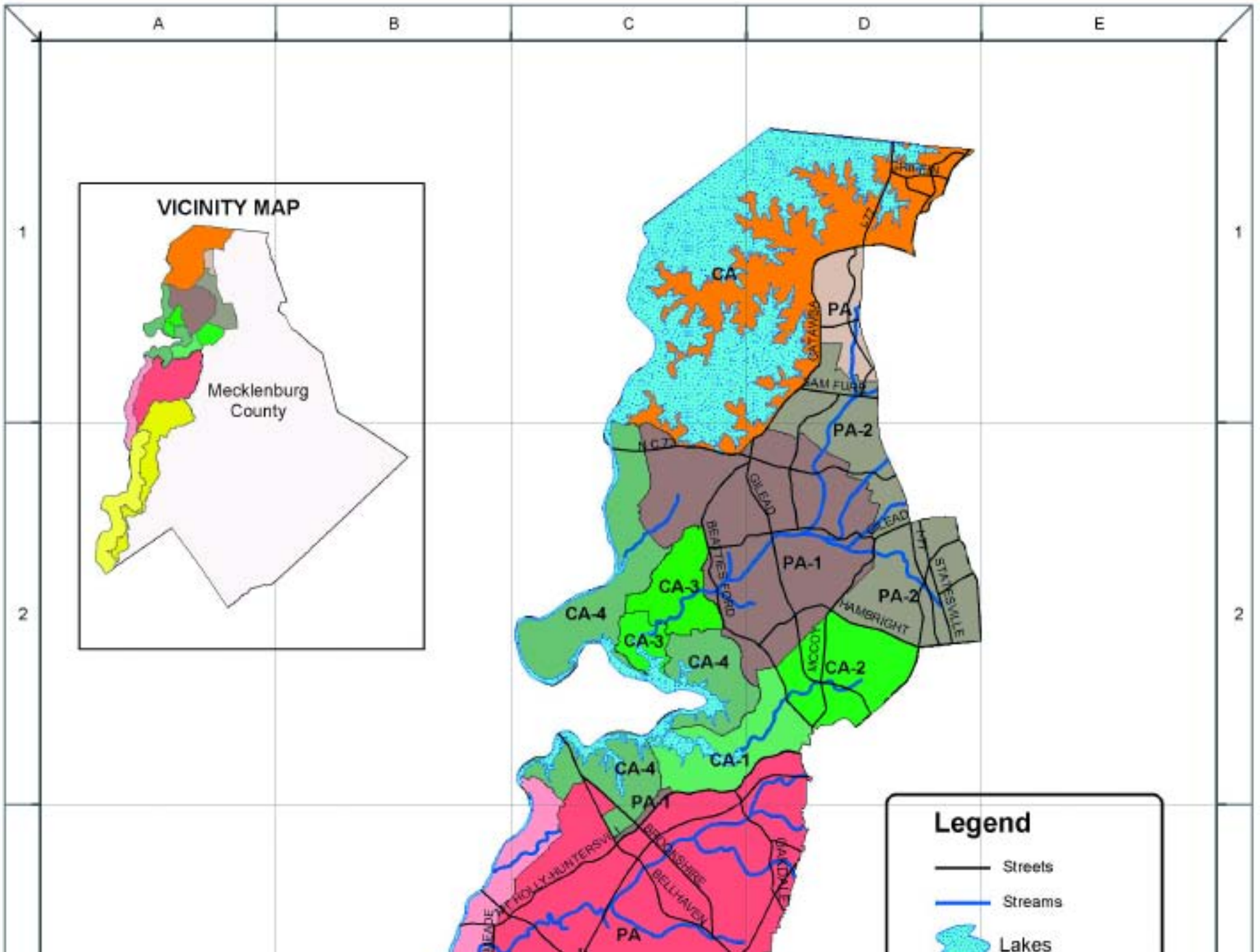
**Town of Davidson**
(704) 892-7591
*www.ci.davidson.nc.us*

**Town of Huntersville**
(704) 875-6541
*www.huntersville.org*

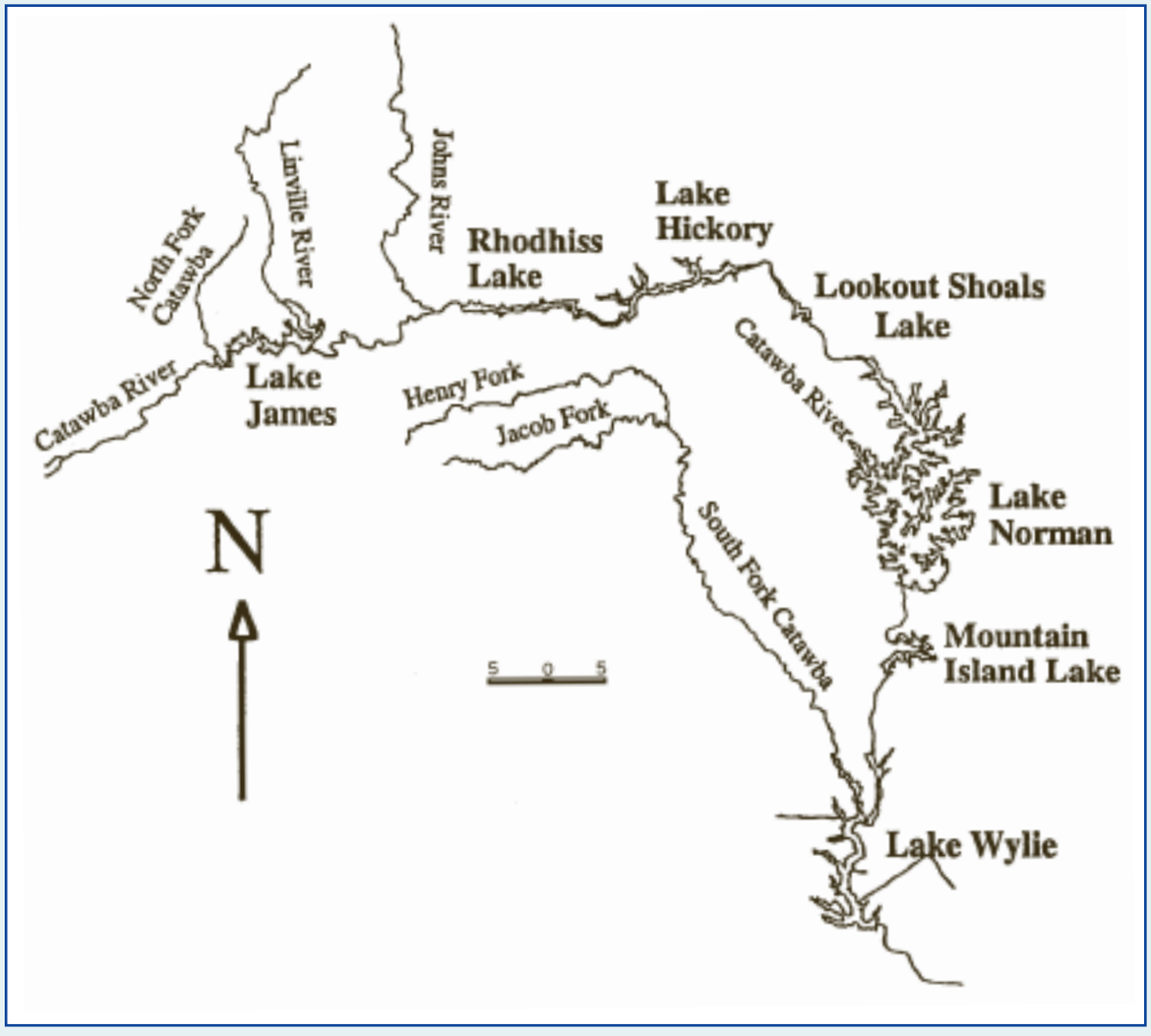

General Map of the Catawba River Basin
Legend
County Boundary
State Boundary
River Basin Boundary
Subbasin Boundary
Hydrography
Municipality
AVERY
Linville
Johns River
03-08-31
03-08-30
Linville River
Steels Creek
CALDWELL
Lenoir
Lower Creek
Middle Little R.
Lower Little R.
03-08-32
Kilby
ALEXANDER
BURKE
L. James
Lower Catawba
Hickory
McDOWELL
Old Fort
Marion
Morganton
Henry Fork
Jacob Fork
South Fork
Maiden
CATAWBA
IREDELL
L. Norman
Mooresville
Catawba River
Davidson
03-08-33
03-08-35
LINCOLN
Lincolnton
Indian Creek
Dutchman's Creek
Cherryville
Catawba R.
03-08-36
Gastonia
03-08-34
Charlotte
03-08-37
Crowders Cr.
GASTON
SOUTH CAROLINA
MECKLENBURG
L. Wylie
Twelve Mile Crk.
Waxhaw
UNION
03-08-38
Vicinity Map
CATAWBA RIVER BASIN
1:900,000
0 10 20 30 miles
DEHNR
Produced by: State Center for Health and Environmental Statistics
June, 1994



# WATERSHED PROTECTION OVERLAY DISTRICTS



# Map of Major Tributaries and Lakes of the Catawba River in North Carolina



# APPENDIX A

WATERSHED BUFFER GUIDELINES for MECKLENBURG COUNTY, NC

**Mecklenburg County Water Quality Program**
**Land Use and Environmental Services Agency**

700 N. Tryon Street, Suite 205
Charlotte, NC 28202

Phone: (704) 336-5500
Fax: (704) 336-4391

*http://waterquality.charmeck.org*

*Revised 1/05*

# Appendix A: Table of Contents

# I. Background

In 1992, the State of North Carolina adopted the Water Supply Watershed Protection Rules, which outlined minimum requirements for protecting water supplies. The rules also required all local governments having land use jurisdiction within water supply watersheds to adopt and implement water supply watershed protection ordinances that met or exceeded the State minimum rules. As a result of this rule, Mecklenburg County, the City of Charlotte, and the Towns of Davidson, Cornelius and Huntersville adopted and implemented watershed protection rules within their jurisdictions. The rules apply to properties that are within drinking water supply watersheds and generally become more restrictive as you get closer to raw drinking water intakes. Currently, Water Supply Watershed Protection Rules apply to all areas of Mecklenburg County that drain to Lake Norman, Mountain Island Lake, and Lake Wylie, all of which have drinking water intakes. The rules limit the type of development, the Built-Upon Area (BUA) of development, and also require buffers along lakes and perennial streams. BUA is defined as impervious or partially impervious material. Local ordinance adoption dates are as follows:

### Lake Norman

| | |
|---|---|
| Mecklenburg County | June 20, 1994 |
| Davidson | October 1, 1993 |
| Cornelius | September 20, 1993 |

### Mountain Island Lake

| | |
|---|---|
| Mecklenburg County | March 8, 1993 |
| Charlotte | June 21, 1993 |
| Cornelius | September 20, 1993 |
| Huntersville | October 1, 1993 |

### Upper Lake Wylie

| | |
|---|---|
| Mecklenburg County | June 20, 1994 |
| Charlotte | June 21, 1993 |

### Lower Lake Wylie

| | |
|---|---|
| Mecklenburg County | July 10, 2001 |
| Charlotte | September 17, 2001 |

# II. Purpose

The purpose of these guidelines is to provide further guidance and clarification relating to the watershed protection buffer requirements in Mecklenburg County and the City of Charlotte, as well as the Towns of Davidson, Cornelius and Huntersville Zoning Ordinances. Although these Guidelines are referenced in many of the above Zoning Ordinances, the Watershed Administrator or their designee for each jurisdiction has the final authority regarding regulations found in the Zoning Ordinances. Any interpretation of the watershed protection regulations or variance granted by local government bodies must at least adhere to the minimum North Carolina regulations, which can be found in North Carolina Administrative Code section 15A NCAC 02B.0216.

## III. Buffer Function

Undisturbed buffers along lakes and streams provide seven basic functions:

1) Provides an area for storm water to filter through, decreasing velocitiy and removing pollutants prior to discharge into a waterbody.
2) Provides stability to lake and stream banks by preserving trees and vegetation, thereby reducing erosion and bank failure.
3) Provides shading to waterbodies, thereby reducing water temperatures and improving aquatic habitats.
4) Provides woody debris in waterbodies, thereby increasing aquatic habitat.
5) Provides wooded corridors and wildlife habitat.
6) Provides open space for recreation, wildlife habitat, general aesthetics, and an improved quality of life.
7) Preserves floodplains, which are critical to reducing downstream flooding.

## IV. General Requirements and Prohibitions

### Buffer Widths

Watershed Protection Buffers apply to all three lakes within Mecklenburg County including Lake Norman, Mountain Island Lake and Lake Wylie. The buffers also apply to all perennial streams within the designated watershed protection areas. The ordinances define perennial streams as streams designated by a solid blue line on a current United States Geological Survey (USGS) topographic map or by local government studies. The buffer widths are defined in the following table:

## Lake Norman Watershed

| Zone | Zoning Jurisdiction | Allowable Built Upon Area[1] | Lake/Stream Buffer |
|---|---|---|---|
| Critical Area (CA) | Davidson | < 24% - Low Density<br>< 50% - High Density | 40 Feet<br>100 Feet |
| Critical Area (CA) | Cornelius | < 24% - Low Density<br>< 50% - High Density | 50 Feet<br>100 Feet |
| Critical Area (CA) | Huntersville | < 24% - Low Density<br>< 50% - High Density | 50 Feet<br>100 Feet |

## Mountain Island Lake Watershed

| Zone | Zoning Jurisdiction | Allowable Built Upon Area[1] | Lake/Stream Buffer |
|---|---|---|---|
| Protected Area (PA) | Cornelius | < 24% - Low Density<br>< 70% - High Density | 50 Feet<br>100 Feet |
| Protected Area 1 (PA1) | Huntersville | < 24% - Low Density<br>< 70% - High Density | 50 Feet<br>100 Feet |
| Protected Area 1 (PA1) | Charlotte/Mecklenburg | < 24% - Low Density<br>< 50% - High Density | 50 Feet<br>100 Feet |
| Protected Area 2 (PA2) | Huntersville | < 24% - Low Density<br>< 70% - High Density | 30 Feet<br>100 Feet |
| Critical Area 1 (CA1) | Huntersville | < 6% - Low Density | 100 Feet or 100 yr. Floodplain (whichever is greater) |
| Critical Area 1 (CA1) | Charlotte/Mecklenburg | < 6% - Low Density | 100 Feet or 100 yr. Floodplain (whichever is greater) |
| Critical Area 2 (CA2) | Huntersville | < 12% - Low Density | 100 Feet or 100 yr. Floodplain (whichever is greater) |
| Critical Area 3 (CA3) | Huntersville | < 12% - Low Density | 100 Feet or 100 yr. Floodplain (whichever is greater) |
| Critical Area 4 (CA4) | Huntersville | < 24% - Low Density | 100 Feet |
| Critical Area 4 (CA4) | Charlotte/Mecklenburg | < 24% - Low Density | 100 Feet or 100 yr. Floodplain (whichever is greater) |

## Upper Lake Wylie Watershed

| Zone | Zoning Jurisdiction | Allowable Built Upon Area[1] | Lake/Stream Buffer |
|---|---|---|---|
| Protected Area (PA) | Charlotte/Mecklenburg | < 24% - Low Density<br>< 70% - High Density | 40 Feet<br>100 Feet |
| Critical Area (CA) | Charlotte/Mecklenburg | < 24% - Low Density<br>< 50% - High Density | 100 Feet<br>100 Feet |

# Lower Lake Wylie Watershed

| Zone | Zoning Jurisdiction | Allowable Built Upon Area[1] | Lake/Stream Buffer |
|---|---|---|---|
| Protected Area (PA) | Charlotte/Mecklenburg | < 24% - Low Density<br>< 70% - High Density | 40 Feet<br>100 Feet |
| Critical Area (CA) | Charlotte/Mecklenburg | < 20% - Low Density<br>< 50% - High Density | 50 Feet<br>100 Feet[2] |

*(1) Structural water quality best management practices are required for all developments exceeding the low density option.*

*(2) For Lower Lake Wylie Watershed only, buffer width is increased 50% for lots with an average slope greater than or equal to 50%. This applies only to new development proposed along the lakeshore, and using the high density option.*

## Measuring Buffers

Stream buffers are measured horizontally from the top of the stream bank on a line perpendicular to the surface water. Lake buffers are measured horizontally from the full pond elevation of each lake, as follows: Lake Norman – 760 feet above sea level, Mountain Island Lake – 648 feet above sea level, Lake Wylie – 569.4 feet above sea level. The buffer line follows the contour line and is not influenced by property lines. The buffer should be recorded on all development plats and individual deeds.

## Additional Buffer Regulations in Mecklenburg County

Since the adoption of the Drinking Water Supply Watershed Protection Buffers, several additional buffer regulations have been passed. When other buffer regulations apply, the more restrictive regulation will always apply.

S.W.I.M., Surface Water Improvement & Management™ Buffers - All jurisdictions within Mecklenburg County have adopted S.W.I.M. buffers. These buffers apply only to streams and are often more restrictive than the drinking water supply buffers. For more information on these regulations, go to http://waterquality.charmeck.org or call (704) 336-5500.

North Carolina Catawba River Basin Riparian Buffers – These regulations were adopted by the State of North Carolina and apply to the entire main stem of the Catawba River from Lake James to the South Carolina border. This includes the entire shoreline of Lake Norman, Mountain Island Lake and Lake Wylie. Generally, the locally adopted Drinking Water Supply Watershed Protection Buffers in Mecklenburg County are more restrictive than these rules. The regulations are found in the North Carolina Administrative Code Section 15A NCAC 02B.0243. For more information on these regulations, go to *www.dem.ehnr.state.nc.us* or call (704) 663-1699.

## General Buffer Prohibitions

The Drinking Water Supply Watershed Protection buffers are generally undisturbed to protect their water quality function. The following are general prohibitions within the buffer:

- No permanent structures, built upon areas, septic tank systems or any other disturbance of existing vegetation is allowed. This also refers to sidewalks, patios, gazebos, brick or concrete walls and out buildings. Pervious asphalt, concrete, any type of gravel and pavers are also considered “built-upon area” and cannot be placed in the buffer.
- No trees larger than 2-inch caliper (measured six inches above the ground) may be removed or damaged.
- No grading, clearing or filling is allowed in the buffer.
- No ponds or structural Best Management Practices (BMPs) are allowed in the buffer.

- No burial of roof drains or other drainage of any type is allowed. All storm water pipes must stop prior to the buffer and discharge as sheet flow.
- No new turf grass can be planted in the buffer (Grass existing prior to the adoption of the ordinance may be maintained).

### General Buffer Allowances

The following activities are allowed within the buffer:

- Minimal hand clearing of small undergrowth and removal of trees 2-inches in caliper or smaller (measured 6 inches above the ground) as approved by the Mecklenburg County Water Quality Program the Mecklenburg County Water Quality Program.
- Stream bank or shoreline stabilization and dredging is allowed if approved by the Mecklenburg County Water Quality Program and Duke Power (for lakes). Note: An application with a buffer restoration plan is required to be submitted and approved prior to beginning work (see Attachment 3).
- The removal of dead or diseased trees, as approved by the Mecklenburg County Water Quality Program.
- The limbing of trees, up to half the distance of their height.
- Pathways that adhere to the Pathway Guidelines (Attachment 1) and are approved by the Mecklenburg County Water Quality Program.
- Irrigation systems that adhere to the Irrigation Installation Guidelines (Attachment 2).
- Piers may encroach in the buffer provided no trees greater than 2-inch caliper (measured 6 inches above the ground) are removed or damaged, slatted decking is used to allow rainwater to pass through, and no roofed structures are placed within the buffer.
- Fences, provided that no trees greater than 2-inch caliper are removed or damaged and are constructed with chain link, split rail or wood slat. No brick or concrete walls are allowed.
- The addition of new trees / shrubs.
- Temporary disturbances of the buffer may be allowed with prior approval from the Mecklenburg County Water Quality Program and shall be evaluated on a case-by-case basis.

### Buffer Plans

Site-specific Buffer Plans must be submitted to the Mecklenburg County Water Quality Program for review and approval in the following situations, to include but not limited to:

1) When stream bank or shoreline stabilization is proposed (this plan must be submitted and approved before the Mecklenburg County Water Quality Program will grant approval, see Attachment 3 for **Application for Temporary Buffer Disturbance**);
2) When removal of any trees greater than 2-inch caliper (measured 6 inches above the ground) is proposed;
3) During new development or the expansion of existing development if the buffer requires enhancement;
4) When any disturbances of existing vegetation is proposed within the buffer;
5) When any land disturbance is proposed or has occurred within the buffer (i.e. grading, cutting, filling, building, soil tilling, etc.). Plan approval will be based on the direct application of these Guidelines as appropriate and on the ability of the buffer to protect water quality.
6) New subdivision plans, which include a watershed buffer must include specific notes relating to the buffer, as specified in Attachment 5.

# V. Maintenance of Existing Buffer Vegetation

## Groundcover

Existing, trees, shrubs, ground covers, natural grasses or perennials should be left in place. Where there is not enough vegetation to control runoff and erosion, a mulch cover of 2 inch minimum depth should be maintained over the entire buffer area. This should be, whenever possible, made up of natural leaf litter as is typically found in an undisturbed wooded area. Where this natural litter is not present at a sufficient depth, it should be supplemented with natural organic mulch such as leaves, leaf mold, wood chips, tree bark or pine needles. Removal of natural leaf fall from within the buffer is prohibited as natural leaf litter provides beneficial results such as enriching the soil, protecting tree roots and absorbing water runoff. Perennial ground cover as specified in Attachment 6 can be used in place of mulch as approved by the Mecklenburg County Water Quality Program.

## Existing Tree Cover

The minimum desired existing tree cover should be retained at a minimum density of at least 10 healthy trees of a minimum 6-inch caliper per 1000 square feet of buffer area. This minimum tree density should be more or less uniformly distributed over the entire buffer area. Pruning of trees within the buffer is limited to the removal of only lateral limbs from no more than the lower 50 percent of the tree's total height. Topping is not allowed. The Ordinances state, "No trees larger than 2-inch caliper are to be removed except for dead or diseased trees." Combinations of larger and smaller trees can also provide an effective buffer. For example, where an adequate density of natural tree cover exists, but there are too few trees of the minimum 6-inch diameter size class, then two trees of at least a 1 1/2-inch caliper may be counted for each deficiency of a larger tree. As an example, if a buffer contained 2500 square feet, the normal standard would be a minimum of 25 six-inch trees. If the buffer had only 10 trees over six inches and the rest were smaller, then the standard would be met with the 10 six-inch trees and 30 (2x15) trees above 1 1/2-inches in caliper.

## Land Clearing

The removal of selective native vines, shrubs, ground covers and small trees (<2-inch diameter) to facilitate a better view or a more aesthetically pleasing natural landscape may be allowed. This thinning operation should be done with hand tools and/or minimal use of herbicides. No grubbing of tree stumps is allowed; however, stump removal with a stump-grinding machine, which causes minimal soil disturbance, is allowed. Natural leaf litter, humus and soil should remain. Additional tree thinning may be permissible with prior approval where thick cover exists and it is desirable to promote a healthy tree cover and produce the most effective buffer. With prior approval from the Mecklenburg County Water Quality Program, the minimum desired tree density standard might be reduced in order to reduce crowding to below 10 trees per 1000 square feet, if the buffer contains a majority of large diameter trees. For every three trees that have a diameter at chest height of over 12 inches, the total number of trees desired within the buffer is reduced by one tree. As an example, if a buffer is 2500 square feet, it should contain a minimum of 25 healthy trees of a minimum 6-inch diameter. Should 15 of these trees be 12 inches in diameter or above, then the minimum desired standard would drop to 20 trees with the lower density being found in the area where the larger trees were predominant.

## VI. Buffer Restoration / Planting New Vegetation in Buffer

### New Tree Cover

In the event that a buffer must be restored or planted with new vegetation due to a violation, shoreline stabilization project, dredging, site mitigation, or other disturbance, the required tree density shall be 10 trees per 1000 square feet and all trees shall have a minimum caliper of 1 1/4-inches measured at 6 inches above the root ball. Larger trees may be required depending on the site conditions. Equivalent combinations of tree, shrub and groundcover may be substituted following the Mecklenburg County Water Quality Program's approval of a site-specific buffer plan (see Attachment 4). All vegetation must be on the approved plant list (Attachment 6).

### New Shrubs and Groundcovers

Planting of additional shrubs, ground covers and perennials is desired if done so with minimal disturbance to root systems of existing trees. Addition of nutrients (fertilizers) into these buffer areas is discouraged except at planting time when mixing nutrients and soil amendments with the backfill soil is acceptable. In the event of buffer restoration or mitigation, the buffer plan should illustrate acceptable ground cover such as two inches of mulch or other approved material.

## VII. Approved Plants for Watershed Buffers

A list of approved trees shrubs and groundcover has been provided in Attachment 6. This list is not comprehensive, but includes species that are native to the Piedmont and tolerate dry to wet conditions. Prior to developing a planting plan, care should be taken in selecting species appropriate for the soil, moisture and light conditions of your specific site. The Mecklenburg County Water Quality Program encourages the planting of native species, however variations from this list may be permitted with prior approval from the Mecklenburg County Water Quality Program. *(The use of invasive, exotic species will not be considered for buffer restoration projects.)*

# Attachment 1

## PATHWAY GUIDELINES FOR WATERSHED BUFFERS

Pathways made of concrete, asphalt, pavers, rock or gravel are not allowed in buffers. Pathways made of materials other than topsoil, mulch, or approved pervious material must meet the following stipulations and must be pre-approved by the Mecklenburg County Water Quality Program. Pathways for handicap access are evaluated on a case-by-case basis.

### Boardwalk:

- Wooden boardwalks are allowed but spaces must be at least 1/4 inch apart between boards. The ground beneath the boardwalk must be comprised of pervious material.
- No trees can be cut or damaged during installation.
- The total impervious area of property may not exceed the amount required by the watershed ordinance. (Boardwalks are not considered impervious areas.)

### Stepping Stones:

- The pathway may be no more than 3 feet wide at any location.
- The rock sections may be no larger than 225 square inches.
- Spaces between all rock sections must be a minimum of 2 inches. Only soil, sand, mulch or vegetation may be installed between or around the rock sections (no gravel).
- The base material must be composed of only soil, sand, mulch or vegetation.
- The pathway should meander through the buffer around trees and should be sloped in a manner as to divert water away from the lake. No trees may be removed or damaged in order to install pathway.
- The total impervious area of property may not exceed the amount required by the appropriate watershed ordinance. (Stepping stones are considered impervious areas.)

## Attachment 2

# IRRIGATION SYSTEM GUIDELINES

1. Homeowners shall notify the Mecklenburg County Water Quality Program the Mecklenburg County Water Quality Program in writing of their intent to install an irrigation system through a buffer. Their name, address, telephone number, and proposed installation date should be included.
2. No trees larger than 2 inches in diameter may be cut from the buffer.
3. No heavy mechanical equipment such as trenchers may be used in the buffer. Only hand clearing and hand digging tools are allowed.
4. No fuel powered pumps are allowed in the buffer. Small electrical pumps are permitted.
5. No impervious pads (concrete, asphalt, etc.) are permitted in the buffer. Wooden frames may be placed around pumps for support.
6. All irrigation lines must be installed in such a way as to prevent the back flow of water to the lake. The use of back flow prevention and foot valves is recommended.
7. Irrigation lines, which are installed through the buffer, should disturb as little area as possible.
8. Erosion control devices such as silt screening should be installed and maintained if the ground is disturbed longer than 24 hours, or if rain is predicted at any time during construction.
9. After installation the disturbed area should be covered with mulch or pine straw.

# Attachment 3
# Application for Temporary Buffer Disturbance

Please complete the following application and submit with the buffer restoration plan

## I. Applicant / Property Owner Information

Name

Mailing Address

Telephone

## II. Location of Proposed Buffer Disturbance

Address

Subdivision Name Lot #

## III. Reason for Proposed Buffer Disturbance

a. Shoreline / stream stabilization
b. Dredging

c. Other, explain

## IV. Proposed Work Schedule

Estimated Project Start Date

Estimated Project Completion Date (including buffer restoration)

## V. Contractor Information *(please list all parties involved in proposed disturbance and restoration activities)*

Name

Address

Telephone

Name

Address

Telephone

Application for Temporary Buffer Disturbance (continued)

### VI. Buffer Disturbance and Restoration Plan

(see Attachment 4 of the Watershed Buffer Guidelines for Mecklenburg County for a sample buffer plan).

### Please attach a plan which illustrates the following:

- Scaled map of lot showing buffer delineation (copy of survey is usually acceptable)
- Map or sketch of buffer area showing proposed disturbed area (should also show equipment access route)
- Square footage of proposed disturbed area in buffer
  **Note: Disturbed area would include all areas of the buffer where the natural ground cover or vegetation has been graded, removed or altered.*
- Proposed number of trees greater than 2 inches in diameter that will be removed from the buffer
- Proposed location, number, and species of all trees to be planted in disturbed area
  **Note: Buffer restoration must occur at a density of 10 trees per 1000 square feet of disturbed area. New trees must be a minimum caliper of 1 1/4 inches measured at 6 inches above the root ball. See Attachment 6 of the Watershed Buffer Guidelines for Mecklenburg County for a list of approved tree species.*
- Type of ground cover to be placed in disturbed area (i.e. mulch, pine straw, etc.)
- Proposed planting schedule and deadline for completion of restoration activities

### Mail or Fax Application and Plan to:

Mecklenburg County Water Quality Program
Land Use & Environmental Services Agency

700 North Tryon Street, Suite 205
Charlotte, NC 28202
(704) 336-5500
Fax (704) 336-4391

# Attachment 4

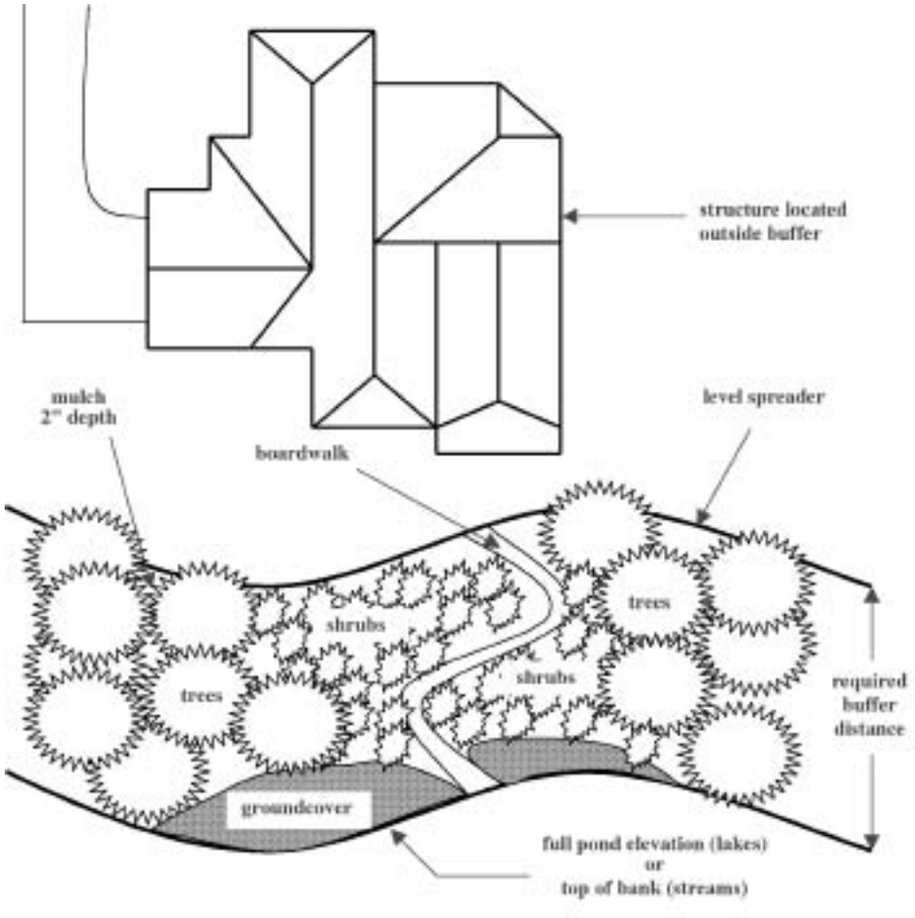
## SAMPLE BUFFER RESTORATION PLAN

### Specifications Which Must Be Included In The Buffer Plan:

- All plant species to be placed in the buffer must be identified.
- The distances between the different plantings must be specified.
- Unless otherwise specified by the Mecklenburg County Water Quality Program, all plantings must comply with the density and size requirements specified in Section VI **Buffer Restoration / Planting New Vegetation in Buffer** which is located on page 7.
- All plantings should be of a variety specified in Attachment 6 entitled **approved groundcovers, tree & shrubs for watershed buffers.**
- Mulch should be specified at a minimum depth of 2 inches.

If the plan is being submitted for shoreline stabilization or dredging, it should illustrate the following:

- Equipment access and staging area and the restoration plans for these areas.
- Existing trees to be removed.
- Width and length of total buffer disturbance, including rip rap or seawall location.



## Attachment 5

# SUBDIVISION PLAN REQUIREMENTS FOR WATERSHED BUFFERS

**A Buffer Plan must be included in the Subdivision Plan package. Components of this Plan may be included on a separate plan sheet or it may be included as part of the grading and drainage plan sheets. The Buffer Plan must contain the following:**

1. The entire buffer area clearly marked or shaded.
2. The point from which the buffer was measured.
3. Any activity or disturbance in the buffer should be identified and "magnified" on the Buffer Plan. Specific details should be given on pathways, boardwalks, shoreline stabilization, etc.
4. If a disturbance is proposed in the buffer, a restoration plan showing replantings should be included as part of the Buffer Plan. The restoration should follow the guidelines stated in Section VI **Buffer Restoration / Planting New Vegetation in Buffer**. Specifics should be stated such as groundcover, tree and shrub types and planting densities.

**The Buffer Plan MUST CLEARLY STATE the following:**

1. No disturbance whatsoever is allowed in the buffer.
2. No sediment basins, open channels, or piped storm water is allowed in or through the buffer. Drainage areas should be designed to allow water to sheet flow across the buffer to filter out pollutants. Plunge pools, level spreaders, diversion devices or wetland flow should be used to provide this sheet flow.
3. No heavy equipment is allowed in the buffer.
4. The buffer will be clearly marked by flagging or fencing prior to any construction at the site.
5. Any activity in the buffer will comply with the Watershed Buffer Guidelines for Mecklenburg County, NC.
6. The Mecklenburg County Water Quality Program will be notified of any changes to the approved Buffer Plan.
7. The buffer will be permanently marked on each individual lot using iron stakes in concrete.
8. Buffer restrictions will be placed on each individual deed.
9. Educational materials concerning the buffer will be distributed to each homeowner and builder prior to construction or occupancy.
10. All sub-contractors will be notified of the buffer regulations prior to development.

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## Attachment 6 - APPROVED GROUNDCOVERS, TREE & SHRUBS FOR WATERSHED BUFFERS

| Ferns | | Wildflowers | | Woody Vines | |
|---|---|---|---|---|---|
| Braken fern | Maidenhair fern | Black cohosh | Eastern columbine | Cross vine | Virginia creeper |
| Broad beech fern | New York fern | Blackeyed Susan | Goatsbeard | Trumpet honeysuckle | Virgin's bower |
| Christmas fern | Royal fern | Cardinal flower | Green and gold | | Yellow jessamine |
| Cinnamon fern | Sensitive fern | Coreopsis | Wild geranium | | |
| Ebony Spleenwort | Southern lady fern | Creeping phlox | Yellow-root | | |

# Attachment 6 - APPROVED GROUNDCOVERS, TREE & SHRUBS FOR WATERSHED BUFFERS

| Group | Common Name | Botanical Name | Light Conditions | Soil Cond. | Ht. / Diameter |
|---|---|---|---|---|---|
| **ConiferousTrees** | Shortleaf Pine | *Pinus echinata* | sun/partial shade | dry | 70-100 ft./2-3 ft. |
| | Virginia Pine | *Pinus virginiana* | sun | dry | 40-70 ft./1-2 ft. |
| | Eastern Red Cedar | *Juniperus virginiana* | sun | dry/moist | 40-60 ft./1-2 ft. |
| **Deciduous Trees** | Ash, Green | *Fraxinus pennsylvanica* | sun | moist | 60-100 ft./1.5 ft. |
| | Basswood (Linden) | *Tilia heterophylla* | sun | moist | 60-100 ft./ 2-3 ft. |
| | Beech, American | *Fagus grandifolia* | sun | moist | 80-100 ft./3 ft. |
| | Bigleaf Snowbell | *Styrax grandifolius* | partial shade | moist | 20 ft. |
| | Birch, River (Red Birch) | *Betula nigra* | sun/partial shade | wet | 60-80 ft./1-2 ft. |
| | Blackhaw | *Viburnum prunifolium* | partial shade | moist | 20-25 ft. |
| | Buckeye, Painted | *Aesculus sylvatica* | partial shade | moist/dry | 20-25 ft. |
| | Carolina Silverbell | *Halesia carolina* | sun/partial shade | moist | 50-60 ft. |
| | Cherry, Black | *Prunus serotina* | sun | moist | 80 ft./2 ft. |
| | Cottonwood, Eastern (Carolina Poplar) | *Populus deltoides* | sun/partial shade | wet1 | 00 ft./5 ft. |
| | Dogwood, Flowering | *Cornus florida* | sun/partial shade | moist/dry | 30-40 ft./12-18 ft. |
| | Dogwood, Silky | *Cornus amomum* | sun/partial shade | wet/moist | 12 ft. |
| | Elm, Slippery (Red Elm) | *Ulmus rubra* | sun | moist | 70-80 ft./2-3 in. |
| | Fringe Tree | *Chionanthus virginicus* | sun/partial shade | moist/dry | 30 ft. |
| | Hickory, Bitternut | *Carya cordiformis* | sun | moist | 60-80 ft./1-2 ft. |
| | Holly, American | *Ilex opaca* | partial shade | moist | 15-30 ft. |
| | Hornbeam, American (Blue Beech, Ironwood) | *Carpinus caroliniana* | sun/partial shade | moist | 35 ft./1 ft. |
| | Hornbeam, Hop | *Ostrya virginiana* | partial shade | dry/moist | 35 ft. |
| | Maple, Ash-leaved (Boxelder) | *Acer negundo* | sun/partial shade | moist/we | t30-60 ft./2.5 ft. |
| | Maple, Red | *Acer rubrum* | sun | moist/dry | 60-90 ft./3 ft. |
| | Mulberry, Red | *Morus rubra* | sun | moist | 60 ft./2 ft. |
| | Oak, Southern Red | *Quercus falcate* | sun | dry | 80-100 ft. |
| | Oak, Scarlet | *Quercus coccinea* | sun | dry | 70-80 ft. |
| | Oak, Swamp Chestnut | *Quercus michauxii* | sun | moist | 60-80 ft./2-3 ft. |
| | Oak, Water | *Quercus nigra* | sun | moist/wet | 60-100 ft./2.5 ft. |
| | Oak, White | *Quercus alba* | sun/partial shade | dry/moist | 80-100 ft./3-4 ft. |
| | Oak, Willow | *Quercus phellos* | sun | moist | .90-100 ft./1-2 ft. |
| | Paw Paw | *Asimina triloba* | sun/partial shade | moist | 25 ft./1-2 ft. |

| Group | Common Name | Botanical Name | Light Conditions | Soil Cond. | Ht. / Diameter |
|---|---|---|---|---|---|
| | Persimmon | *Diospyros virginiana* | sun/partial shade | moist/dry | 20-70 ft./ 1-2 ft. |
| | Redbud (Judas Tree) | *Cercis canadensis* | sun | moist | 40 ft./8 in. |
| | Silverbell, Carolina | *Halesia carolina* | partial shade | moist | 30-50 ft./1 ft. |
| | Sourwood | *Oxydendrum arboreum* | sun/partial shade | moist/dry | 20-30ft./10-12in. |
| | Sycamore (Planetree) | *Platanus occidentalis* | sun | wet | 60-100 ft./3-5 ft. |
| | Tulip Poplar (Yellow Poplar) | *Liriodendron tulipifera* | sun | moist | 80-120 ft./3-4 ft. |
| | Tupelo, Black (Blackgum) | *Nyssa sylvatica* | sun | moist | 50-100 ft./2-3 ft. |
| | Viburnum, Possumhaw | *Viburnum nudum* | partial shade | moist | 15-20 ft. |
| | Willow, Black (Swamp Willow) | *Salix nigra* | sun/partial shade | wet | 80-100 ft./2.5 ft. |
| **Shrubs** | Alder, Tag | *Alnus serrulata* | sun/partial shade | wet/moist | 3-6ft. |
| | Azalea-Pinxter | *Rhododendron nudiflorum* | partial shade | moist | 4-10 ft. |
| | Beautyberry, American | *Callicarpa americana* | sun/partial shade | moist/dry | 5-10 ft. |
| | Buckeye, Bottlebrush * | *Aesculus parviflora* | sun/partial shade | moist | 15-20 ft. |
| | Buttonbush | *Cephalanthus occidentalis* | sun/partial shade | wet/moist | 3-6 ft. |
| | Mountain Laurel | *Kalmia latifolia* | partial shade | moist/dry | 20-25 ft./8-10 in. |
| | Possum haw (Deciduous holly) | *Ilex deciduas* | sun/partial shade | dry/moist | 20 ft. |
| | Red Chokeberry | *Sorbus arbutifolia* | sun/partial shade | wet/moist | 6-9 ft. |
| | Rosebay Rhododendron | *Rhododendron maximum* | partial shade | moist | 30 ft./8-10 in. |
| | Sparkleberry, Huckleberry | *Vaccinium arboreum* | sun/partial shade | moist/dry | 6-10 ft. |
| | Spicebush | *Lindera benzoin* | shade | wet/moist | 6-12 ft. |
| | St. John's Wort | *Hypericum hypericoides* | sun/partial shade | moist/dry | 1-3 ft. |
| | Strawberry Bush | *Euonymus americanus* | shade | dry/moist | 3-5 ft/ |
| | Sweet Shrub | *Calycanthus floridus* | sun/partial shade | moist | 6-10 ft. |
| | Waxmyrtle * (Southern Bayberry) | *Myrica cerifera* | sun/partial shade | dry/wet | 30 ft. |
| | Willow, Virginia * | *Itea virginica* | sun/partial shade | dry/moist | 6 ft. |
| | Witch-hazel | *Hamamelis virginiana* | partial shade | moist | 30-35 ft. |

** Native, but not necessarily to the Piedmont region of North Carolina*

**References:** Brown and Kirkman, *Trees of Georgia and Adjacent States*,
Radford, Ashe, Bell, *Manual of the Vascular Flora of the Carolinas*


## Mecklenburg County Water Quality Program

**Land Use & Environmental Services Agency**

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*http://waterquality.charmeck.org*