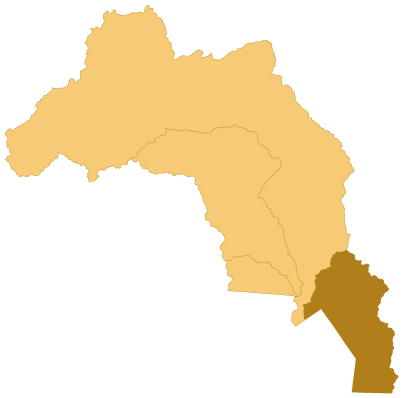
CHAPTER THREE

Catawba River Subbasin

HUC 03050103



Includes Sugar Creek, Twelvelmile Creek, Cane Creek & Fishing Creek

General Subbasin Description

This eight-digit hydrologic unit code (HUC) subbasin, with an area of about 406 square miles, is the smallest eight-digit HUC in the Catawba River basin and includes DWQ subbasins 03-08-33 (the lower portion), 03-08-34 and 03-08-38 (See map in *Appendix 3-D*). Irwin, Sugar, Little Sugar, McMullen, McAlpine, Sixmile, Twelvemile, and Waxhaw Creeks begin within this subbasin and flow southwest into South Carolina.

The land cover in the subbasin is mostly developed land (52%), with some agricultural lands (31%) and little forested lands (14%) further south. The major municipal area is the City of Charlotte which covers roughly half of this HUC. This subbasin has the largest percentage of impervious surface (in which water cannot penetrate) than any other subbasin in the Catawba River basin. This can cause some unique water quality issues and is discussed further throughout the Chapter.

Despite the fact that this subbasin is the smallest in size, it has a population of only 23,000 less than the largest subbasin (03050101) according to the most recent population data from the 2000 census. Population density in the upper two-thirds of the subbasin are roughly 1,000 to 3,265 persons per square mile. The lower third ranges from four to 150 persons per square mile. See the *Population & Land Cover Section* of this chapter for additional information.

Subbasin at a Glance

Counties:

Mecklenburg and Union

Municipalities:

Charlotte, Indian Trail, Marvin, Matthews, Mineral Springs, Mint Hill, Monroe, Pineville, Stallings, Waxhaw, Weddington, and Wesley Chapel

Ecoregions:

Southern Outer Piedmont and Carolina Slate Belt

Permitted Facilities:

NPDES WWTP:..... 14
Major 4
Minor 10
NPDES NonDischarge: 9
Stormwater:..... 171
General 138
Individual 33
Animal Operations: 0

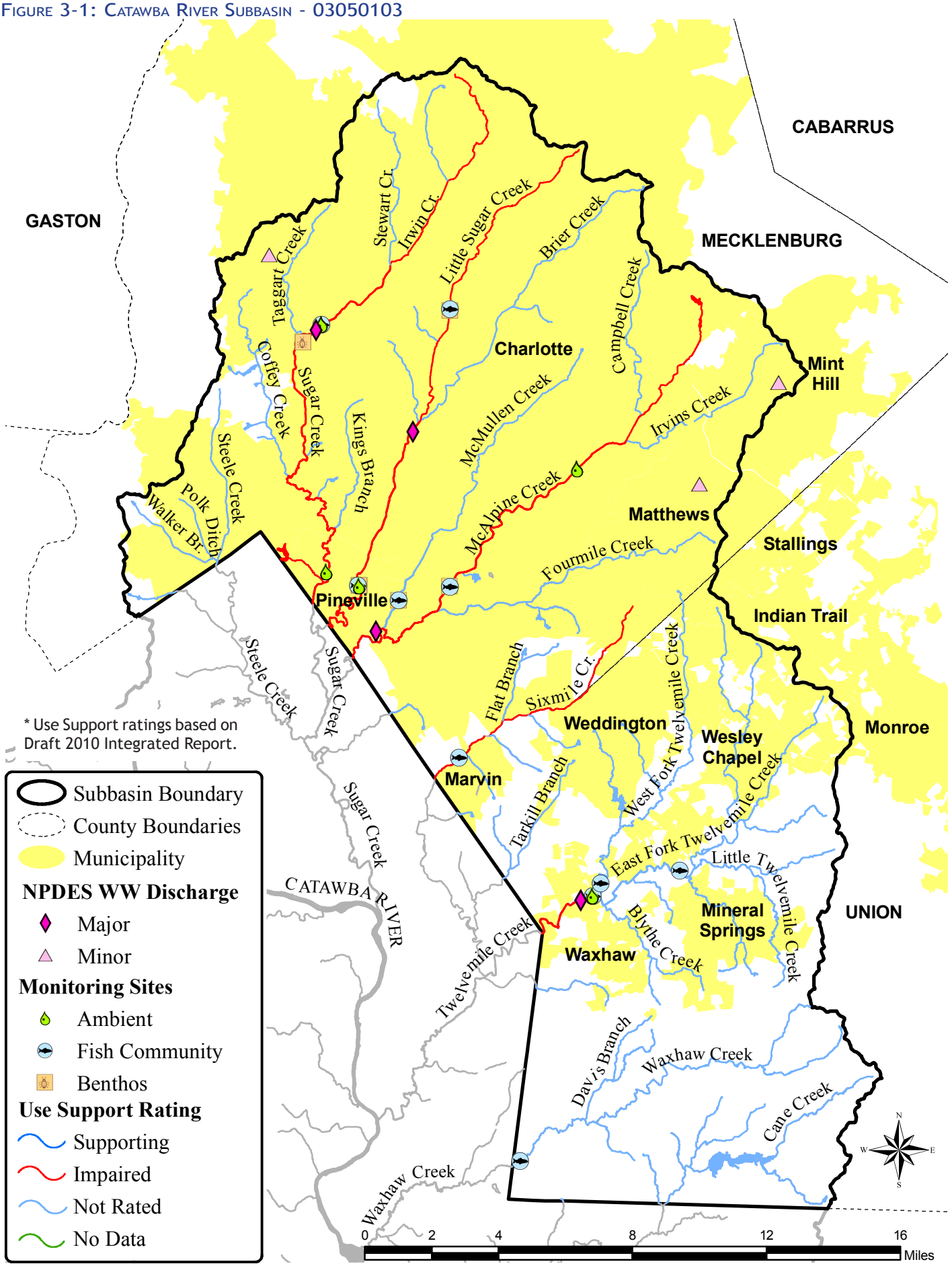
Population:

534,539

% of Impervious Surface:

14.9%

FIGURE 3-1: CATAWBA RIVER SUBBASIN - 03050103



Water Quality Overview

Water quality within this subbasin is influenced by ecoregions, land use and population. Water Quality is generally greater in the lower non-developed regions than the upper portion of this subbasin near major urban centers. The major water quality issues in this subbasin originate from the effects of a densely populated area with large amounts of impervious surfaces. This subbasin had the highest levels of nutrients and fecal coliform bacteria measured within the Catawba basin. These impacts as well as high turbidity levels are common for large urban areas. The lower portion of this subbasin had high levels of turbidity due to increasing development. This portion also includes the Waxhaw Creek watershed which DWQ has recognized as one of the most biologically important aquatic habitats in the basin due to the presents of the endangered Carolina Heel splitter Mussel among other reasons.

Local governments, watershed groups, natural resource agencies and local stakeholders have been actively working throughout this subbasin to assess some of these issues and develop implementation plans to deal with these impacts. Many of these efforts are currently on-going and others have been completed and resulted in measurable water quality improvements. These topics and others are discussed in greater detail throughout this Chapter.

Biological Data

Biological samples were collected during the spring and summer months of 2004 and 2007 by DWQ-Environmental Sciences Section as part of the five year basinwide sampling cycle with exception to special studies. Overall, nine biological sampling sites were monitored within the Catawba River Watershed. Of those nine sites, two were benthic stations and seven were fish community stations. Five of those nine sites (all fish) were sampled for the first time. Each site is given a rating or bioclassification of Excellent, Good, Good-Fair, Fair, Poor or Not Rated. The Excellent, Good, Good-Fair and Not Rated are ratings given to streams which are Supporting aquatic life. Streams that are given a Fair or Poor rating are Impaired and do not support aquatic life. The ratings given for each five year sampling cycle station can be seen in Table 3-1. The last column of this table includes the results of the current cycle (2003-2007) and the results of the previous sampling cycle (1998-2002) taken.

Little Sugar Creek and Waxhaw Creek were not sampled for fish and Waxhaw Creek and McAlpine Creek were not sampled for macroinvertebrates due to low flows in 2002 and 2007. Sugar Creek at SC-160 was not sampled in 2007 due to high flows. Due to the number of new sampling sites in 2007, there is not enough data for a pie chart comparison (as seen in previous chapters).

Table 3-1: Biological Sampling Locations and Ratings for 03050103, 2002 - 2007

Station ID**	Waterbody	Assessment Unit #	Description	County	Site Location	Sample Results
BENTHOS SAMPLE SITES						
CB157	Sugar Cr.	11-137b	From SR-1156 Mecklenburg to Hwy 51	Mecklenburg	SR-1156	`07 - Fair `02 - Poor
CB146	Little Sugar Cr.	11-137-8b	From Archdale Rd to NC-51	Mecklenburg	NC-51	`07 - Fair `02 - Poor
FISH COMMUNITY SAMPLE SITES						
CF23*	Irwin Cr.	11-137-1	From source to Sugar Creek	Mecklenburg	off US-521	`04 - Poor
CF28	Little Sugar Cr.	11-137-8b	From Archdale Rd to NC-51	Mecklenburg	NC-51	`07 - Fair `99 - Good-Fair
CF39*	McAlpine Cr.	11-137-9c	From NC-51 to NC-521	Mecklenburg	NC-51	`04 - Fair
CF71*	McMullen Cr.	11-137-9-5	From source to McAlpine Creek	Mecklenburg	off NC-51	`07 - Good
CF59*	W FK Twelvemile Cr.	11-138-1	From source to Twelvemile Creek	Union	SR-1321	`07 - Good
CF60*	E FK Twelvemile Cr.	11-138-2	From source to Twelvemile Creek	Union	SR-1008	`07 - Good
CF58	Waxhaw Cr.	11-139	From source to North Carolina-South Carolina State Line	Union	SR-1103	`07 - Good `97 - Excellent

* = New station location; therefore, no data for 2002.
** = See Figure 3-1 for locations on map.

Fish Kills in the Catawba River Subbasin

Between 2003 and 2007, two fish kills were investigated within the Catawba River subbasin. Below is a brief description of each investigation. For more detailed information see *pages 76 & 77* of the 2008 Catawba Basinwide Assessment Report.

Stewarts Creek:

In July of 2007, a sanitary sewer overflow from an industrial property was responsible for a relatively small fish kill event which resulted in the mortality of about 40 sunfish. The overflow, which lasted about two or three hours, contained at least one type of dye which colored the water a purple/blue.

Little Sugar Creek:

In September 2007, ValleyCrest Landscape Development, Inc. was contracted by Carolina Medical Center (CMC) in Charlotte to clean the concrete areas around the facility. The company used a degreaser (Orange Tough 90) to power-wash the area. The degreaser continuously drained into the stormwater system for the 11 hour duration of the cleaning. The stormwater system discharged into Little Sugar Creek killing up to 15,000 fish in a 1.19 mile stretch of the creek. Enforcement action was initiated by DWQ-MRO. The landscaping company was issued an NOV/NRE and subsequently fined $8,508.22 for the release of pressure washing wastewater, a stream standard violation and a large fish kill. The penalty was paid in full on in February of 2008.

Stream Flow & Drought

The rate at which a volume of water moves through a stream (the flow rate) can have a negative impact on water quality. In particular, droughts can have major effects on water quality parameters such as dissolved oxygen, turbidity, pH, and others due to extremely low stream flow. Therefore, it is useful to track changes in stream flow over the course of the assessment period to see when drought or high flow events might be present. A significant drought affected the Catawba River Basin from March 2007 to beyond the end of the assessment period.

Figure 3-2: Flow Rates of Five USGS Gage Stations in HUC 03050103 Between 1997 & 2007

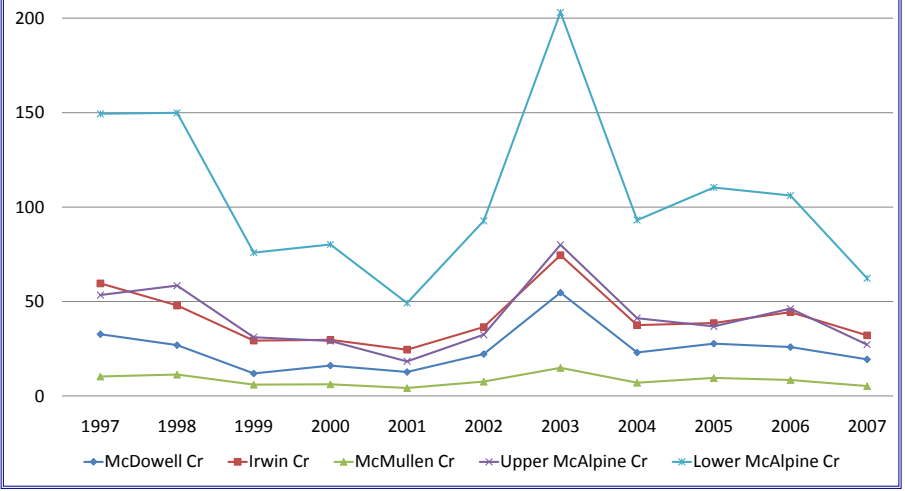


Figure 3-2 shows the yearly averages for five different USGS gage stations spread through the 03050103 HUC between 1997 and 2007. The figure also shows the drought that impacted the basin between 1999 and 2002 as well as the impact from heavy rain events in 2003 and the three hurricanes that occurred between mid 2004 to mid 2005.

Ambient Data

Chemical and physical samples are taken by DWQ throughout the basin once a month. A majority of the ambient stations are associated with waterbody locations where potential pollution could occur from known land use activities and are not random. There are also portions of the watershed where no water quality data is collected; therefore, conclusions can not be drawn on the value of water quality in those areas. Parameters collected at each site depend on the waterbody classification, but typically include conductivity, dissolved oxygen, pH, temperature, turbidity, nutrient measurements, metals, and fecal coliform bacteria. Each classification has an associated set of standards the parameters must meet in order to be considered as supporting its designated uses. For more information on waterbody classifications, see Section 2.2 of the *Supplemental Guide to North Carolina's Basinwide Planning*. Ten sample results are required within the five year data collection window in order to evaluate the water quality parameter and compare it to the water quality standards. For more information on ambient monitoring and seasonal variation in this basin, see the *Catawba River Basin Ambient Monitoring System Report*.

The ambient data is used to develop use support ratings every two years, which are then reported to the EPA via the Integrated Report (IR). The IR is a collection of all monitored waterbodies in North Carolina and their water quality ratings. The most current IR is the 2008 version and is based on data collected between 2002 and 2006. The ambient data reported in this basin plan was collected between 2004 and 2008 and will be used for the 2010 IR. If a waterbody receives an Impaired rating, it is then placed on the 303(d) Impaired Waters List. The Catawba portion of the Draft 2010 IR can be found in *Appendix 3-A* and the Final 2008 IR can be found on the *Modeling and TMDL Unit's website*.

During the current sampling cycle (January 2004 and January 2008), five Ambient Monitoring Systems (AMS) stations collected ten or more samples and were used for use support assessment (see Figure 3-1 for station locations). There were four Random Ambient Monitoring Systems (RAMS) stations sampled within the basin between 2007 and 2008, two of which were located in this subbasin and are listed at the bottom of Table 3-2.

Five of the ambient stations are rated Impaired for exceeding copper, lead, zinc, mercury and/or turbidity standards (Table 3-2). A station is rated Impaired if 10.1% of the samples collected in a given sampling cycle are over the State's standards for any given parameter. For example, if 10.3% of samples taken between 2004 and 2008 are over the 50 NTU standard for turbidity, that stream segment is then rated as Impaired and placed on the 303(d) Impaired Waters List.

Of the seven total ambient stations, none are Impacted (See Table 3-2). For the purposes of this plan, any site with 7.1% to 10.0% of samples over a parameters State standard will be considered Impacted. The term *Impacted* is not an official rating by DWQ and is used to indicate streams with potential of becoming impaired in the near future. These impacted waters are identified to allow targeting of resources to prevent further degradation.

Table 3-2: Ambient Monitoring Stations in the HUC 03050103

Station ID	Current Status	Waterbody	AU#	Location	Impaired* (by Parameter)	Impacted (by Parameter)
C8896500	Active	Irwin Cr.	11-137-1	Irwin Creek WWTP near Charlotte	Turbidity (15.3%) Copper (38.5%) Lead (23.1%) Zinc (23.1%)	---
C9050000	Active	Sugar Cr.	11-137c	NC-51 at Pineville	Copper (46.2%)	---
C9210000	Active	Little Sugar Cr.	11-137-8b	NC-51 at Pineville	Copper (30.8%)	---
C9370000	Active	McApline Cr.	11-137-9	SR-3356 Sardis Rd near Charlotte	---	---
C9819500	Active	Twelvemile Cr.	11-138	NC-16 near Waxhaw	Turbidity (13.3%) Copper (23.1%)	---
C9085000	`07-`08 RAMS	Little Sugar Cr.	11-137-8a	East Morehead St. in Charlotte	Turbidity (20.8%) Copper (33.3%) Mercury (12.5%)	---
C9620000	`07-`08 RAMS	McMullen Cr.	11-137-9-5	Park Vista Cr. in Pineville	---	---

* Data collected between 2004-2008 and will be reflected on the 2010 Draft Integrated Report. Impaired segments may be seen as category 4 or 5. For more details about the Integrated Report and category definitions see the *Methodology Chapter.*

The following discussion of ambient monitoring parameters includes graphs showing the median and mean concentration values for all ambient stations in this watershed for a specific parameter over a 12 year period (1997-2008). Each major parameter is discussed in this Section even if no current impairment exists. These graphs are not intended to provide statistically significant trend information, but rather an idea of how changes in land use conditions or climate conditions can effect parameter readings over the long term. The difference between median and mean results indicate the presence of outliers in the data set. Box and whisker plots of individual ambient stations were completed by parameter for data between 2002 and 2007 by DWQ's Environmental Sciences Section (ESS) and can be found in the *Catawba River Basin Ambient Monitoring System Report*.

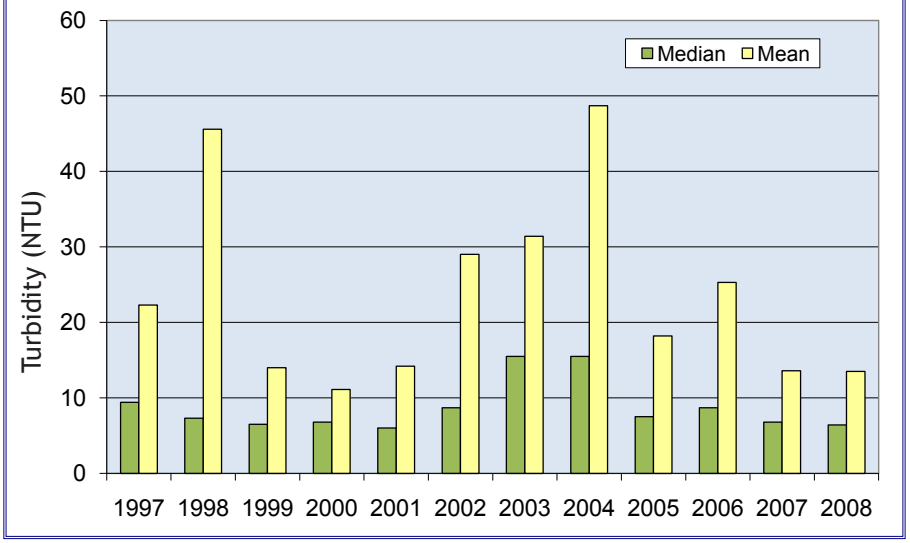
Turbidity

Turbidity is a measure of cloudiness in water and is often accompanied by excessive sediment deposits in the streambed. Excessive sediments deposited on stream and lake bottoms can choke spawning beds (reducing fish survival and growth rates), reduce fish food sources, fill in pools (reducing cover from prey and high temperature refuges), and reduce habitat complexity in stream channels. Excessive suspended sediments can make it more difficult for fish to find prey and at high levels can cause direct physical harm, such as clogged gills. Sediments can cause taste and odor problems, block water supply intakes, foul water treatment systems, and fill reservoirs (USEPA, 1999 and Waters, 1995).

The NC standard for turbidity in freshwater streams is 50 NTUs. As seen in Table 3-2, three stream segments are Impaired for turbidity in this subbasin. The highest percent of turbidity exceedances can be seen at site C9085000 (Little Sugar Creek) with 20.8% of samples exceeding the standard. For more specific information about this sample site, see *Sugar Creek (0305010301)* watershed discussion below.

Figure 3-3 shows the mean and median of turbidity levels for all samples taken over the course of 12 years in the Catawba River subbasin. The highest yearly averages for turbidity were recorded in 1998 and 2004. However, the highest percent of standard violations for turbidity were in 2003, 2004 and 2006 (15%, 15% and 13% respectively).

FIGURE 3-3: SUMMARIZED TURBIDITY VALUES FOR ALL DATA COLLECTED AT AMBIENT SAMPLING STATIONS IN HUC 03050103



Soil erosion is the most common source of turbidity and sedimentation and, while some erosion is a natural phenomenon, human land use practices accelerate the process to unhealthy levels. Construction sites, mining operations, agricultural operations, logging operations, excessive stormwater flow off impervious surfaces are all potential sources. The distribution of turbidity violations and sample locations make it difficult to isolate a single source of erosion in the Catawba River watershed. It appears, however, that violations are highest near urban areas and transitional suburban areas. This trend demonstrates the importance of *protecting and conserving stream buffers and natural areas*.

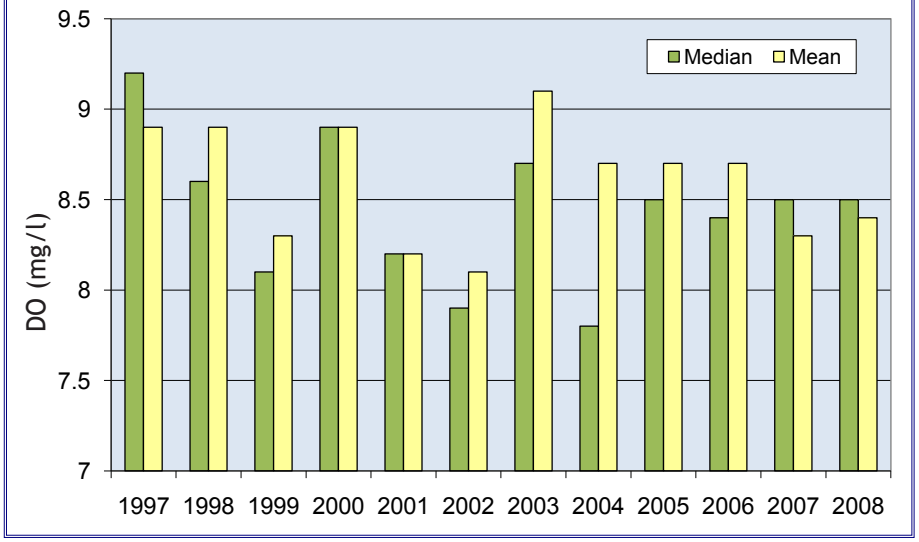
Dissolved Oxygen

Dissolved Oxygen (DO) can be produced be turbulent actions, such as waves, rapids or waterfalls that mix air into the water. High levels are found mostly in cool swift moving waters and low levels are found in warm slow moving waters. In slow moving waters, such as reservoirs and estuaries, depth is also a factor. Wind action and plants can cause these waters to have a higher dissolved oxygen concentration near the surface and decline to as low as zero at the bottom.

The NC standard for DO in freshwater is no less than a daily average of 5.0 mg/l (milligrams per liter of water) with a minimum instantaneous value of no less than 4 mg/l.

Figure 3-4 shows the mean and median of DO levels for all samples taken over the course of 12 years in the Catawba River subbasin. The lowest yearly average for DO was recorded in 2002. The highest percent of standard violations for DO occurred in 2001, 2002 and 2007 (7%, 7% and 8% respectively). Dissolved Oxygen can be strongly influenced by water temperature and drought. The low average recorded in 2002 was likely caused by drought.

FIGURE 3-4: SUMMARIZED DO VALUES FOR ALL DATA COLLECTED AT AMBIENT SAMPLING STATIONS IN HUC 03050103



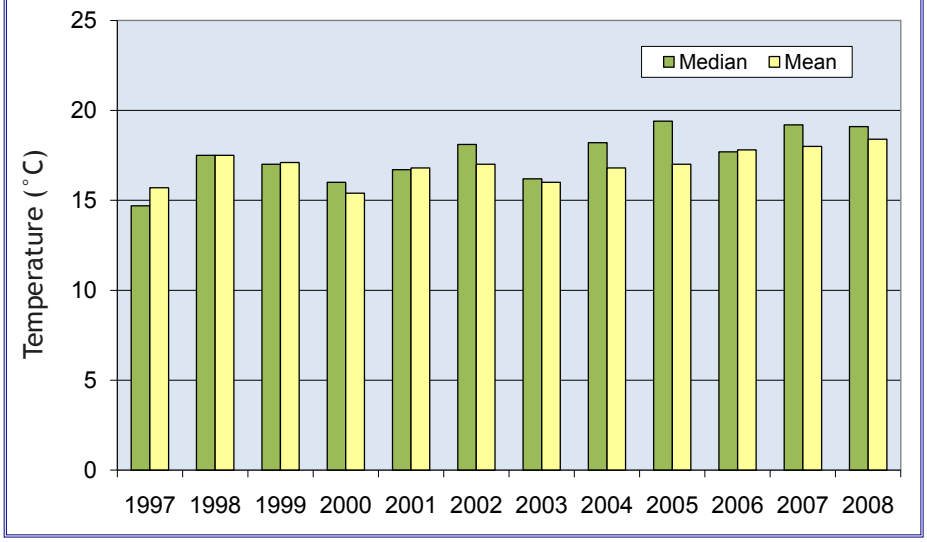
Temperature

All aquatic species require specific temperature ranges in order to be healthy and reproduce. An aquatic species becomes stressed when water temperatures exceed their preferred temperature range, and stressed fish are more susceptible to injury and disease.

NC Water quality standards state that discharge from permitted facilities in the lower piedmont/coastal plain should not exceed the natural temperature of the water by more than 2.8˚C (5.04˚F) and that waters should never exceed 32˚C (89.6˚F) for the upper piedmont area. No stations in this subbasin exceeded state standards for temperature during this sampling cycle (see Table 3-2).

Figure 3-5 shows the mean and median of temperature levels for all samples taken over the course of 12 years in the Catawba River subbasin. The highest yearly average for temperature was recorded in 2008. During this sampling cycle, there was only one sample over the temperature standard which was at station C9210000 - Little Sugar Creek.

Figure 3-5: Summarized Temperature Values for All Data Collected at Ambient Sampling Stations in HUC 03050103



Fecal Coliform Bacteria

The presence of fecal coliform bacteria (FCB) in aquatic environments indicates that the water has been contaminated with the fecal material of humans or other warm blooded animals and its associated pathogens or disease producing bacteria or viruses. The presence of fecal contamination is an indicator that a potential health risk exists for individuals exposed to this water. Fecal coliform bacteria may occur in ambient water as a result of the overflow of domestic sewage and from other nonpoint sources of human and animal waste, including pets, wildlife and farm animals.

The FCB standard for freshwater streams is not to exceed the geometric mean of 200 colonies/100 ml or 400 colonies/100 ml in 20% of the samples where 5 samples have been taken in a span of 30 days. Only results from 5 samples in 30 days (5-in-30) are used to indicate whether the stream is Impaired or Supporting. Four of the AMS stations in the Catawba River subbasin recorded FCB levels above a geometric mean of 200 colonies/100 ml or 400 colonies/100 ml in 20% of samples taken between 2004 and 2008 Table 3-3. However, since none of the stations received a 5-in-30 study during this time period, none will be Impaired for FCB on the 2008 or 2010 Impaired Waters List. For more specific information about these sample sites, see *Appendix 3-C*.

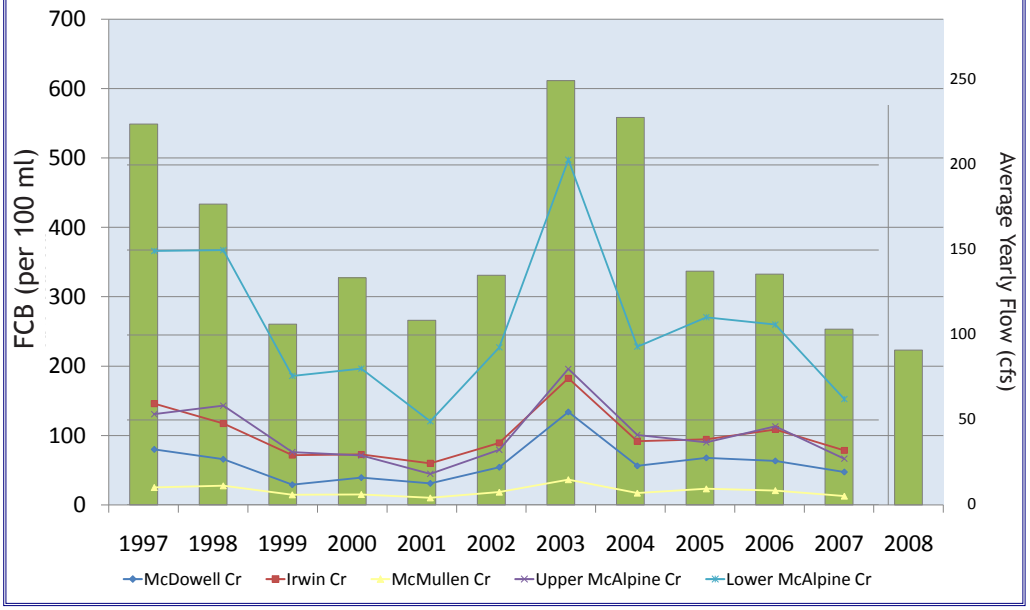
Table 3-3: Waters with Elevated FCB Levels & Without 5-in-30 Studies.

Station ID	Waterbody	Class.	AU#	Location	Geometric Mean	# of Samples Above 400 colonies/100ml	% of Samples Above 400 colonies/100ml
C8896500	Irwin Cr.	C	11-137-1	Irwin Creek WWTP near Charlotte	328	22 out of 58	38%
C9050000	Sugar Cr.	C	11-137c	NC-51 at Pineville	376	21 out of 58	36%
C9210000	Little Sugar Cr.	C	11-137-8b	NC-51 at Pineville	347	24 out of 58	41%
C9370000	McApline Cr.	C	11-137-9	SR-3356 Sardis Rd near Charlotte	373	23 out of 60	38%

Figure 3-6 shows the geometric mean of FCB levels for all samples taken over the course of 12 years in the Catawba River subbasin. The geometric mean is a type of mean or average, which indicates the central tendency or typical value of a set of numbers.

The highest yearly geometric mean for FCB was recorded in 2003. This figure also includes the yearly average stream flow, as seen in Figure 3-2, to show how flow can be closely linked to FCB levels.

Figure 3-6: Summarized Fecal Coliform Bacteria Values for All Data Collected at Ambient Sampling Stations in HUC 03050103 with Overlaying Flow



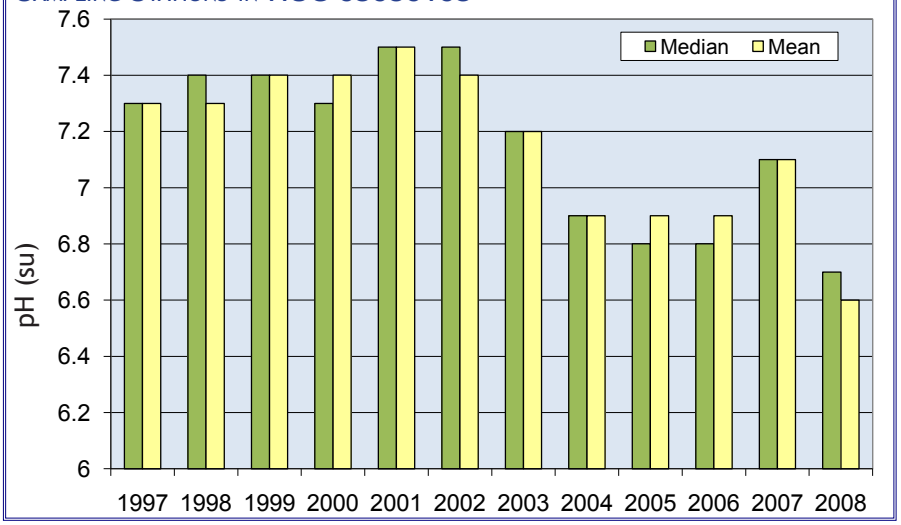
pH

pH is a measure of hydrogen ion concentration that is used to express whether a solution is acidic or alkaline (basic). Lower values can have chronic effects on the community structure of macroinvertebrates, fish and phytoplankton. Changes in the pH of surface waters occur primarily through point source discharges and natural fluctuations. Changes can also occur during accidental spills, acid deposition (i.e.; rain, snow) and algal blooms.

The water quality standards for pH in surface freshwater is 6.0 to 9.0su. As seen in Table 3-2, no stations had pH standard violations during this sampling cycle.

Figure 3-7 shows the mean and median of pH levels for all samples taken over the course of 12 years in the Catawba River subbasin. The lowest pH yearly average recorded and the year with the most standard violations was 2008. The overall basin trend during this 12 year period is a significant decline in pH levels. In this subbasin, yearly averages dropped from mid 7's to high 6's starting around 2003. For a more detailed discussion of what may be causing this trend basinwide, see the *Basin Overview Chapter.*

Figure 3-7: Summarized pH Values for All Data Collected at Ambient Sampling Stations in HUC 03050103



10-Digit HUC Watershed Breakdown

Understanding this Section

In this Section, more detailed information about stream health, special studies, aquatic life stressors and sources and other additional information is provided by each 10-digit Hydrological Unit Code (HUC). Waterbodies discussed in this Chapter include all monitored streams, whether monitored by DWQ or local agencies with approved methods. Use Support information on all monitored streams within this subbasin can be seen in Figure 3-1, and a Use Support list of all monitored waters in this basin can be found in *Appendix 3-A*. Within each 10-digit watershed section, waterbodies are grouped by a designation of Restoration Opportunities, Protection Priorities or Success Stories and then by 12-digit subwatersheds. The three designations are described below. These designations do not indicate the Use Support rating (Supporting, Impaired or No Data) for a waterbody. The Use Support rating can be found at the top of the *Use Support and monitoring box* (Figure 3-9)which is provided for each waterbody to the right of the waterbody discussion, as described below.

Hydrologic Unit Codes (HUC):

DWQ has recently made a change from the State designated subbasin lines (e.g., 03-08-30) to the nationally recognized HUC lines. This Plan is organized by HUCs to provide, not only a detailed look at a particular waterbody, but also how that waterbody fits into the larger watershed picture. Table 3-4 provides a brief description of the different HUC sizes and names. There are three 8-digit subbasins within the Catawba River Basin (03050101, 03050102 & 03050103). Due to the large size of these 8-digit subbasins, each chapter is broken down even further into 10-digit watersheds for a more local water quality analysis. Within each 10-digit watershed section of the Chapter, waterbodies are grouped by 12-digit subwatershed to better identify specific stressors and sources. A comparison map of the State designated subbasin lines used in the past verses the new nationally recognized HUC lines is included in *Chapter 11*.

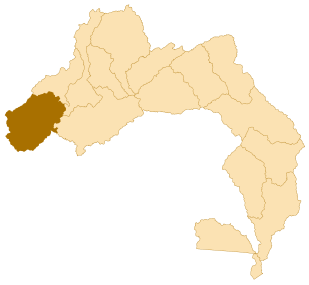
Table 3-4: HUC Quick Reference

HUC Digit	HUC Name	Average Size[1]
2-digit	Region	177,560
4-digit	Subregion	16,800
6-digit	Basin	10,596
8-digit	Subbasin	700
10-digit	Watershed	227
12-digit	Subwatershed	40

[1] In approximate square miles

The 10-Digit Watershed Map:

Figure 3-8: Example of the 10-Digit HUC Map



At the beginning of each 10-digit watershed section is a small reference map as seen in Figure 3-8. **These maps are also a hyperlink to a full page detailed map of that particular watershed**. Click on the map to view the full page map, then when you wish to return back to the text, click the inset map on the full page map. If you are viewing a hardcopy version of this Plan, these maps can be found at the end of this chapter or in *Appendix 3-D*. **Interactive elements** have been incorporated within all 10-digit watershed maps. To use the new features click on the *Layers* tab on the left side of the Adobe Reader window. Expand the folder tree by clicking on the (+) sign to the left of the map name. Each item in the subsequent folder tree is a layer on the map. These layers can be turned on or off by clicking the symbol to the left of the layer name. This allows you to view all layers or select only layers of interest and decrease the amount of symbols and labels for a cleaner look. Reminder: to return to your previous place within the text, just click the smaller map in the upper left hand corner of the 10-digit watershed map.

Restoration Opportunities, Protection Priorities & Success Stories:

Within each 10-digit watershed section, waterbodies are grouped by a designation of Restoration Opportunities, Protection Priorities or Success Stories. This grouping is used to provide a better understanding of what types of actions, if any, need to be taken for a particular body of water based on known water quality information.

Restoration Opportunities:

The term *Restoration Opportunities* refers to waters which are degraded and are in need of restoration to return the water quality back to natural conditions. This designation is given to not only waters already on the Impaired Waters List, but also waters that are predicted to be on the Impaired Waters List in the future if no restoration action is taken. Impacted waters, as defined by the DWQ Planning Section (see Acronyms & Definitions), are often included in this group. Restoration efforts may include development and implementation of a watershed restoration plan, installation of appropriate best management practices (BMPs), implementation of local ordinances, educational efforts and/or extending monitoring efforts among many others.

Protection Priorities:
The term *Protection Priorities* refers to waters which are in need of protection to keep it from becoming impacted or Impaired in the future. This includes waters that are currently supporting aquatic life, but are within watersheds that have recently undergone a land use change or other changes that may have a negative impact on water quality in that stream. This designation is given to assist DWQ and other water quality agencies in being more proactive about protecting water quality and minimize stream degradation. Protection efforts may include among others, finding the sources of degradation, educating local communities of water quality concerns, developing and implementing an action plan and developing a local ordinance that requires environmentally sound development and land use changes. Protecting these waterbodies not only ensures continued stability of aquatic life and associated habitat, but also saves local, state and federal agencies from a costly and time consuming restoration effort after the waterbody has become Impaired.

Success Stories:
The term *Success Stories* refers to waters that have shown long term improvement for a known reason. This includes improvements on all levels, whether it's a stream that has been removed from the Impaired Waters List or that a source of pollution, which may have been negatively impacting the stream, has been removed or no longer has an impact. However, not all streams that have been removed from the Impaired Waters List are listed in this Plan as a success due to the fact that the reasons for some improvements are not known and may be due to temporary changes in the watershed. This designation is also used to discuss streams that have undergone restoration or protection efforts that have resulted in measured water quality improvements or are expected to in the near future. Not all efforts show instantaneous results and may be designed for gradual long term improvement. However, those efforts should be recognized to increase awareness of what other water quality groups and agencies are doing and to promote cooperation among those groups and agencies with the same goal.

Assessment Unit Numbers [AU#]:

Each waterbody throughout the state is given one or more assessment unit (AU) number(s). These identification numbers are assigned to a particular stream or portion of a stream for many reasons. One of those reasons is to reduce confusion when different streams have the same name. For example, there are five different streams in different parts of the Catawba River Basin named Big Branch. Another reason is to identify a particular segment of a stream. A longer stream may be split into multiple segments to provide more accurate assessments, classifications and reporting of a particular portion of that stream.

These AU numbers are indicated at the beginning of each new waterbody discussion following the stream name in [brackets]. If multiple segments of a stream are included in that discussion, each AU# will be listed. To reduce space, some AU numbers may be abbreviated. For example, the North Fork Catawba River is split into four segments, 11-24-(1), 11-24-(2.5)a, 11-24-(2.5)b, and 11-24-(13). This is then abbreviated to 11-24-(1), (2.5)a, (2.5)b & (13) where the common numbers are removed from the first part of the AU.

Use Support & Monitoring Box:

To reduce confusion and provide a quick reference, each waterbody discussed in the Restoration Opportunities and Protection Priorities sections have a corresponding Use Support and Monitoring Box (Figure 3-9). The top row indicates the draft 2010 Use Support and the length of that stream or stream segment. The next two rows indicate the overall Integrated Report category which further defines the Use Support for both the 2008 and the draft 2010 reports. These first three rows are consistent for all boxes in this Plan. The rows following, are based on what type of monitoring stations are found on that stream or stream segment and may include benthic, fish community and/or ambient monitoring data. If one of these three types of monitoring sites is not shown, then that stream is not sampled for that type of data. The first column indicates the type of sampling in bold (e.g., **Benthos**) with the site ID below in parenthesis (e.g., CB79). The latest monitoring result/rating of that site is listed in the next column followed by the year that sample was taken. If there is more than one benthic site, for example, on that stream, the second site ID and site rating will be listed below the first. The last row in the sample box in Figure 3-9 is the AMS data. The data window for all AMS sites listed in the boxes in this Plan is between 2004-2008. Only parameters exceeding the given standard are listed in the second column with the percent of exceedance listed beside each parameter.

Figure 3-9: Example of a Use Support and Monitoring Box

Use Support: Impaired (14 mi)	
2008 IR Cat.	4a
2010 IR Cat.	4
Benthos (CB79) (CB80)	 Fair (2002) Fair (2002)
Fish Com (CF33)	Good-Fair (2002)
AMS (C1750000)	Turbidity - 12% FCB - 48%

Please note any fecal coliform bacteria (FCB) listing in the last row (as seen in Figure 3-9) only indicates elevated levels and a study of five samples in 30 days (5-in-30) must be conducted before a stream becomes Impaired for FCB.

Table 3-5: Waterbodies & the Section(s) Where Discussed Within This Subbasin Chapter

Stream Name	AU#	10-Digit HUC	IR Category[1]	Restoration/ Protection/Success[2]
Irwin Cr	11-137-1	0305010301	5	Restoration
Little Sugar Cr	11-137-8a, b, & c	0305010301	5	Restoration
Sugar Cr	11-137a, b, & c	0305010301	5	Restoration
McCullough Br	11-137-7	0305010301	5	Restoration
McAlpine Cr	11-137-9a, b, c, & d	0305010301	5	Restoration
Sixmile Cr	11-138-3	0305010302	5	Restoration
Twelvemile Cr	11-138	0305010302	5	Restoration
Waxhaw Cr	11-139	0305010303	2	Protection

1. The Integrated Report category noted in this table refers to the category given on the DRAFT 2010 Report.
2. Waters monitored in the Catawba River basin are given a designation of Restoration Opportunities, Protection Priorities or Success Stories within this Plan to provide a broad indication of current water quality. For more information on these designations see *Understanding This Section*.

Sugar Creek (0305010301)

Restoration Opportunities

Irwin Creek (030501030101)

Irwin Creek [AU: 11-137-1]:

Irwin Creek is approximately 12 miles long beginning north of I-85 and flows along I-77 through downtown Charlotte before becoming Sugar Creek [AU: 11-137a]. The full length of the creek drains dense residential urban areas as well as industrial parks upstream. This creek was last sampled in 2004 and received a Poor fish community rating. A Poor benthic rating was given in 1992. In 2004, biologist noted elevated conductivity levels, which is typical of urban streams. The fish sample site had the fewest species of any fish community site in the entire basin. An Ambient Monitoring System (AMS) station is located about 1,300 feet upstream from the Irwin Creek WWTP (NC0024945). As seen in the table to the right, between 2004 and 2008, five physical/chemical parameters were elevated. This creek is Impaired for exceeding copper, lead, zinc, and turbidity standards as well as for receiving a Poor fish community rating.

Use Support: Impaired (12 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Fish Com (CF23)	Poor (2004)
AMS (C8896500)	Copper - 39% Lead - 23% Turbidity - 15% Zinc - 23% FCB - 38%

The excess lead levels are thought to have originated from a point source discharger (Willard Industries) that is no longer in operation. Conductivity levels in the creek have experienced a very slight downward trend since the facility closed indicating it had a definite impact on the creek but may not be the only source. Scattered throughout this subwatershed are industrial transportation facilities (e.g., trucking, freight, railways and automotive industries) which are known to produce toxic metal-laden stormwater runoff, and could be another source of lead, copper and zinc contamination.

The Charlotte Mecklenburg Utility Department's (CMUD) Irwin Creek WWTP (NC0024945) is located just downstream of the AMS site. Even though this facility was not contributing to the AMS parameter violations discussed above, the effluent levels reported by the facility between 2004 and 2008 indicates that it was a small contributing factor to the FCB levels within the creek. Recent upgrades to the facility greatly reduced the level and occurrence of these FCB violations. This WWTP is included in the phosphorus load reduction strategy discussed below.

Irwin Creek is included in a fecal coliform bacteria TMDL discussed below in *Watershed TMDL's & Strategies*.

Little Sugar Creek (030501030102)

Little Sugar Creek [AUs: 11-137-8a, b & c]:
Little Sugar Creek is approximately 20 miles long and is split into three segments. The full length of the creek drains dense residential urban areas as well as industrial parks upstream. Little Sugar Creek was sampled in 2007 for fish and benthic communities. The low biological ratings which it received are not uncommon in a highly urban and densely populated area.

Use Support: Impaired (20 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB146)	Fair (2007)
Fish Com (CF70) (CF28)	Poor (2007) Fair (2007)
AMS (C9210000)	Copper - 31% FCB - 41%
RAMS (C9085000)	Turbidity - 21% Copper - 33% Mercury - 13%

A Random Ambient Monitoring System (RAMS) station was placed on Little Sugar Creek (East Morehead Street). The fish community site, mentioned above, was placed at this same location to provide additional data about the RAMS location. RAMS stations are monitored for two years and are located based on a probabilistic approach, not based on any known concerns in the subwatershed. The parameters sampled at the RAMS sites do not match the normal parameters of at AMS sites. Roughly nine miles downstream of this RAMS site, the permanent AMS site which is located at NC-51. Two physical/chemical parameters were elevated, copper and FCB.

The differences between the two stations seem to indicate that the turbidity source is contained within the headwaters of the creek and the sources of copper are spread throughout the subwatershed. These elevated parameters at the RAMS site are most likely originating from industrial areas in the headwaters. The mercury samples taken at the RAMS and the AMS sites are not comparable due to differing methods; therefore, it is unknown if these levels are also being seen downstream. Mercury trapped in the sediment years ago may have been recently stirred up by construction activities just upstream of this site. The CMU Sugar Creek WWTP (NC0024937) may have been a contributing factor to the high FCB levels sampled at the AMS site between 2004 and 2008. However, no permit violations have been reported recently indicating the facility has address this problem. This WWTP is included in the phosphorus load reduction strategy discussed below. This creek is Impaired for exceeding copper, mercury and turbidity standards as well as biological integrity of fish and benthic communities.

This subwatershed is included in the same FCB TMDL as Irwin Creek. This TMDL and its implementation plans are discussed in more detail *below*.

Upper Sugar Creek (030501030103)

Sugar Creek [AUs: 11-137a, b & c]:
Sugar Creek is approximately 14 miles long and is split into three segments. The subwatershed drains highly populated urban areas. The majority of the creek's length is in AU: 11-137b (10 miles) which was sampled in 2007 for benthos and 1999 for fish community (Poor). The last segment [AU: 11-137c] includes an AMS site which is showing elevated copper and FCB levels between 2004 and 2008. A portion of the copper is flowing downstream from Irwin Creek; however, there is evidence of a copper source within this subwatershed as well. This creek is Impaired for exceeding copper standards as well as biological integrity of the benthic community.

Use Support: Impaired (14 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB157)	Fair (2007)
AMS (C9050000)	Copper - 46% FCB - 36%

This subwatershed is included in the same FCB TMDLs as Irwin Creek. This TMDL and its implementation plan are discussed in more detail below. Sugar Creek is also included in the phosphorus load reduction strategy discussed below in *Watershed TMDL's & Strategies*.

McCullough Branch [AU: 11-137-7]:
McCullough Branch is a three mile creek that drains into Sugar Creek less than a mile upstream of South Carolina (SC). The stream receives runoff from Martin Marietta Aggregates quarry as well as a 6,619 acre agricultural property which has recently been cleared for residential development. This creek was last monitored in 1990 and received a Poor benthic (CB154) rating. DWQ will work with local DLR to ensure the development is adhering to all necessary sediment and erosion control measures. DWQ will monitor this stream during the next sampling cycle to determine if it should remain on the Impaired Waters list.

Use Support: Impaired (3 mi)	
2008 IR Cat.	5
2010 IR Cat.	5

McAlpine Creek (030501030107)

McAlpine Creek [AUs: 11-137-9a, b, c & d]:
McAlpine Creek has a total length of about 20 miles and drains the southern portion of Charlotte which is a dense residential urban area. In 2002, a benthic sample resulted in a Fair rating. A fish community sample taken in 2004 was the only biological sampling done during this cycle. At that time, there was severe bank erosion, side undercuts and deep entrenchment. The only physical/chemical parameter with elevated levels was FCB. This creek is Impaired for biological integrity and has been placed in the IR category four due to an approved FCB TMDL.

Use Support: Impaired (20 mi)	
2008 IR Cat.	4a/4s
2010 IR Cat.	4s/4t
Fish Com (CF39)	Fair (2004)
AMS (C9370000)	FCB - 38%

This subwatershed is included in the same FCB TMDL as Irwin Creek. This TMDL and its implementation are discussed in more detail *below*. CMU's McAlpine Creek WWTP (NC0024970) is also included in the phosphorus load reduction strategy discussed *below*.

Watershed TMDLs & Strategies

Turbidity TMDL:

A *TMDL* was approved in February of 2005 to address the turbidity exceedances in Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork and Mud Creek. However during the TMDL study window (1997-2004), the only creek exceeding the turbidity standard was Long Creek which is located in the headwaters subbasin (03050101). Therefore, this turbidity TMDL only covers Long Creek.

During the current data (2004-2008) window, ambient monitoring showed that Irwin Creek is once again exceeding the turbidity standard along with Long Creek. The majority of these exceedances for Irwin Creek occurred between 2003 and 2006. During that time period there were three hurricanes and one tropical storm which greatly increased the amount of sediment entering the streams. The City of Charlotte has adopted ordinances and other measures to protect the streams against further sedimentation.

Fecal Coliform Bacteria (FCB) TMDL:

In February of 2002, a *Fecal Coliform Bacteria TMDL* for the Irwin, McAlpine, Little Sugar and Sugar Creek Watersheds was approved by the EPA. This TMDL was developed through a stakeholder process which involved state and local agencies, Sierra Club, Catawba RiverKeeper and SCDHEC. Using data from 1999, the TMDL calls for individual total reductions from each watershed and is broken out by sources in Table 3-6. Beginning February 2005, the Charlotte-Mecklenburg Stormwater Services entered into a federal grant to develop the Mecklenburg County Surface Water Improvement and Management Program (SWIM). This program was formed to address implementation of a Watershed Plan developed by the stakeholder group to address this TMDL, among other water quality improvement efforts. This is discussed in more detail below.

Table 3-6: In-Stream FCB Load Reductions as Set in TMDL

Sources	Reductions (by watershed)				
	Irwin	McAlpine[1]	McAlpine[2]	Little Sugar	Sugar
Point Sources					
WWTP	3.6%	64%	0%	16.7%	7.2%
Sanitary Sewer Overflows	86.7%	78.2%	32.6%	53.2%	75.7%
Nonpoint Sources					
Wildlife	0%	0%	0%	0%	0%
Failing Septic Systems	60%	38.1%	50.7%	60%	61.7%
Dry Weather Flow from Storm Drain Systems	60%	39.7%	53.8%	60%	61.7%
Sewer Exfiltration	91.3%	89.1%	87.7%	88.7%	91.6%
All Sources	**58.9%**	**65.8%**	**52.1%**	**40.9%**	**59.2%**

[1] Downstream of Sardis Road; [2] Upstream of Sardis Road

Current Status of FCB levels:
Five compliance points were listed in this TMDL and can be seen as AMS sites C8896500 (Irwin Creek), C9050000 (Sugar Creek), C9210000 (Little Sugar Creek), C9370000 (McAlpine Creek) and C9680000 (McAlpine Creek) on the watershed map. These sites have been sampled monthly by DWQ for FCB as are most ambient monitoring stations. Figure 3-10 below displays each FCB sample taken by DWQ between 1997 and 2008 for each of these sites. The orange line in this figure represents 400 colonies per 100 ml. Table 3-7 compares the percent of samples taken which were over 400 colonies per 100 ml for the 2004 cycle (data window: 1997-2002) and the 2008 cycle (data window: 2004-2008). The table indicates that Irwin Creek and the upper McAlpine Creek sites resulted in fewer

Table 3-7: Site FCB Comparison of Previous & Current Cycle Samples

AMS #	2002 %>400	2008 %>400
C8896500	49%	38%
C9050000	36%	36%
C9210000	29%	41%
C9370000	41%	38%
C9680000	26%	28%

samples over 400 colonies/100 ml; however, samples taken at Little Sugar Creek and the lower McAlpine Creek sites are increasing in FCB levels. Even though these sample locations are still not meeting the 400 colonies/100 ml standard, actions have been taken to locate sources and correct the problem. It is critical that implementation of the TMDL Watershed Plan continue until the FCB levels drop below the standard.

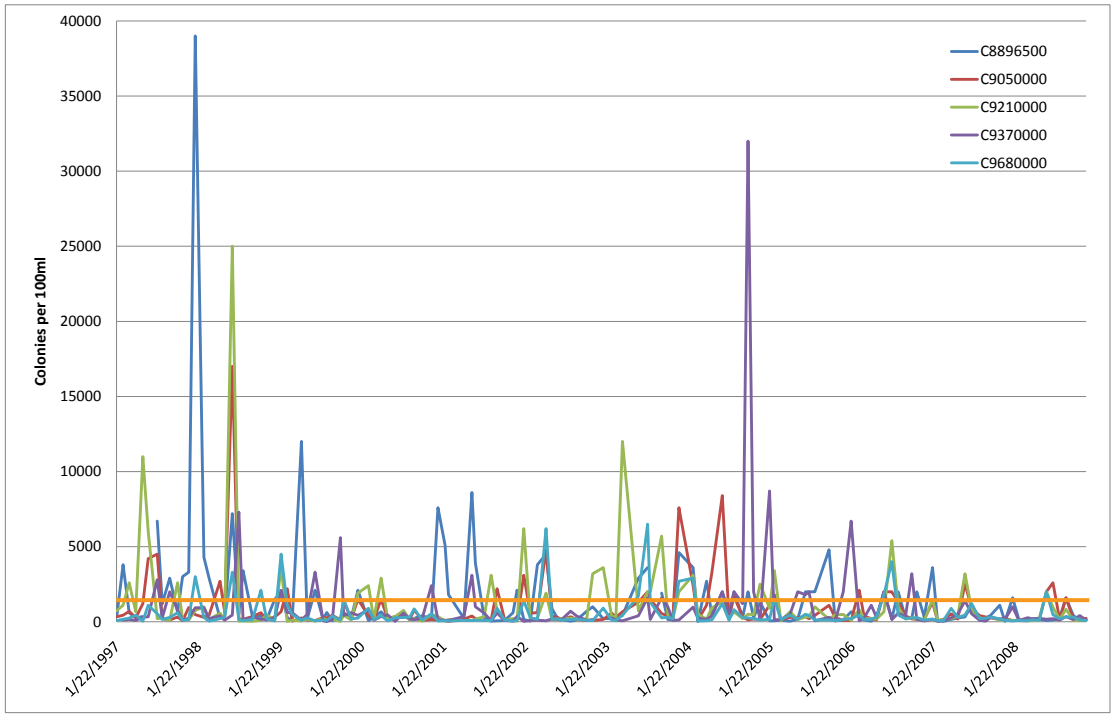
Implementation of TMDL Watershed Plan:

A 319 Federal Grant ($49,590) was awarded to Charlotte-Mecklenburg Stormwater Services (CMSWS) to begin Implementation of the TMDL Watershed Plan. The final report also listed the accomplishments CMSWS was able to make during the contract period (January 2005 - November 2007). These accomplishments include the following...

- The majority of effluent samples at the three WWTPs met the source reduction targets set within the Watershed Plan;
- Fecal coliform loading from SSOs only exceeded the source reduction targets for the watersheds on one occasion which lasted for 26 days on Little Sugar Creek;
- The number and duration of SSOs met targets but only within the Sugar Creek Watershed;
- Stream walks to help identify problem areas which led to the location and elimination of 72 failing septic systems within the TMDL watersheds and source reduction targets being met for Upper and Lower McAlpine Creek watersheds;
- Conducted ambient monitoring and 5-in-30 monitoring through the duration of the grant term; and
- Educational effort to advise the public of the TMDL and what it meant.

The results of these efforts are beginning to show signs of fecal reductions as seen in the figure above around mid 2007. Efforts to locate and eliminate sources of excess fecal coliform levels should be continued until the source reduction targets are met. DWQ will continue to assist local agencies in this effort as requested.

Figure 3-10: FCB Values Between 1997-2008 For Each Compliance Point* (AMS) Within the TMDL Watersheds.



***Compliance Point (AMS) Locations:**

- **C8896500** - Irwin Creek @ Irwin Creek WWTP
- **C9050000** - Sugar Creek @ NC-51, Pineville
- **C9210000** - Little Sugar Creek @ NC-51, Pineville
- **C9370000** - McAlpine Creek @ Sardis Rd.
- **C9680000** - McAlpine Creek in SC near Camp Cox

Phosphorus Load Reduction Strategy:

In the summer of 2001, the South Carolina Department of Health and Environmental Control (SCDHEC) filed a Petition for a Contested Case in the North Carolina Office of Administrative Hearings regarding the renewal of the Charlotte Mecklenburg Utilities Department (CMUD) McAlpine Creek WWTP. The primary complaint on the part of SCDHEC was that the permit was renewed without a phosphorus limit. Nearly all of South Carolina's municipal dischargers to the mainstem Catawba River (upstream of Lake Wateree) have been given phosphorus limits, generally equivalent to 1 mg/l. The McAlpine Creek WWTP permit had a phosphorus optimization study special condition that stipulated preparatory requirements for the facility to ready itself for the upcoming phosphorus TMDL.

In January 2002, SCDHEC, DWQ and CMUD reached an agreement on the terms of the phosphorus limits at the McAlpine treatment plant and expanded the permitting strategy to include the WWTPs on Sugar and Irwin Creeks. The final settlement agreement includes three main points as follows.

- A Bubble Limit: this refers to a mass limit for total phosphorous that applies to discharge at the three CMUD plants (McAlpine, Sugar and Irwin Creeks) *combined*. The bubble limit, as calculated by a 12-month rolling average, is 826 lbs/day of total phosphorous from all three plants. This corresponds to a 1 mg/l phosphorous limit at permitted discharge for the three plants.
- A Mass Cap: SCHEC requested that monthly mass caps also be included. The mass caps at the three plants take the form of a monthly average mass limit and correspond to a concentration limit of 2 mg/l at maximum permitted flow. At McAlpine Creek, this limit is 1,067 lbs/day of total phosphorous which began February of 2006. In addition, Irwin, Sugar and McAlpine combined must meet a 12-month rolling average of 823 lbs/day.
- Inclusion of a TMDL: SC has advised NC that a phosphorous TMDL will be developed. The settlement agreement states that NC and all parties that may be effected by the implementation of said TMDL must have the opportunity to be involved in the process of developing the TMDL. As of April 2010, the development of the TMDL has not started.

Separate from the settling agreement between the two states, an agreement was made to establish total phosphorous limits on the Twelvemile Creek WWTP in Union County. The facility has a mass limit equivalent to 1 mg/l at the permitted flow. As with the CMUD facilities, the limit will be judged on a rolling annual average.

At the end of 2009, the compliance evaluation indicated that all three CMUD facilities are in compliance and the Twelvemile Creek facility has been in compliance since mid 2007. The Union County facility had multiple violations between 2006 and mid 2007; however, the facility was undergoing construction upgrades and proper enforcement action was taken.

Watershed Recommendations & Action Plans

The City of Charlotte and Mecklenburg County have been working with DWQ for the past several years to find the most efficient and effective ways to protect water quality against urban and point source impacts. DWQ supports the city and county's watershed protection actions and will continue to assist local governments in finding ways to further reduce FCB and phosphorus levels within these streams. For more information on the *Charlotte/Mecklenburg water quality programs* see their website.

Twelvemile Creek (0305010302)

Restoration Opportunities

Sixmile Creek (030501030203)

Use Support: Impaired (9 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Fish Com (CF52)	Fair (2002)

Sixmile Creek [AU: 11-138-3]:
Sixmile Creek flows roughly nine miles southwest mostly along the Mecklenburg/Union county boundaries. The land use in this drainage area is mostly dense residential area. This stream was sampled for fish community health in 2002 and received a Fair rating. It was not sampled during this cycle due to low stream flows. Since the 1999 plan, all NPDES point source dischargers have been removed from the creek. Sixmile Creek had the highest conductivity rating of any stream in the basin during the 2002 sampling cycle. It was also noted that cattle had full access to the stream. These two points and the natural low flow of this stream indicate its sensitivity to nonpoint source runoff. Both Mecklenburg and Union counties have made efforts to establish buffer zones around the creek. DWQ will re-sample this site during the next sampling cycle to determine if restoration efforts in this stream have improved the biological health.

Twelvemile Creek (030501030204)

Twelvemile Creek [AU: 11-138]:
The East and West Forks of Twelvemile Creek merge just upstream of NC-16 to create Twelvemile Creek. The creek is about three miles long and flows southwest from Union County into SC. The land use within the creek, as well as in the East and West Forks, includes agricultural lands that are being converted into densely populated residential areas. Much of this subwatershed is currently being developed. The last biological sampling done here was in 2002 when the creek received a Fair fish community rating. The AMS site is located just upstream of Union County's Twelvemile WWTP. Of the samples collected between 2004 and 2008, low dissolved oxygen was noted as a stressor but instantaneous readings exceeded the standard in only 6.7% of samples. Therefore, the creek will only be on the Impaired Waters list for copper, turbidity and biological integrity.

Use Support: Impaired (3 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Fish Com (CF55)	Fair (2002)
AMS (C9819500)	Copper - 23% Turbidity - 13%

The turbidity violations recorded at this AMS site are not a new occurrence; however, recent use assessment methodology changes enable streams to be listed for individual parameters. Between 1997 and 2002, turbidity values exceeded the standard in 12.7% of the samples.

About a half mile downstream from the confluence of East and West Twelvemile Creeks is Union County's Twelve Mile Creek WWTP (NC0085359). This facility has received NPDES permit violations for BOD, FCB, discharge flow, nitrogen, phosphorus and TSS. The facility completed upgrades to address the majority of these issues and was back in compliance by late 2005 with the exception of FCB. There have been numerous FCB violations since 2003; however, the facility has only had four violations since 2007 and are working on necessary improvements to meet FCB limits.

Fishing Creek Reservoir - Catawba River (0305010306)

Protection Priorities

Waxhaw Creek (030501030603)

Waxhaw Creek [AU: 11-139]:
Waxhaw Creek flows approximately 16 miles southwest from across the lower portion of the basin. It is the only stream in the Catawba River basin that supports populations of the federally endangered Carolina Heelsplitter Mussel. The fish community sampled during this cycle received a Good rating. DWQ will sample the benthic community (CB251) again during the next sampling cycle to determine if it has changed from its 1992 rating of Good-Fair. DWQ has recognized this watershed as one of the most biologically important aquatic habitats in the basin and therefore should be a high protection priority.

Use Support: Supporting (16 mi)	
2008 IR Cat.	2
2010 IR Cat.	2
Fish Com (CF58)	Good (2007)

Subbasin Recommendations & Action Plans

Update of 7Q10 Flows in NPDES Permits

It is important that 7Q10 flow values be updated to include changing climatic conditions and water withdrawals that impact stream flow conditions. All NPDES permitted facilities use 7Q10's as critical flow in determining permit limits for toxicants. These critical flow values used to determine permit limits for all NPDES facilities may need to be reviewed as the permits come up for renewal. Currently, a 7Q10 is only evaluated in the initial application of the permit and upon expansion. Low flow conditions induced by drought impacts the health of aquatic life as demonstrated in this basin for roughly seven years between 1997 and 2007 (see Figure 3-2: stream flow graph). Droughts as well as the demand on water resources are very likely to increase; therefore, the reevaluation of stream flow will become more critical to water quality within the next decade or so. DWQ will work with DWR and other agencies to discuss the need and resource availability to update 7Q10 values.

Point Source Contributors

National Pollutant Discharge Elimination System Permit Program

The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States, as authorized by the Clean Water Act. Non-compliance with permit limits on wastewater flow and constituents can lead to discharge of pollutants that degrade surface waters making them unsafe for drinking, fishing, swimming, and other activities. The NPDES Permitting and Compliance Programs of North Carolina's DWQ are responsible for administering the program for the state. These permits are reviewed and are potentially renewed every 5 years, a list and map of NPDES permits can be found in *Appendix 3-E & 3-D*, respectively.

There are a total of 14 NPDES Dischargers within this subbasin. Four of those are Major Dischargers which means the facility discharges greater than one million gallons of wastewater a day (1 MGD). Ten of the facilities are Minor facilities which discharge less than 1 MGD. The Major facilities discharge mainly to the Catawba River and Irwin, Little Sugar, Sugar, McAlpine and Twelvemile Creeks. If a facility is impacting water quality or has made improvements to minimize the impact of their waste load, it is discussed in the 10 Digit HUC watershed sections.

Implementation of New Water Quality Standard for Total Residual Chlorine:

On April 1, 2003, a new aquatic life surface water quality standard for total residual chlorine (TRC) became effective in North Carolina. Previously, TRC had been a freshwater Action Level standard, except in designated Trout waters where the aquatic life standard of 17 ug/l was implemented as a permit limit. The new standard removes the Action Level status and sets the new instream standard for TRC for all freshwater streams at 17 µg/L including those classified as Tr. After April 1, 2003, as existing permits were renewed and new permits issued, TRC limits were included in the permits. Facilities that do not use chlorine for disinfection did not receive TRC limits; however, the presence of a chlorine back-up system to augment Ultraviolet (UV) and other disinfection treatments resulted in a TRC permit limit. Facilities that discharge to streams with a 7Q10 flow <0.05 cfs (considered zero-flow streams) received a limit of 17 µg/L. TRC permit limits are capped at 28 µg/L in freshwater discharges to protect against acute impacts.

Facilities were given 18 months to add dechlorination or other means of disinfection to become compliant with the new standard. The 18 month period for most facilities in the Catawba River basin fell between 2004 and 2007, depending on when the permit was renewed. All facilities in the Catawba basin are beyond this 18 month period. It should be noted that meeting the new TRC limits has been difficult for some facilities; however, DWQ has been working with all facilities to assist with compliance.

Special Order by Consent (SOC):

Special Order by Consent may be an appropriate course of action if a facility is unable to consistently comply with the terms, conditions, or limitations in an NPDES Permit. However, SOCs can only be issued if the reasons causing the non compliance are not operational in nature (i.e., they must be tangible problems with plant design or infrastructure). Should a facility and the Environmental Management Commission enter into an SOC, limits set for particular parameters under the NPDES Permit may be relaxed, but only for a time determined to be reasonable for making necessary improvements to the facility.

Pretreatment

The Federal and State Pretreatment Program gives regulatory authority for EPA, States, and Municipal Governments to control the discharge of industrial wastewater into municipal Wastewater Treatment Plants (WWTPs) or Publicly Owned Treatment Works (POTWs). The objectives of the Pretreatment Program are to prevent pass-through, interference, or other adverse impacts to the POTW, its workers or the environment; to promote the beneficial reuse of biosolids; and to assure all categorical pretreatment standards are met. There are currently around 700 Significant Industrial Users (SIUs) who discharge industrial wastewater to over 120 POTWs throughout the State of North Carolina. The WWTPs covered by POTW Pretreatment Programs are indicated in *Appendix 3-E* by an asterisk (*) next to the permit number. If a facility's Pretreatment Program is impacting water quality or has made improvements to minimize the impact of their industrial user waste load, it is discussed in the 10-digit HUC watershed sections.

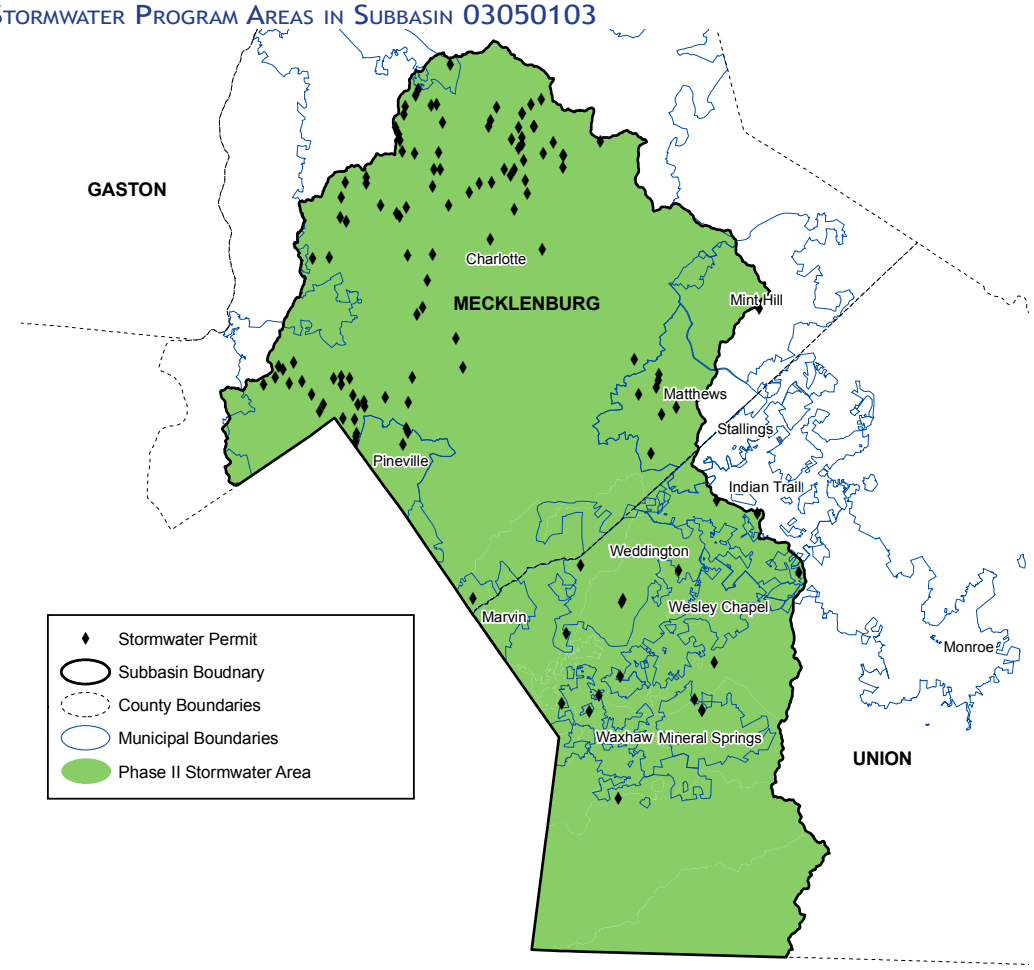
Nonpoint Source Contributors

Stormwater

There are many different stormwater programs administered by DWQ. One or more of these affects many communities in the Catawba River basin. The goal of the DWQ stormwater discharge permitting regulations and programs is to prevent pollution from entering the waters of the state via stormwater runoff. These programs try to accomplish this goal by controlling the source(s) of pollutants. These programs include NPDES Phase II, HQW/ORW stormwater, and Water Supply Watershed Program. Figure 3-11 indicates the different stormwater programs in this subbasin.

This entire subbasin is covered under the NPDES Phase II Stormwater program. The Phase II programs are delegated to either the cities or the counties in this subbasin. The City of Charlotte and Mecklenburg County have one of the top Stormwater Programs in the state and remain active in keeping up to date with the most effective stormwater BMPs available. The *Charlotte/Mecklenburg website* also has educational materials available for interested citizens. For a brief discussion of the programs recent projects, see *Local Initiatives* Section. For more information on stormwater permits and the requirements of each, see *Chapter 5.3 of the Supplemental Guide to NC's Basinwide Planning* or *DWQ's Stormwater Permitting Unit's website*.

Figure 3-11: Stormwater Program Areas in Subbasin 03050103



Industrial Stormwater

The Division has renewed several industrial stormwater permits with a revised monitoring strategy in the past few years, including the majority of General NPDES Stormwater Permits. These permits now incorporate benchmark concentrations to provide permittees a tool with which to assess the effectiveness of best management practices (BMPs). These benchmark concentrations are not effluent limits but instead provide guidance for responses under the facility's Stormwater Pollution Prevention Plan (SPPP). The basis for each benchmark varies depending on the type of pollutant; values are based on thresholds like acute effects to aquatic life (e.g., metals), water quality standards (e.g., pH), secondary treatment standards (e.g., BOD and COD), or other reference levels.

Exceedances of stormwater benchmark values require the permittee to respond in a tiered program with increased monitoring, increased management actions, increased record keeping, and/or installation of stormwater BMPs. In previous versions of these general permits, "cut-off concentrations" were used to minimize the required analytical monitoring. The arithmetic mean of all monitoring data collected during the term of the permit was compared to the cut-off concentration. If the mean was less than the cut-off concentration, then the facility could discontinue analytical monitoring for that parameter at that outfall until the final year of the permit.

The Division revised that strategy to incorporate benchmarks with (typically) semi-annual monitoring throughout the permit term on the basis that (1) so few data points over the term of a permit were insufficient to provide confidence in an average concentration and justify discontinuation of monitoring; (2) industrial processes or activities may change during the period of the permit that the facility is not monitoring; and (3) periodic monitoring encourages maintained attention to stormwater management.

Non-Discharge

Non-discharge wastewater treatment options include spray irrigation, animal waste management systems, rapid infiltration basins, drip irrigation systems, land application of residuals programs, wastewater collection systems and beneficial reuse of wastewater systems. These systems are operated without a discharge to surface waters; however, they still require a DWQ permit. Sanitary sewer collection systems used to collect the wastewater from NPDES discharge wastewater treatment facilities and non-discharge wastewater treatment facilities are both permitted by Non-Discharge Permitting Unit (NDPU). The land application of residuals program and the distribution and marketing program are also permitted by NDPU. The permit insures that treated wastewater is applied to the land at a rate that is protective of groundwater, and does not produce ponding or runoff into a waterbody. A list of Non-Discharge Permits in this watershed are listed in *Appendix 3-E*. More information about land application and non-discharge requirements and how it impacts water quality can be found in Section 9.3.2 of the *Supplemental Guide to North Carolina's Basinwide Planning* or the DWQ Aquifer Protection Section-*Land Application Unit* website. A map of these permits can be seen in *Chapter 11*.

Wetland Or Surface Water Disturbance (401 Certification)

The "401" refers to Section 401 of the Clean Water Act. The North Carolina Division of Water Quality (DWQ) is the state agency responsible for issuing 401 water quality certifications (WQC) (Table 3-8). When the state issues a 401 certification this certifies that a given project will not degrade Waters of the State or violate State water quality standards. A 401 WQC is required for any federally permitted or licensed activity that may result in a discharge to waters of the U.S. Typically, if the USACE determines that a 404 Permit or Section 10 Permit is required because your proposed project involves impacts to wetlands or surface waters, then a 401 WQC is also required. Examples of activities that may require permits include:

- Any disturbance to the bed (bottom) or banks (sides) of a stream.
- Any disturbance to a wetland.
- The damming of a stream channel to create a pond or lake.
- Placement of any material within a stream, wetland or open water, including material that is necessary for construction, culvert installation, causeways, road fills, dams, dikes or artificial islands, property protection, reclamation devices and fill for pipes or utility lines.
- Temporary impacts including dewatering of dredged material prior to final disposal and temporary fill for access roads, cofferdams, storage and work areas.

Table 3-8: 401 Permits Within the Catawba River Subbasin (03050103) Issued Between 2004 & 2009

Impact Category	Project Type	Approved Area
Open Water	Shoreline Stabilization	7.1 ac
	Residential	5.2 ac
	Commercial	12.1 ac
	Recreational	5.9 ac
	Other	6.0 ac
Total Open Water Acres		**36.3 ac**
Buffer	Recreational	15,458 sq ft
	Shoreline Stabilization	54,602 sq ft
	Residential	1,368 sq ft
	Other	8,025 sq ft
Total Buffer Square Feet		**74,833 sq ft**
Stream	Recreational	188 ft
	Residential	16,151 ft
	Commercial	47,970 ft
	Roads	7,089 ft
	Sewer/Piping	9,186 ft
	Shoreline Stabilization	27,446 ft
	Stream Restoration	1,718 ft
	Other	32, 372 ft
Total Stream Feet		**142,120 ft**
Wetland	Residential	9.3 ac
	Commercial	45 ac
	Sewer/Piping	5.4 ac
	Roads	4.0 ac
	Shoreline Stabilization	0.1 ac
	Other	6.3 ac
Total Wetland Acres		**70.1 ac**

In streams and wetlands (in accordance with 15A NCAC 02H .0506(h) and 15A NCAC 02H .1305(g)) the DWQ requires compensatory mitigation (Table 3-9) for losses of streams and wetlands (404 jurisdictional wetlands as well as isolated and other non-404 jurisdictional wetlands) as follows:

- For all non-linear public transportation projects, mitigation shall be required for impacts equal to or exceeding 150 linear feet of perennial and intermittent streams or impacts equal to or exceeding one acre of wetlands.
- For linear public transportation projects, mitigation shall be required for impacts equal to or exceeding 150 linear feet per stream or one acre of wetlands.

Buffer mitigation may be required for any project within a Riparian Buffer Protection Rule for impacts to the protected riparian buffer listed as "(potentially) allowable with mitigation" or "prohibited" within the Table of Uses require mitigation. For more information about the Riparian Buffer Protection Rules including the Table of Uses, *click here*.

Options for compensatory mitigation:

- **Mitigation banks:** Applicant satisfies the mitigation requirement by purchasing mitigation credits from an approved mitigation bank.
- **In-lieu fee mitigation:** Applicant satisfies the mitigation requirement by purchasing mitigation credits through the N.C. Ecosystem Enhancement Program (NCEEP).
- **Project-specific mitigation:** Applicant satisfies the mitigation requirement him/herself, either at the project site or at an off-site location.

For impacts to federally jurisdictional waters requiring compensatory mitigation, information on mitigation options can be viewed at the U.S. Army Corps of Engineers Mitigation *website*.

Table 3-9: 401 Mitigation Within the Catawba River Subbasin (03050103) Issued Between 2004 & 2005*

Impact Category	Mitigation Type	Amount
Buffer	Restoration (Zone 2)	4,673 sq ft
	WRP/EEP (Zone 1)	5,344 sq ft
Total Buffer Mitigation (Square Feet)		**10,017 sq ft**
Stream	Restoration	295 ft
	WRP/EEP	14,468 ft
	Mitigation Bank	5,811 ft
Total Stream Mitigation (Feet)		**20,574 ft**
Wetland	WRP/EEP	14.4 ac
Total Wetland Mitigation (Acres)		**14.4 ac**

For more information about 401 certifications and 404 federal permits, see the DWQ's *401 Oversight & Express Permitting Unit* website.

Agriculture

Agriculture is North Carolina's leading industry and is found scattered in this subbasin of the Catawba River basin. The approach taken in North Carolina for addressing agriculture's contribution to the nonpoint source water pollution problem is to primarily encourage voluntary participation by the agricultural community. This approach is supported by financial incentives, technical and educational assistance, research, and regulatory programs.

The conversion of agricultural lands to developed lands with large amounts impervious surfaces is another major contributing factor to nonpoint source pollution. A report by the American Farmland Trust organization identifies this subbasin as having high quality farmland with areas threatened by development. A *map of these areas* is available from their website. However, other farmers are protecting their land through the Conservation Reserve Enhancement Program (CREP). CREP is a voluntary program utilizing federal and state resources to achieve long-term protection of environmentally sensitive cropland and marginal pasture land. These voluntary protection measures are accomplished through 10-, 15-, 30-year and permanent conservation easements.

NC Agriculture Cost Share Program

The NC Agriculture Cost Share Program (ACSP) started in 1984 to help reduce the sources of agricultural nonpoint source pollution to the state's waters. The program assists owners and renters of established agricultural operations to improve their on-farm management by using Best Management Practices (BMPs). It is a voluntary program that reimburses farmers up to 75% of the cost of installing an approved BMP. The Division of Soil and Water Conservation implements the program on both a county district (SWCD) and state level. The Division has been very active in this basin as can be seen in the tables and figure below.

Animal Operations

DWQ's Animal Feeding Operations Unit is responsible for the permitting and compliance activities of animal feeding operations across the state. There are no registered animal operations in this subbasin. For more details about animal operation permits in North Carolina, see Section 6.3.3 of the *Supplemental Guide to NC's Basinwide Planning*.

Figure 3-12: BMPs Implemented by ACSP Between January 2003 to June 2009 in HUC 03050102

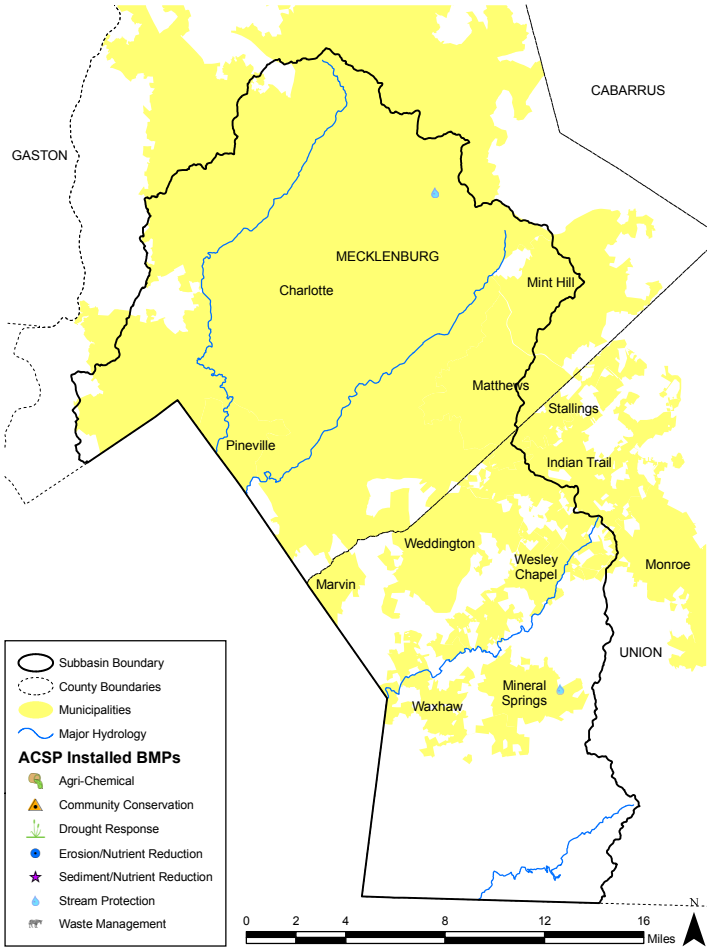


Table 3-10: List of BMPs Implemented by ACSP Between January 2003 to June 2009 in HUC 03050103

Purpose of BMP	Total Implemented	Cost-Shared Funds	Total Project Costs
Stream Protection	--	$25,107	$33,476
Linear Feet Treated	11,875	--	--
Grand Total	**11,875**	**$25,107**	**$33,476**

On-Site Wastewater Treatment Systems (Septic Systems)

Wastewater from many households is not treated at wastewater treatment plants associated with NPDES discharge permits. Instead, it is treated on-site through the use of permitted septic systems. Poorly planned and/or maintained systems can fail and contribute to nonpoint source pollution. Wastewater from failing septic systems makes its way to streams or contaminates groundwater. Failing septic systems are illegal discharges of wastewater into waters of the State. Information about the proper installation and maintenance of septic tanks can be obtained by calling the environmental health sections of the local county health departments. Precautions should be taken by local health departments to ensure that new systems are sited and constructed properly and an adequate repair area is available. County, town and city planners need to understand the economic and human health ramifications caused by failing septic systems and plan for long-term septic system sustainability. For more information on how septic systems impact water quality, see 9.1.3 of the *Supplemental Guide to North Carolina's Basinwide Planning.*

In 2007, North Carolina Agricultural Research Service completed a report concerning nitrogen contributions from on-site wastewater systems for each river basin. When compared to the other 16 river basins in the state, the Catawba River Basin had the most septic systems per square mile. The results for this subbasin based on 1990 census data indicate a population of 126,295 people using 19,227 septic systems resulting in a nitrogen loading of 483,214 lbs/yr and nitrogen loading rate of 4,731 lbs/mi^2/yr. These numbers reflect the total N discharged to the soil from the septic system and does not account for N used because of soil processes and plant uptake (Pradhan et al. 2007). The full study (*Potential Nitrogen Contributions from On-site Wastewater Treatment Systems to North Carolina's River Basins and Sub-basins)* can be viewed on the North Carolina State University website or the link above.

Population & Land Cover

Population

The 2000 census estimated population for this subbasin is 534,539 and this number is expected to increase with the results of the 2010 census. As population increases so does our demand for clean water from aquifer and surface water sources and an increase in demand for the land and water to assimilate wastes. Table 3-11 lists the populations for the 10-Digit HUCs in this subbasin and the estimates for future population values.

Table 3-11: Population and Estimated Populations for 2000 to 2030 for Subbasin 03050103

10-Digit HUC	2000 Population	2000 Population Density (per sq mi)	2010 Estimated Population	2020 Estimated Population	2030 Estimated Population
0305010301	485,874	2,115	654,688	831,122	1,019,104
0305010302	42,764	362	67,494	93,267	121,092
0305010303	1,968	87	3,303	4,693	6,199
0305010306	3,933	111	6,602	9,381	12,390
Total	**534,539**	**2,675**	**732,086**	**938,463**	**1,158,784**

* Source: Pate, Travis. 2009. *Watershed Assessment in North Carolina: Building a Watershed Database with Population, Land Cover, and Impervious Cover Information*. Master Theses, University of North Carolina at Chapel Hill.

Information on population density at a watershed scale is useful in determining what streams are likely to have the most impacts as a result of population growth. This information is also useful in identifying stream segments that have good opportunities for preservation or restoration. For more information on how population impacts water quality, see *Chapter 12 of the Supplemental Guide to NC's Basinwide Planning.*

Land Cover

Table 3-12 to the right, displays the percentage of each land cover type within this subbasin according to 2001 land cover data. The data shows the majority of the Catawba River subbasin is just over 50% developed land. Total agricultural land is about 14% and forested land is about 31% (Homer, 2004). In municipal areas, impervious surfaces (those which water can not penetrate, like asphalt) can prevent rainfall from filtering into the ground. Instead, the stormwater is sent at high velocities into storm drains which empty into the nearest waterbody without treatment. This can cause multiple negative water quality impacts including elevated water temperatures, eroding streambanks from high velocity runoff, toxic urban runoff in the streams, etc. For more information on how to better understand these issues and find solutions see Chapter 5 of the *Supplemental Guide to NC's Basinwide Planning.* A full page subbasin land cover map can be seen in *Appendix 3-D*.

Table 3-12: Land Cover Percentages

Land Cover Type	Percentage
Developed Open Space	25.0
Developed Low Intensity	17.0
Developed Medium Intensity	6.1
Developed, High Intensity	4.0
Total Developed	**52.1**
Bare Earth or Transitional	0.0
Deciduous Forest	24.1
Evergreen Forest	6.1
Mixed Forest	1.0
Total Agriculture	**31.2**
Scrub/Shrub	0.2
Grasslands	1.5
Pasture/Hay	13.9
Cultivated Crops	0.4
Total Non-Wetland Forest	**14.3**
Wooded Wetlands	0.6
Emergent Wetlands	0.0
Total Wetlands	**0.6**
Bare Earth or Transitional	0.0
Scrub/Shrub	0.2
Grasslands	1.5
Other	**1.7**

Restoration, Protection & Conservation Planning

One NC Naturally Conservation Planning Tool

NCDENR's One North Carolina Naturally initiative promotes and coordinates the long-term conservation of North Carolina's threatened land and water resources. Each DENR division specializes in management of a specific natural resource, while the collaborative coordination and planning process results in cost effective implementation and management of multiple resources. Natural resource planning and conservation provides the science and incentives to inform and support conservation actions of North Carolina's conservation agencies and organizations. The Conservation Planning Tool

was developed to assist in building partnerships through the exchange of conservation information and opportunities, support stewardship of working farms and forests, inform conservation actions of agencies and organizations, and guide compatible land use planning. For more information about land trusts in North Carolina, see the *Conservation Trust for North Carolina's* website.

Watershed Planning

Figure 3-13 illustrates a general process for developing watershed restoration plans. This process can and should be applied to streams suffering from habitat degradation and pollution. Interested parties should contact the Basinwide Planning Program to discuss opportunities to begin the planning and restoration process in their chosen watershed. Many tools are available to address habitat degradation and pollution including; urban stormwater BMPs, agricultural BMPs, ordinance/rule changes at the local, state, and federal levels, volunteer activism, and education programs. New and existing development should employ stormwater BMPs wherever practical.

Figure 3-13: Watershed Planning

DWQ believes land conservation accompanied with stream restoration projects can be very successful. Prevention and protection activities are known to be more cost effective than retrofits and restoration. DWQ strongly encourages conservation in this watershed. Many programs and organizations can assist with these projects. Additionally, there are significant tax incentives landowners can take advantage of. Many of these programs allow and encourage owners to maintain control and exclusive use or their land. Some provide opportunities to ensure farmland remains productive and is not converted into commercial development and subdivisions. Local land trusts can help landowners explore conservation options and identify potential funding sources. For more information about land trusts in North Carolina, see the *Conservation Trust for North Carolina's* website.

Local Initiatives

Sediment & Erosion Control Local Programs

The North Carolina Sedimentation Control Commission may delegate authority to implement the Sedimentation Pollution Control Act to cities and counties that adopt a qualifying local erosion and sediment control ordinance in compliance with State requirements. Local programs' staff perform plan reviews and enforce compliance with plans within their jurisdictions. The City of Charlotte and Mecklenburg County administer the only S&EC Local Program in this subbasin. For more information about the Division of Land Resources and Local Programs visit the *Local Programs* page of their website.

Local initiatives covering more than one subbasin are discussed in the *Local Initiative Chapter*.

Construction Grants & Loans

The NC Construction Grants and Loans (CG&L) Section of DWQ provides grants and loans to local government agencies for the construction, upgrades and expansion of wastewater collection and treatment systems. As a financial resource, the section administers five major programs that assist local governments. Of these, two are federally funded programs administered by the state, the Clean Water State Revolving Fund (SRF) Program and the State and Tribal Assistance Grants (STAG). The STAG is a direct congressional appropriations for a specific "special needs" project within NC. The High Unit Cost Grant (SRG) Program, the State Emergency Loan (SEL) Program and the State Revolving Loan (SRL) Program are state funded programs, with the later two being below market revolving loan money. The Section also received an additional Capitalization Grant authorized by the American Recovery and Reinvestment Act of 2009 in the amount of $2,246,532. These funds are administered according to existing SRF procedures. All projects (Table 3-13) must be eligible under title VI of the Clean Water Act. For more information, please see the *CG&L* website.

Table 3-13: Construction Grants & Loan Projects Between 2004 & 2009 in Subbasin 03050103

Location	Project Description	Date	~ Amount
Charlotte, City of	McAlpine Creek WWMF-phase II, primary treatment improvement & effluent Filter rehabilitation	6/29/2007	$433,700
Charlotte, City of	Revolution Park Water Reuse Project	5/5/2009	$577,555
Union County	107,000 LF of drinking water lines.	8/17/2009	$1,961,300
Charlotte, City of	Wilora lake BMP construction.	1/6/2010	$1,319,982
Total Funded:			**$2,772,455**

Clean Water Management Trust Fund

Created in 1996, the Clean Water Management Trust Fund (CWMTF) makes grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address water pollution problems. The fund has made several investments in the South Fork Catawba River subbasin. Table 3-14 includes a list of recent (2004-2008) projects and their cost. These projects include several land acquisitions and WWTP upgrades.

Table 3-14: Clean Water Management Trust Fund Projects Between 2004 - 2008 in Subbasin 03050103

ID	Project Name	Project Description	County	Funded
2005B-404	Mecklenburg County - Rest/ Four Mile Creek Project (Withdrawn)	Design, permit and construct a natural channel stream enhancement project on 5,000 LF of Four mile Creek. County will conduct water quality monitoring. Complements upstream restoration work.	Mecklenburg	$542,000
2005B-704	Mecklenburg County - Storm/ Restoration Initiative Phase VII, Little Sugar Creek	Design, permit and construct 2 stormwater wetlands to reduce contamination to Little Sugar Creek from a 31 acre drainage area. Compliments other restoration and stormwater efforts in the watershed. Includes a greenway trail and water quality monitoring.	Mecklenburg	$280,000
2006A-404	Mecklenburg County-Rest/ Little Sugar Creek Restoration Initiative, Phase VIII	Design, permit & construct natural channel design stream enhancement project on 2,000 lf of Little Sugar Ck, a 303(d) stream. Construct 2 bioretention areas, 1 rain garden, & 1 water quality pool. Part of greenway system. Monitor water quality.	Mecklenburg	$1,000,000
2006A-405	Mecklenburg County-Rest/ McAlpine Creek Restoration Project	Design, permit & construct natural channel design stream enhancement project on 5,000 linear feet of McAlpine Creek, a 303(d)-listed stream. Includes stormwater BMPs in the buffer area. Will become part of a greenway system.	Mecklenburg	$845,000
2006B-702	Charlotte, City of - Storm/ Campbell Creek Stormwater Initiative, Muddy Creek	Design & permit 3 priority stormwater BMPs in Muddy Creek & Eastland Branch watersheds, tribs to 303(d)-listed McAlpine Creek. If constructed, could support goals established by the approved fecal coliform bacteria TMDL & phosphorus reduction strategy.	Mecklenburg	$125,000
2006B-811	Pineville, Town of - Plan/ Storm/ Bioretention and BMP Study, Sugar Creek	Fund a planning effort in the Town to identify potential stormwater BMP retrofit sites and the construction of a demonstration retrofit bioretention facility for an existing development.	Mecklenburg	$30,000
2007-021	Mineral Springs - Acq/ Greenway Project, Wolf & Bates Branches	Protect through conservation easement 47 acres, including 35 riparian acres along Wolfe Br and Bates Br. The property will become part of a greenway system	Union	$307,000
2007-404	Mecklenburg County - Rest/ Little Sugar Creek Restoration, Phase 9	Permit and construct/enhance 1,280 LF along Little Sugar Cr.; remove 750 LF of parking deck cap and create 820 LF of new channel.	Mecklenburg	$615,000
2008-702	Charlotte, City of - Storm/ Campbell Creek Watershed Restoration	Construct stormwater bmps and stream restoration on Muddy Cr., Campbell Cr., and tributaries to mitigate pollution sources in headwater streams tributary to McAlpine Cr.. Projects builds on design, permitting grant from CWMTF.	Mecklenburg	$219,000
2008-707	Mecklenburg SWC District - Storm/ Urban Cost-Share Program, McAlpine Creek	Construct or install selected BMPs on tributaries to McAlpine Cr.. This project provides an alternative to the Ag Cost Share in an urbanized county for encouraging property owners to protect and conserve resources.	Mecklenburg	$70,000
Total Amount				**$4,033,000**

Section 319-Grant Program

The Section 319 Grant Program was established per the Federal Clean Water Act to provide funding for efforts to reduce nonpoint source (NPS) pollution, including that which occurs though stormwater runoff. The U.S. Environmental Protection Agency provides funds to state and tribal agencies, which are then allocated via a competitive grant process to organizations to address current or potential NPS concerns. Each fiscal year North Carolina is awarded nearly 3 million dollars to address nonpoint source pollution through its 319 Grant Program. Thirty percent of the funding supports ongoing state nonpoint source programs. The remaining seventy percent is made available through a competitive grants process. No 319 contracts were issued in this subbasin between 2004 and 2008. More information can be found about these contracts and the *319 Grant Program* on their website.

Ecosystem Enhancement Program (EEP)

EEP uses watershed planning at two scales (basinwide and local) to identify the best locations to implement stream, wetland and riparian buffer restoration/enhancement and preservation projects. The planning process considers where mitigation is needed and how mitigation efforts might contribute to the improvement of water quality, habitat and other vital watershed functions in the state. Watershed planning requires GIS data analysis, stakeholder involvement, water quality monitoring, habitat assessment and consideration of local land uses and ordinances. It is a multi-dimensional process which considers science, policy and partnership.

River Basin Restoration Priorities

EEP River Basin Restoration Priorities (RBRPs) are focused on the identification of Targeted Local Watersheds (TLWs) within the 8-digit Cataloging Units (subbasins) that comprise individual river basins. TLWs represent priority areas (14-digit HUCs) for the implementation of stream and wetland mitigation projects. GIS screening factors considered in the selection of TLWs include: documented water quality impairment and habitat degradation, the presence of critical habitat or significant natural heritage areas, the presence of water supply watersheds or other high-quality waters, the condition of riparian buffers, estimates of impervious cover, existing or planned transportation projects, and the opportunity for local partnerships. Recommendations from local resource agency professionals and the presence of existing watershed projects are given significant weight in the selection of TLWs. RBRP documents (and TLW selections) for each of the 17 river basins in North Carolina are updated periodically to account for changing watershed conditions, increasing development pressures and local stakeholder priorities.

The most recent updates to the Catawba River Basin TLWs occurred in 2007 for the lower Catawba and in 2009 for the upper Catawba. In total, 41 14-digit HUCs have been designated TLWs by EEP in the Catawba Catalog Units (Table 3-15). These updated RBRPs, including a summary table of Targeted Local Watersheds, can be found at EEP's website for the *2007* and *2009* reports.

Table 3-15: Catawba River TLWs & LWPs by Subbasin (as of February 2010).

HUC	TLWs (#)	LWPs (# - Names)
03050101	26	3 - Muddy Creek, Lower Creek, & Charlotte (partial)
03050102	9	1 - Indian/Howard Creeks
03050103	6	1 - Charlotte (partial)
Total:	**41**	**4**

Local Watershed Planning

EEP Local Watershed Planning (LWP) initiatives are conducted in specific priority areas (typically a cluster of two or three Targeted Local Watersheds) where EEP and the local community have identified a need to address critical watershed issues. The LWP process typically takes place over a two-year period, covers a planning area around 50 to 150 square miles, and includes three distinct phases: I - existing data review and preliminary watershed characterization (largely GIS-based); II – detailed watershed assessment (including water quality & biological monitoring and field assessment of potential mitigation sites); and III – development of a final Project Atlas and Watershed Management Plan. EEP collaborates with local stakeholders and resource professionals throughout the process to identify projects and management strategies to restore, enhance and protect local watershed resources. EEP is currently conducting LWP Phase IV activities (project site evaluation and landowner outreach) in the Lower Creek, Hunting Creek and Muddy Creek watersheds within the Catawba 03050101 subbasin.

More information about the River Basin Restoration Priorities and LWP project areas within the *Catawba River Basin* can be found on the EEP website.

EEP Projects in the Catawba Basin

As of February 2010, EEP had a total of 40 mitigation projects in some stage of being completed in the Catawba Basin. These stages include identification/acquisition; design; construction; monitoring (construction complete); and long-term stewardship. Table 3-16 provides details on these project that include stream and wetland restoration/enhancement and

preservation projects. In total, EEP is in some stage of restoration or enhancement on over 191,000 feet of stream and 127 acres of wetlands in the Catawba. In addition, the program is in some stage of preservation on over 97,000 feet of stream and 43 acres of wetlands. For additional information about EEP's Project Implementation efforts, go to the *EEP Project Implementation* webpage. To view the locations of these project sites, go to *EEP's Web Map site*.

Table 3-16: EEP Projects in Some Stage of Completion in the Catawba River Basin by Subbasin

HUC	Projects (#)	Stream Restoration/ Enhancement (ft)	Stream Preservation (ft)	Wetland Restoration/ Enhancement (ac)	Wetland Preservation (ac)
03050101	30	151,829	97,597	71.1	38.7
03050102	6	27,848	0	52.0	4.5
03050103	4	11,500	0	4.7	0
Total:	**40**	**191,177**	**97,597**	**127.7**	**43.2**

For more information on EEP mitigation projects in the Catawba 03050101 and 03050101 subbasins, contact Paul Wiesner or Julie Cahill in EEP's western field office (Asheville) at, respectively, 828-273-1673 or 828-230-5172. For 03050103 subbasin, contact Robin Dolin at 919-715-5836.

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