CHAPTER TWO

South Fork of the Catawba River Subbasin

HUC 03050102

Includes: Henry Fork, Jacob Fork, Clark Creek & South Fork Catawba River

General Subbasin Description

This eight-digit hydrologic unit code (HUC) subbasin, with an area of about 661 square miles, is the second largest eight-digit HUC in the Catawba River basin and includes DWQ subbasins 03-08-35 and 03-08-36 (See map in *Appendix 2-D*). This HUC begins with the Henry and Jacob Forks watersheds in the southern portion of Burke County flowing east then merges with the South Fork Catawba River flowing south before merging with the Catawba River at the North and South Carolina state line.

Land cover in this subbasin is largely forest (47%), with a considerable amount of agricultural (30%) and urban (18%) areas further south. The majority of forested areas are found in the upper portions of this subbasin. The major municipal areas include Hickory, Newton, Lincolnton, Gastonia, and Belmont.

The most populated areas within this subbasin are along the South Fork Catawba River. The City of Gastonia has the most densely populated areas with roughly 600 to 1,000 people per square mile. See the *Population & Land Cover Section* of this chapter for additional information.

There are 11 major NPDES facilities operating in this HUC, with a total discharge of nearly 60 MGD. The largest of these dischargers are municipal WWTPs that serve Hickory (9 MGD to Henry Fork), Newton (7.5 MGD to Clarks Creek), Lincolnton (6MGD to the South Fork Catawba River), Gastonia (16 MGD to Long Creek), and Cramerton (4 MGD to the South Fork Catawba River). There are also about 20 other minor NPDES dischargers in this HUC with discharges of less than 1 MGD.

Subbasin at a Glance

Counties:

Burke, Catawba, Lincoln, and Gaston

Municipalities:

Belmont, Bessemer City, Brookford, Cherryville, Conover, Cramerton, Dallas, Gastonia, Hickory, High Shoals, Hildebran, Kings Mountain, Lincolnton, Long View, Lowell, Maiden, McAdenville, Newton, Ranlo, Spencer Mountain and Stanley

Ecoregions:

Eastern Blue Ridge Foothills, Kings Mountain, Southern Outer Piedmont & Northern Inner Piedmont

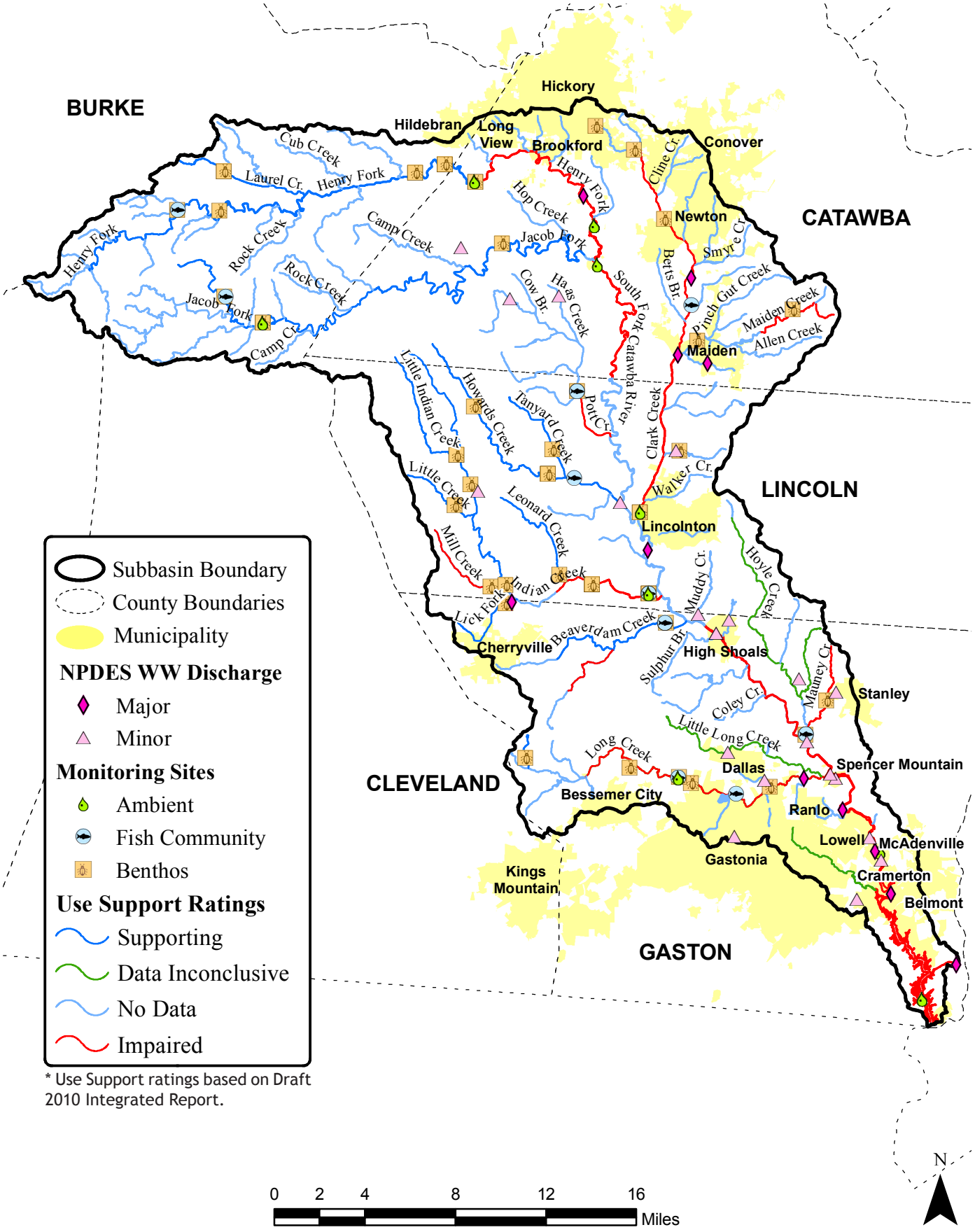
Permitted Facilities:

NPDES WWTP:..... 31
Major 11
Minor 20
NPDES NonDischarge: 10
Stormwater:..... 137
General 124
Individual 13
Animal Operations: 12

Population: 189,487

% of Impervious Surface: 4.5%

Figure 2-1: South Fork Catawba River Subbasin - 03050102



Water Quality Overview

Water Quality within this subbasin is influenced by ecoregions, land use and population. Water Quality is generally better in the upper non-developed regions and more impacted in the lower portion of this subbasin near urban centers. The major water quality issues in this subbasin include urban development, excess nutrient loading and nonpoint source runoff. The subbasin headwaters are experiencing impacts from urban and agricultural stormwater runoff, excess fecal coliform bacteria levels and low pH. These impacts are accumulating as water flows downstream with additional impacts from out-dated WWTP's as well as failing septic systems. The lower South Fork Catawba River, as it flows into Lake Wylie, receives nutrient enriched discharge from point sources and agricultural runoff. Fecal coliform bacteria and turbidity levels increase in the lower portion of the subbasin where urban sprawl consumes agricultural and forested areas.

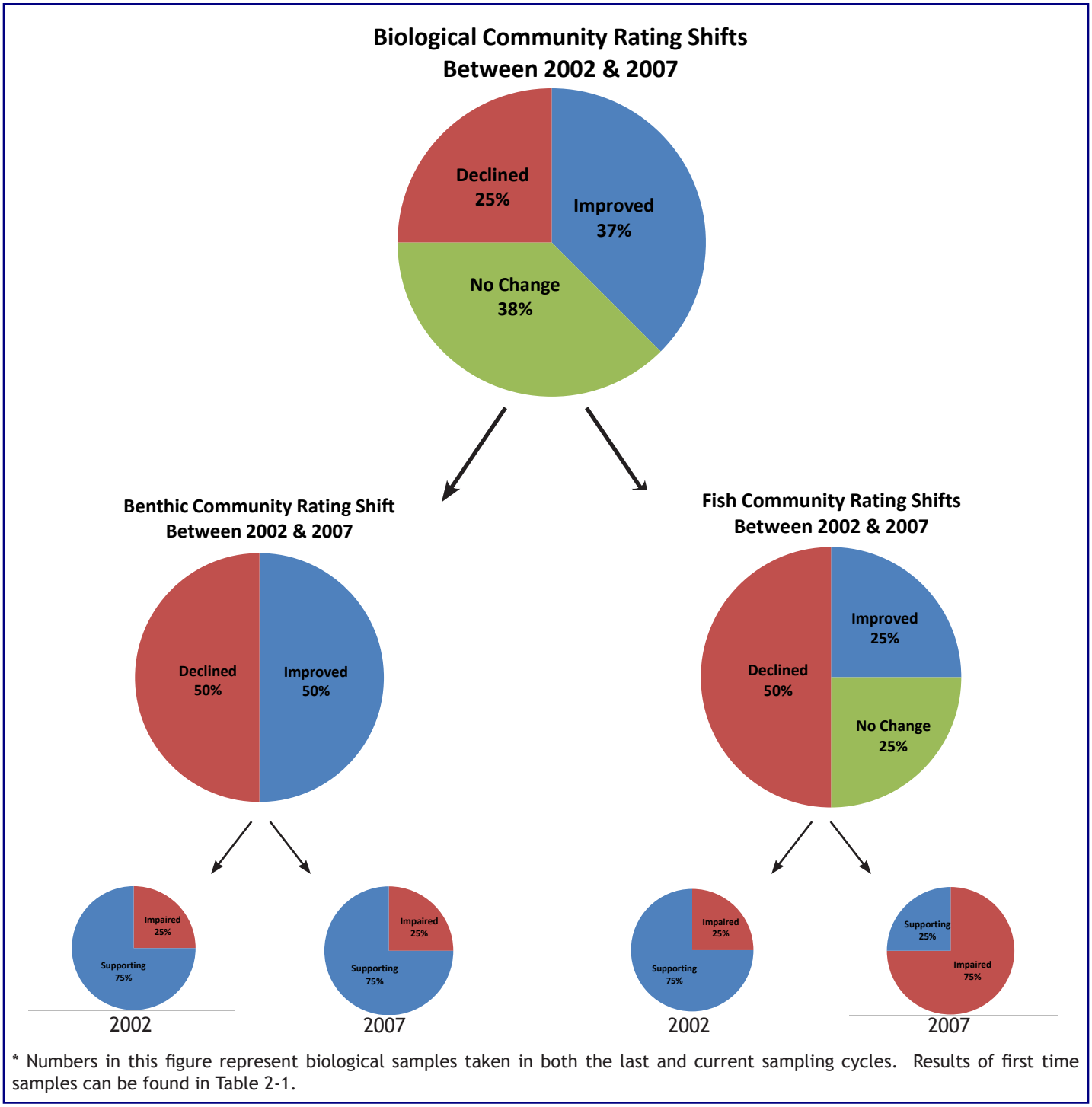
Local governments, watershed groups, natural resource agencies and local stakeholders have been actively working throughout this subbasin to assess certain watersheds and develop implementation plans to deal with these issues. Many of these efforts are currently on-going; however, others have resulted in measurable water quality improvements. The Soil & Water Conservation Districts have installed numerous best management practices mostly between NC-10 and NC-150 to address many of the agricultural impacts. The Ecosystem Enhancement Program has also focused efforts in that area on monitoring and other restoration projects. 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, 14 biological sampling sites were monitored within the South Fork Catawba River Watershed. Of those 14 sites, six were benthos stations and eight were fish community stations. Of those sites, three (all fish community) 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 for each five year sampling cycle station can be seen in Table 2-1. 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.

Figure 2-2 shows a comparison between 2002 and 2007 sample cycle data. The top graph compares all biological samples taken as part of the past two five year sampling cycles. Thirty-three percent of samples in both cycles received the same rating, 22% received lower ratings than its previous sample and 45% received higher ratings. The second row of graphs split the biological samples into benthic and fish community. Of these two, the fish community had the only decline (50%) in ratings and benthic samples had the largest improvement (60%). The third row breaks the fish and benthic graphs into the percent of results which are Supporting or Impaired for each sample cycle. Benthos samples which are Supporting gained 3% and fish samples lost 25% Supporting.

Figure 2-2: Shifts in Biological Ratings Between 2002 & 2007 for 03050102



* Numbers in this figure represent biological samples taken in both the last and current sampling cycles. Results of first time samples can be found in Table 2-1.

Table 2-1: Biological Sampling Locations and Ratings for 03050102, 2002 - 2007

Station ID**	Waterbody	Assessment Unit #	Description	County	Site Location	Sample Results
BENTHOS SAMPLE SITES						
CB178	Henry Fork	11-129-1-(12.5)b	From SR-1124 to State Route 1143	Catawba	SR-1124	`06 - Good `02 - Good
CB192	Jacob Fork	11-129-2-(4)	From Little River to Camp Creek	Burke	SR-1924	`06 - Excellent `02 - Good
CB185	Howard Cr.	11-129-4	From source to South Fork Catawba River	Lincoln	SR-1200	`08 - Good-Fair `06 - Good `02 - Good-Fair
CB165	Clark Cr.	11-129-5-(9.5)	From a point 0.9 mile upstream of Walker Creek to South Fork Catawba R.	Lincoln	SR-1008	`07 - Fair `02 - Fair
CB188	Indian Cr.	11-129-8-(6.5)	From a point 0.3 mile upstream of Lincoln County SR-1169 to South Fork Catawba River	Lincoln	SR-1252	`08 - Good-Fair `06 - Good `02 - Not Rated
CB224	Long Cr.	11-129-16-(4)	From Mountain Creek to South Fork Catawba River	Gaston	SR-1456	`07 - Good-Fair `97 - Good-Fair
FISH COMMUNITY SAMPLE SITES						
CF18	Henry Fork	11-129-1-(2)	From Morganton Water Intake to Laurel Creek	Burke	SR-1922	`07 - Good `98 - Good
CF48	Pott Cr.	11-129-3-(0.7)	From a point 0.3 mile upstream of Lincoln County SR-1217 to South Catawba Fork River	Lincoln	SR-1217	`06 - Fair `02 - Good
CF61*	Howard Cr.	11-129-4	From source to South Fork Catawba River	Lincoln	SR-1185	`07 - Good
CF7*	Clark Cr.	11-129-5-(0.3)b	From Miller Branch to 0.9 mile upstream of Walker Creek	Catawba	SR-2012	`04 - Poor
CF21	Indian Cr.	11-129-8-(6.5)	From a point 0.3 mile upstream of Lincoln County SR-1169 to South Fork Catawba River	Lincoln	SR-1252	`06 - Fair `02 - Fair
CF2	Beaverdam Cr.	11-129-9-(0.7)	From a point 0.3 mile upstream of Gaston County SR-1626 to South Fork Catawba River	Gaston	SR-1609	`06 - Excellent `02 - Good
CF19	Hoyle Cr.	11-129-15-(6)	From a point 0.2 mile downstream of Mauney Creek to South Fork Catawba River	Gaston	SR-1836	`06 - Fair `02 - Good-Fair
CF29*	Long Cr.	11-129-16-(4)	From Mountain Creek to South Fork Catawba River	Gaston	SR-1456	`04 - Excellent

* = New station location; therefore, no data for 2002.
** = See Figure 2-1 for locations on map

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 2-3: Yearly Average Flow Rates of Two USGS Gage Stations in HUC 03050102 Between 1997 & 2007

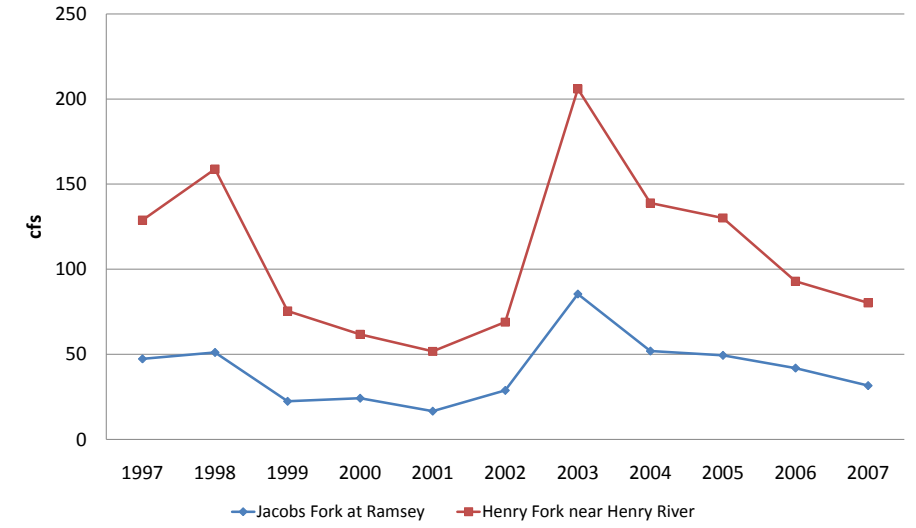


Figure 2-3 shows the yearly averages for two different USGS gage stations in the 03050102 HUC between 1997 and 2007. The figure also shows the drought that impacted the basin between 1999 and 2002 as well as the impact from heavy rain events in 2003 and the three hurricanes that occurred between mid 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 2-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), nine Ambient Monitoring System (AMS) stations collected ten or more samples and were used for use support assessment (see Figure 2-1 for station locations). There were four Random Ambient Monitoring System (RAMS) stations sampled within the basin between 2007 and 2008, one of which was located in this subbasin and is listed at the bottom of Table 2-2.

Eight of the ambient stations are rated Impaired for exceeding low pH, copper, high temperature and/or turbidity standards (See Table 2-2). 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 nine ambient stations, one station is Impacted for turbidity (See Table 2-2). For the purposes of this plan, any site with 7.1% to 10.0% of samples over a parameter's 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 2-2: Ambient Monitoring Stations in the HUC 03050102

Station ID	Current Status	Waterbody	AU#	Location	Impaired* (by Parameter)	Impacted (by Parameter)
C4300000	Active	Henry Fork	11-129-1-(12.5)b	SR-1124 near Henry River	Low pH (25.4%) Turbidity (10.2%)	---
C4360000	Active	Henry Fork	11-129-1-(12.5)c	SR-1143 near Brookford	Turbidity (10.2%)	---
C4370000	Active	Jacob Fork	11-129-2-(4)	SR-1924 at Ramsey	---	---
C4380000	Active	S Fk Catawba R.	11-129-(0.5)	NC-10 near Startown	Low pH (22%) Turbidity (11.9%)	---
C4800000	Active	Clark Cr.	11-129-5-(9.5)	SR-1008 Grove St at Lincolnton	Turbidity (15.3%) Copper (15.4%)	---
C5170000	Active	Indian Cr.	11-129-8-(6.5)	SR-1252 near Laboratory	Low pH (15.3%) Turbidity (10.2%)	---
C5900000	Active	Long Cr.	11-129-16-(4)	SR-1456 near Bessemer City	Low pH (11.9%)	Turbidity (8.5%)
C6500000	Active	S Fk Catawba R.	11-129-(15.5)	NC-7 at McAdenville	Low pH (10.2%) Turbidity (11.9%)	---
C7000000	Active	S Fk Catawba R.	11-(123.5)b	SR-2524 near South Belmont	High Temp (27.1%) Copper (69.2%)	---
C4368900	`07-`08 RAMS	Little R.	11-129-2-5	S Mt. Baptist Camp near Pleasant Grove	---	---

* 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 each year. These graphs are not intended to provide statistically significant trend information, but rather an idea of how changes in land use conditions or climate changes 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*.

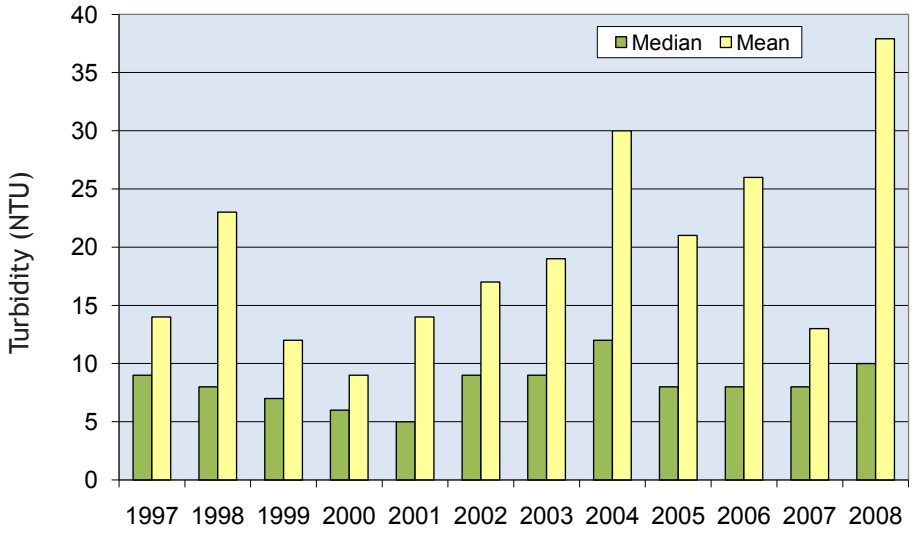
Turbidity

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 2-2, six stream segments are Impaired and one segment is Impacted for turbidity in this watershed. The highest percent of turbidity violations can be seen on Clark Creek at site C4800000 with 15% of samples exceeding the standard. For more specific information about this sample site, see the *Clark Creek Watershed (0305010203)* Section below.

Figure 2-4 shows the mean and median of turbidity levels for all samples taken over the course of 12 years in the South Fork Catawba River subbasin. The highest yearly averages for turbidity were recorded in 2004, 2006 and 2008 which were the same years with highest percent of turbidity standard violations (10%, 12%, and 11% respectively).

FIGURE 2-4: SUMMARIZED TURBIDITY VALUES FOR ALL DATA COLLECTED AT AMBIENT SAMPLING STATIONS IN HUC 03050102



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 South Fork Catawba River watershed. It appears, however, violations are highest near urban areas. Violations are lowest where land cover is predominantly forest. This trend demonstrates the importance of *protecting and conserving stream buffers and natural areas*.

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 9.0 su. Low pH was one the most common reason for Impairment in this subbasin. Five stream segments are Impaired because of low pH levels. Station C4300000 (Henry Fork) had the highest percent (25%) of samples violating the standard between 2004 and 2008 (See Table 2-2). For more specific information about this sample site, see *Appendix 2-C*.

FIGURE 2-5: SUMMARIZED PH VALUES FOR ALL DATA COLLECTED AT AMBIENT SAMPLING STATIONS IN HUC 03050102

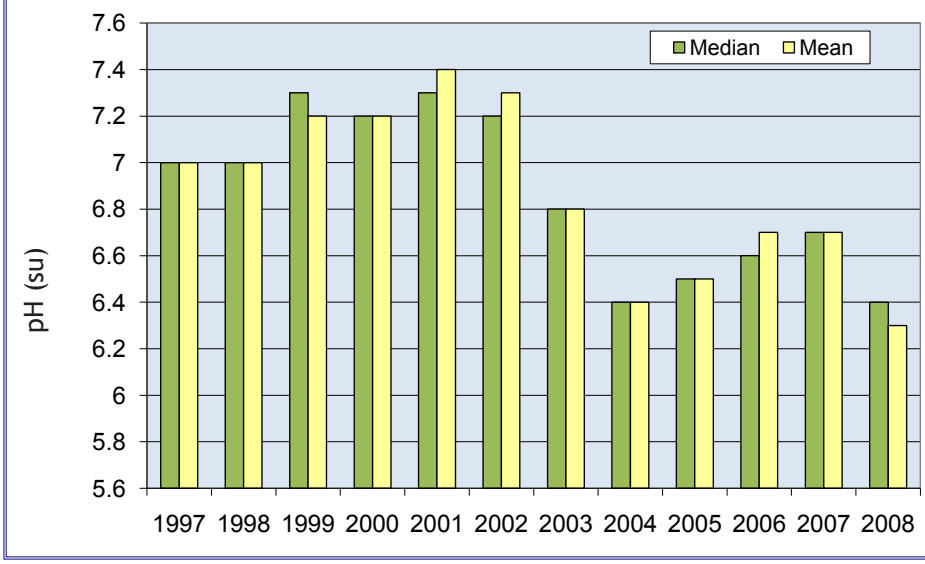


Figure 2-5 shows the mean and median of pH levels for all samples taken over the course of 12 years in the South Fork Catawba River subbasin. The lowest pH yearly average recorded and the year with the most standard violations was 2008. The overall basin trend during this 12 year period is a significant decline in pH levels. In this subbasin, yearly averages dropped from low to mid 7's to mid 6's starting around 2003. For a more detailed discussion of what may be causing this trend basinwide, see the *Basin Overview Chapter.*

Dissolved Oxygen

Dissolved Oxygen (DO) can be produced by 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. Trout waters (Tr) should not have less then 6.0 mg/l DO. Trout waters in this subbasin are found in the headwaters. For more information on Trout water classifications and where they are located in the Catawba River basin, see the *Buffer Rules Chapter*. As seen in Table 2-2, no stream segments in this subbasin are Impaired or Impacted due to DO levels.

Figure 2-6: Summarized DO Values for All Data Collected at Ambient Sampling Stations in HUC 03050102

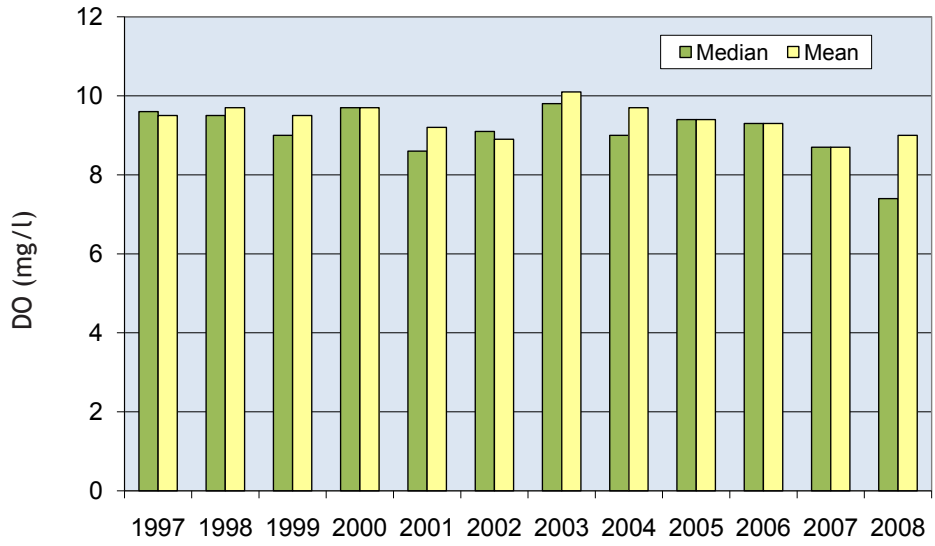


Figure 2-6 shows the mean and median of DO levels for all samples taken over the course of 12 years in the South Fork Catawba River subbasin. The lowest yearly average for DO was recorded in 2007. The highest percent of DO standard violations during the 12 years occurred in 2002 (6%).

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.

Water quality standards state that discharge from permitted facilities 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 lower piedmont area. The only station in this subbasin to exceed the standard during this cycle was C7000000 (see Table 2-2). It should also be noted that between 1997 and 2008, C7000000 (South Fork Catawba River) was the only station within this subbasin to exceed the standard. For more specific information about this sample site, see the *Lower South Fork Catawba River Watershed (0305010206)* Section below.

Figure 2-7: Summarized Temperature Values for All Data Collected at Ambient Sampling Stations in HUC 03050102

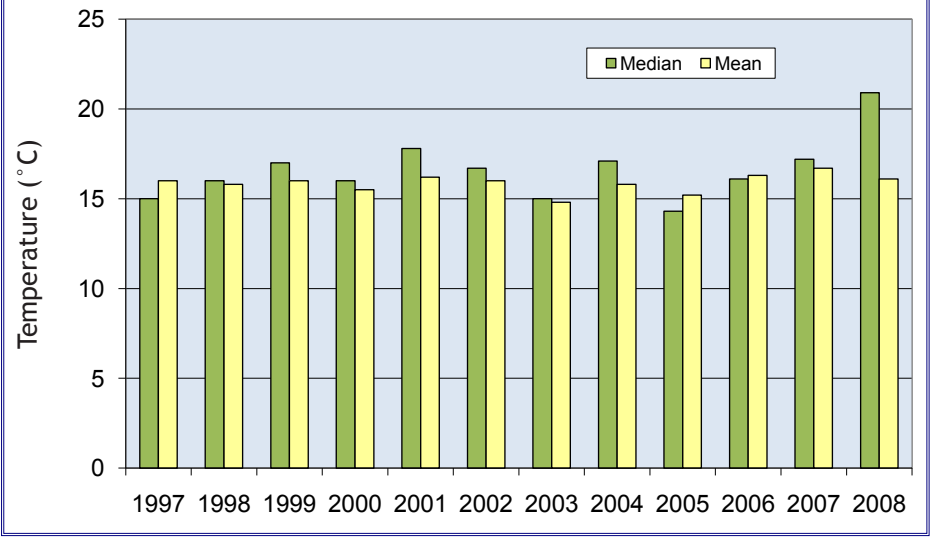


Figure 2-7 shows the mean and median of temperature levels for all samples taken over the course of 12 years in the South Fork Catawba River subbasin. The highest yearly average for temperature was recorded in 2007. The highest percent of temperature standard violations occurred in 2004 and 2007 (4% for both years).

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 to be used to indicate whether the stream is Impaired or Supporting. Five out of the nine ambient stations in the South Fork 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 2-3). 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 additional information about theses sample sites, see *Appendix 2-C*.

Table 2-3: Waters with Elevated FCB Levels & Without 5-in-30 Studies.

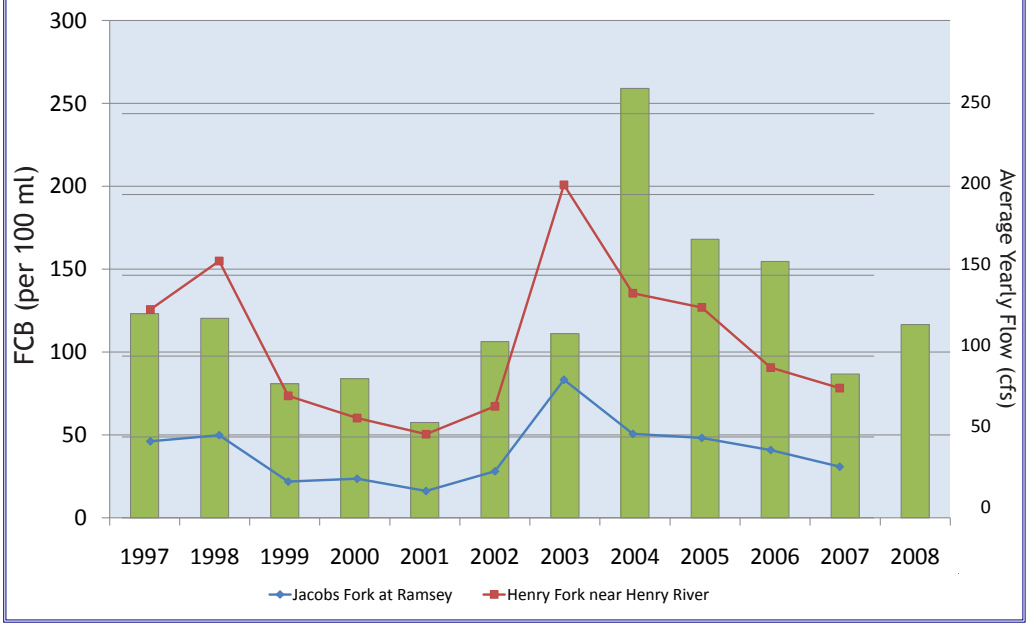
Station ID	Waterbody	Class.	AU#	Location	Geometric Mean	# of Samples Above 400 colonies/100ml	% of Samples Above 400 colonies/100ml
C4380000	S. Fork Cat. R.	WS-IV	11-129-(0.5)	NC-10 near Startown	181	15 out of 58	26%
C4800000	Clark Cr.	WS-IV	11-129-5-(9.5)	SR-1008 Grove St at Lincolnton	610	30 out of 59	51%
C5170000	Indian Cr.	WS-IV	11-129-8-(6.5)	SR-1252 near Laboratory	354	22 out of 59	37%
C5900000	Long Cr.	C	11-129-16-(4)	SR-1456 near Bessemer City	428	23 out of 58	40%
C6500000	S. Fork Cat. R.	WS-V	11-129-(15.5)	NC-7 at McAdenville	160	12 out of 59	20%

Figure 2-8 shows the geometric mean of FCB levels for all samples taken over the course of 12 years in the South Fork 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 average for FCB was recorded in 2004. This figure also includes the yearly average stream flow as seen in Figure 2-3 to how flow can be linked to FCB levels.

For more information regarding any of the parameters listed above, see Section 3.3 of the *Supplemental Guide to North Carolina's Basinwide Planning*. Data sheets for each of the ambient monitoring stations in this watershed can be found in *Appendix 2-C* of this Chapter.

Figure 2-8: Summarized Fecal Coliform Bacteria Values for All Data Collected at Ambient Sampling Stations in HUC 03050102 with Overlaying Rainfall



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 2-1, and a Use Support list of all monitored waters in this basin can be found in *Appendix 2-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 2-10) 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 2-4 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 the *Maps Chapter.*

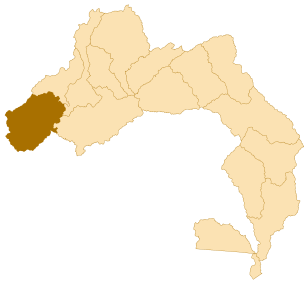
Table 2-4: HUC Quick Reference

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 2-9: 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 2-9. **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 2-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 2-10). 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 2-10 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 2-10: 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%

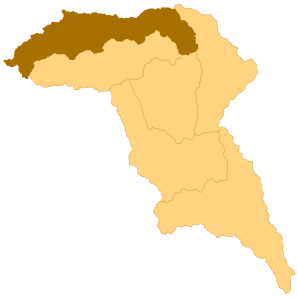
Please note any fecal coliform bacteria (FCB) listing in the last row (as seen in Figure 2-10) only indicates elevated levels and a study of five samples in 30 days (5-in-30) must be conducted before a stream becomes Impaired for FCB.

Table 2-5: Waterbodies & the Section(s) Where Discussed Within This Subbasin Chapter

Stream Name	AU#	10-Digit HUC	Integrated Report Category[1]	Restoration/Protection/ Success[2]
Henry Fk	11-129-1-(12.5)b & c	0305010201	5	Restoration
Henry Fk	11-129-1-(12.5)a	0305010201	2	Success
Jacobs Fk	11-129-2-(4)	0305010202	2	Protection
Maiden Cr	11-129-5-7-2-(1)	0305010203	5	Restoration
Clark Cr	11-129-5-(0.3)b & (9.5)	0305010203	5	Restoration
Town Cr	11-129-5-4	0305010203	2	Protection
Potts Cr	11-129-3-(0.3) & (0.7)	0305010204	5	Restoration
S Fk Catawba R	11-129-(0.5)	0305010204	5	Restoration
Howard Cr	11-129-4	0305010204	2	Protection
Indian Cr	11-129-8-(6.5)	0305010205	5	Restoration
Beaverdam Cr	11-129-9-(0.7)	0305010205	2	Protection
Hoyle Cr	11-129-15-(6)	0305010206	5	Restoration
Mauney Cr	11-129-15-5	0305010206	5	Restoration
Long Cr	11-129-16-(4)	0305010206	5	Restoration
Dallas Br	11-129-16-7b	0305010206	5	Restoration
S Fk Catawba R	11-129-(10.5) & (14.5)	0305010206	5	Restoration
S Fk Catawba R	11-129-(15.5)	0305010206	5	Restoration

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*.

Henry Fork (0305010201)



Restoration Opportunities

Lower Henry Fork (030501020103)

Henry Fork [AUs: 11-129-1-(12.5)b & c]:
The segments of Henry Fork within this 12-Digit subwatershed are a combined length of 13.4 miles and flow from State Route 1124 to Jacobs Fork. The majority of the stream drains residential areas as well as some forested and agricultural areas. The first segment in this subwatershed [AU: 11-129-1-(12.5)b] has been rated Good for benthos (CB178) since 1989 as it did in 2006.

Use Support: Impaired (13 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB178)	Good (2006)
AMS (C4300000)	Low pH - 25% Turbidity - 10.2% FCB - 14%
AMS (C4360000)	Turbidity - 10.2% FCB - 18%

Data from the ambient monitoring station (C4300000) located on the middle portion of Henry Fork [AU: 11-129-1-(12.5)b] shows the creek is being impacted by both high turbidity and low pH, which are two parameters heavily influenced by rainfall. AMS site C4360000 on the lower portion of Henry Fork [AU: 11-129-1-(12.5)c]; however, only had a few readings of low pH. The turbidity readings spike during and shortly after rainfall events suggesting these violations are from nonpoint sources and natural causes; however, further study should be done to confirm. Both segments will be Impaired for turbidity and the upper segment will also be Impaired for low pH.

Both of these segments are also showing signs of being impacted by fecal coliform bacteria (FCB). The City of Hickory's WWTP (NC0040797) is located on the lower portion of Henry Fork in between the two AMS sites. This facility has received no NPDES permit violations for excess FCB. While it may be the cause of some high nutrients and suspended solids, it does not appear to be causing the high levels for this waterbody.

Watershed Restoration & Success Stories

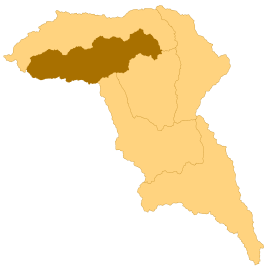
Middle Henry Fork (030501020102):

Henry Fork [AU: 11-129-1-(12.5)a]:

This segment was on the 2006 303(d) list for biological impairment. It has seen significant and steady improvement among the benthic community since 2001 when it received a Fair rating. Sampling was initiated here due to a large release of sand and sediment from behind the Henry River Dam in June 2001. The sand and sediment smothered the habitat by several feet shortly after being released causing the Impaired rating. Effects from the release are still being seen; however, it is significantly less than previous years. The site downstream of the dam now has the highest habitat score (84) of the five sites along Henry Fork.

Use Support: Supporting (10 mi)	
2008 IR Cat.	2
2010 IR Cat.	2
Benthos	
(CB181)	Good (2006)
(CB180)	Good (2006)

Jacobs Fork (0305010202)



Protection Priorities

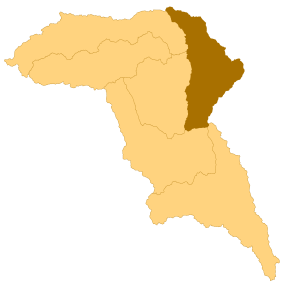
Upper Jacobs Fork (030501020201)

Jacobs Fork [AU: 11-129-2-(4)]:

In May of 2006, biological sampling for a Watershed Stressor Study[1] was conducted, and Jacobs Fork received a benthic community rating of Excellent. However, ambient samples indicate a decrease in overall pH levels and a slight increase in fecal coliform bacteria levels. This section of Jacobs Fork is considered a high priority for protection due to a discovery made by DWQ biologist of the appearance of *Baetopus trishae*, a rare mayfly known previously in only two locations (both in Jackson County, NC) and only four specimens have been seen in North America. This finding extends the eastern range of this mayfly in North Carolina by more than 90 miles. Biological samples taken further upstream on Jacobs Fork and the Little River show the water quality and habitat are fully supporting aquatic life. For this reason, the entire Upper Jacobs Fork watershed should be actively protected from human impacts. DWQ will continue to monitor the benthic station (CB192) to help further understand the extent of this mayfly's existence and to ensure it continues to have supporting habitat.

Use Support: Supporting (7 mi)	
2008 IR Cat.	2
2010 IR Cat.	2
Benthos	
(CB192)	Excellent (2006)
AMS	
(C4370000)	No Exceedances

Clark Creek (0305010203)



Restoration Opportunities

Maiden Creek (030501020301)

Maiden Creek [AU: 11-129-5-7-2-(1)]:

Maiden Creek flows southwest for 7.5 miles before merging with Allen Creek around the Town of Maiden and drains mostly agricultural land. In 1993, Maiden Creek's benthic community was rated Good; however the fish community was given Good-Fair. Since than, the creek was sampled once in 2002 and received a benthic rating of Fair. Upstream of the 2002 sampling location, there is one registered impoundment and at least two other agricultural impoundments. During the 2002 sampling biologist noted that the flow of Maiden Creek was reduced by half during the time it took to sample the creek. The benthic community showed signs of severe impact due to inconsistent flow as noted in the 2002 special study[2]. DWQ will re-sample this site (CB193) during the next sampling cycle, and will work with SWCD and property owners to ensure adequate flow remains in Maiden Creek.

Use Support: Impaired (5 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos	
(CB193)	Good (2002)

1 *Results of Biological Sampling from the Watershed Stressor Study in the Catawba River Basin: Burke, Catawba, and Lincoln counties, Subbasin 35 and 36 (BF-20061207).* Requests for a copy of this and other special studies must submitted to ESS via phone (919-743-8400) or e-mail (jay.sauber@ncdenr.gov).

2 Biological Monitoring of Maiden Creek (Catawba Subbasin 35), August 2002. (B-20021210). Requests for a copy of this and other special studies must submitted to ESS via phone (919-743-8400) or e-mail (jay.sauber@ncdenr.gov).

Upper & Lower Clark Creek (030501020302 & 030501020303)

Clark Creek [AUs: 11-129-5-(0.3)a, (0.3)b & (9.5)]:

Clark Creek runs a little over 20 miles south from the source near the southeast portion of the City of Hickory to its confluence with the South Fork Catawba River on the west side of the City of Lincolnton. The creek is split into three segments which drain a variety of landscapes including mostly agricultural land with a mixture of residential areas. In August of 2002, a fecal coliform bacteria TMDL was completed for the entire length of Clark Creek and its watershed. This is discussed further in the Section below.

Clark Creek [AU: 11-129-5-(0.3)b]: The longest of the three segments of Clark Creek is AU: 11-129-5-(0.3)b (16.6 miles) and has been on the Impaired Waters list since 1998 for biological integrity. The most recent benthic sample, taken in 2001 at station CB166 in Newton, received a Good-Fair rating which suggests improvement. However, the most recent fish community sample, taken in 2004, rated the creek as Poor. This low rating may be a result of both point and nonpoint pollutants. A cattle exclusion fence, which are designed to run parallel with the stream, crosses the channel giving cattle full access. Urban debris is scattered across the banks and channel.

Use Support: Impaired (17 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB166)	Good-Fair (2001)
Fish Com (CF7)	Poor (2004)

This segment also receives effluent from the Town of Maiden's WWTP (NC0039594) which could be causing the lack of pollution intolerant species due to the high levels of biological oxygen demand (BOD) and suspended solids found in the WWTP's effluent. The pure oxygen plant had numerous maintenance issues due to problems getting spare parts, issues with operations, and the pretreatment program for industrial users. One of these issues was elevated BOD coming into the plant that could not be treated. Per previous agreements unrelated to Maiden's violations, the high BOD contributor was rerouted to a neighboring WWTP in July 2008. The Town of Maiden had planned for an upgrade but refused to apply for a SOC during construction. New management, operators, and pre-treatment program coordinator were employed and the Town began operation of the new Sequencing Batch Reactor (SBR) Treatment System as of September of 2008. During start-up there were problems setting up the SBR to properly mix, settle, and decant but no violations were generated. There have been no violations issued to the plant since July 2008. The Mooresville Regional Office inspected the plant in February of 2009 and although a few issues were raised relating to influent/effluent sampling and grit removal the facility was found to be in compliance.

Clark Creek [AU: 11-129-5-(9.5)]: The last segment of Clark Creek is the most downstream segment before it flows into the South Fork Catawba River. It was originally placed on the Impaired Waters list for fecal coliform bacteria (FCB) standard violations in 1998. A *TMDL for FCB* was completed in August of 2002 as a result of this listing and is discussed below. The same month the TMDL report was published, the segment was biologically sampled and received a Fair benthic rating which caused it to remain on the Impaired Waters list. The impairments continue with a Fair benthic rating in 2007 and physical/chemical standard violations accumulated between 2004 and 2008.

Use Support: Impaired (2 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB165)	Fair (2007)
AMS (C4800000)	Copper - 15% Turbidity - 15% FCB - 51%

Ambient monitoring (2004 - 2008) resulted in 51% of samples above the action level for FCB of 400 colonies per 100 ml (details below). The copper standard of 7 µg/l was exceeded in 15% of samples which is 2% higher than the previous sampling cycle. A copper study was conducted in 2004 to determine the impact of copper on Clark Creek and concluded that the amount of copper in the water column at that time was not significant enough to impair the creek. However, more recent sampling has documented increasing copper exceedances; therefore, Clark Creek has been placed on the 2008 and 2010 Impaired Waters list for copper. Eight percent of lead and zinc samples were exceeding the standard as well. Clark Creek will not be impaired for lead or zinc but the exceedance indicates the creek is being impacted by metal toxicity. This toxicity is believed to be caused by urban land use activities.

In July of 2002, the Clean Water Management Trust Fund funded the *Assessment Report: Biological Impairment in the Upper Clark Creek Watershed* which analyzed a broad range of data about the watershed to determine the most probable stressors and sources of the impairment. Once three main sources were determined (habitat degradation, toxicity from nonpoint sources and toxicity due to chlorine discharge from the Newton WWTP), the report recommended ten steps to address current sources of impairment and prevent further degradation. These steps are summarized in the *2004 Catawba River Basinwide Water Quality Report* in *Section B, Chapter 6*. Recommendations and action plans for Clark Creek are discussed below.

Protection Priorities

Upper Clark Creek (030501020302)

Town Creek [AU: 11-129-5-4]:

Town Creek is just under four miles long and mostly drains dense urban areas from the Town of Newton. This creek was sampled once (2000) and received a benthic rating of Good-Fair. The somewhat low rating likely reflects impacts from toxic urban stormwater runoff and residential nonpoint source pollution. DWQ will re-sample this site during the next sampling cycle. DWQ will also work with the City of Newton to reduce the impacts of stormwater and residential runoff to Town Creek. This creek receives a high priority for protection since it drains into Clark Creek [AU: 11-129-5-(0.3)b] which is on the Impaired Waters list.

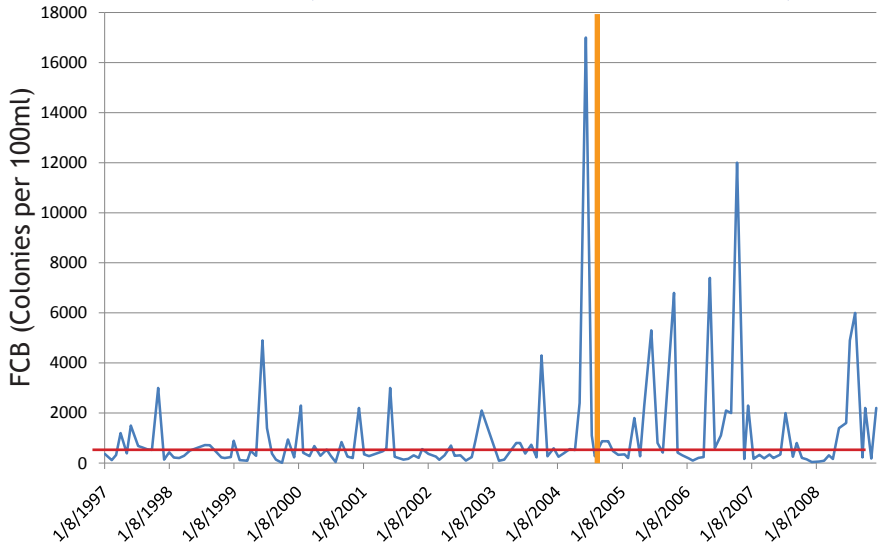
Use Support: Supporting (4 mi)	
2008 IR Cat.	2
2010 IR Cat.	2
Benthos (CB204)	Good-Fair (2000)

Watershed Recommendations & Action Plans

Clark Creek FCB TMDL:

In 2002, a TMDL was developed and approved for Clark Creek to address the excessive fecal coliform bacteria (FCB) levels sampled in the creek. Figure 2-11 shows each sample taken by DWQ between 1997 and 2008. The orange line indicates the approval of the TMDL and the red line roughly indicates the standard of 400 colonies per 100ml in 20% of samples. Potential nonpoint sources of FCB loading and calculated reductions in the watershed include urban development (53%), animal grazing (22%), and failing septic systems (15%). The study called for a total FCB loading reduction of 77% from nonpoint sources. Point sources were noted as contributing less than 5%; therefore, reductions are not recommended for FCB loading from point sources.

Figure 2-11: C4800000 Fecal Coliform Bacteria Sample Results Between 1997 & 2008 (Orange line indicates release of TMDL)*

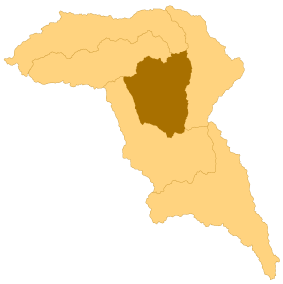


* The orange line indicates the approval of the TMDL and the red line roughly indicates the standard of 400 colonies per 100ml in 20% of samples.

Clark Creek Action Plan:

Local agencies have recommended this watershed as a potential DWQ Use Restoration Watershed due to the amount of urban and nonpoint source FCB issues impacting this creek which DWQ has recently approved. A group of local agencies (Carolina Land & Lakes RC&D, Catawba County and City of Hickory) has recently formed to begin developing a Watershed Restoration Plan. Focus will be placed on the headwater portions of the watershed at first, then the group will gradually move downstream. This will ensure activities in the headwaters will not degrade efforts being made downstream. This Watershed Restoration Plan will reconfirm the sources found during the 2002 Biological Assessment Report (as discussed above) as well as design a plan of implementation. The group will use resources already developed to address excessive FCB levels and expand the study range to include other parameters of interest in this watershed. Study will begin in the upper headwaters of the watersheds and work downstream. A more wholistic approach to this watersheds restoration is over all less costly and increases the ability for success. DWQ will assist with this restoration effort and supports the need for funding to develop and implement the Watershed Restoration Plan. For more information and progress on this effort visit the *DWQ Use Restoration Watershed webpage*.

Upper South Fork Catawba River (0305010204)



Restoration Opportunities

Pott Creek (030501020401)

Use Support: Impaired (13 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthic (CB197)	Good (2006)
Fish Com (CF48)	Fair (2006)

Pott Creek [AUs: 11-129-3-(0.3) & (0.7)]:
Pott Creek is about 13 miles in total length and drains rural agricultural lands into the South Fork Catawba River [AU: 11-129-(2.5)]. Historically, the lower section of this creek has received Good fish community ratings (1997 & 2002). However, a 2006 sample from a Watershed Stressor Study[1], conducted by ESS, resulted in a drop to a Fair rating. This may be in part due to limited avenues for recolonization. During the same study, a benthic sample received a Good rating. Hurricanes in 2004 caused a significant amount of erosion from the creek banks and are likely causes of the fish community impairment. Poor habitat, also caused by the hurricanes, was then further stressed by low flows in 2007. Nutrient tolerant species found in the benthic samples indicate the creek is also being effected by excess nutrients. The source of this excess nutrients could have originated from the large amounts of agricultural drainage found in this watershed. The local SWCD has placed nine agricultural BMPs (mostly sediment and nutrient removal measures) just downstream of the monitoring stations between 2004 and 2008. Improvements to the biological community are expected in the next couple of years due to these BMPs. DWQ will continue to work with SWCD to further assess the need for additional agricultural BMPs as well as work to identify other sources in this subwatershed.

Town of Startown-South Fork Catawba River (030501020403)

Use Support: Impaired (8 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
AMS (C4380000)	Low pH - 22% Turbidity - 12% FCB - 26%

South Fork Catawba River [AU: 11-129-(0.5)]:
The South Fork Catawba River is just over 56 miles in total length and drains into Lake Wylie just before reaching the City of Belmont. The river is split into eight different segments to better assess its ability to support its designated uses and overall health. Each segment is discussed in its corresponding 10-Digit watershed. The river begins at the confluence of Jacob Fork and Henry Fork. This segment [AU: 11-129-(0.5)] was first placed on the Impaired Waters list in 2008 for a low pH standard violations. It will remain on the DRAFT 2010 list for low pH as well as for turbidity violations between 2004 and 2008. The pH violations at this ambient monitoring station closely follow the basinwide trend of dropping significantly in 2003. The AMS data also showed elevated FCB levels. The segment has not been biologically monitored since 1997; therefore, it is recommended to be sampled during the next cycle to determine if there has been an impact to the biological community.

Protection Priorities

Howards Creek (030501020402)

Use Support: Supporting (14 mi)	
2008 IR Cat.	2
2010 IR Cat.	2
Benthic (CB185)	Good-Fair (2008)
Fish Com (CF61)	Good (2007)

Howards Creek [AU: 11-129-4]:
Howards Creek is a 13.5 mile creek that drains rural agricultural areas and empties into the South Fork Catawba River [AU: 11-129-(3.7)] just west of the City of Lincolnton. In 2007, the fish community in this creek was sampled for the first time and received a Good rating. It was also sampled for benthic community in 2006 as part of a Watershed Stressor Study[1] conducted by ESS, and was rated Good. At that time, biologist noted a large hole (>2 meters deep) created by a dip crane in support of an ongoing sand mining operation. This constant disturbance of sediment has caused the substrate, in which the benthic community lives, to become embedded. Samples were taken in June and October of 2008 to assist the Ecosystem Enhancement Program (EEP) with a Local Watershed Plan (LWP) for Howards and Indian Creek. The benthic community dropped to a Good-Fair rating. According to findings from the LWP, Good-Fair Bioclassifications reflect the overall marginal aquatic habitat conditions found in Howards Creek that would be improved through planting of stream buffers and stabilizing of stream banks.

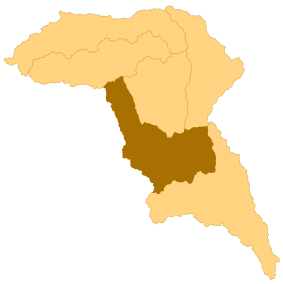
1 *Results of Biological Sampling from the Watershed Stressor Study in the Catawba River Basin: Burke, Catawba, and Lincoln counties, Subbasin 35 and 36 (BF-20061207).* Requests for a copy of this and other special studies must submitted to ESS via phone (919-743-8400) or e-mail (jay.sauber@ncdenr.gov).

In 2008, EEP identified this watershed, as well as the neighboring Indian Creek subwatersheds (030501020501 & 030501020502), as high priority areas for EEP's detailed watershed assessment and planning process. EEP will complete it's 3-phase Local Watershed Planning (LWP) initiative, culminating in production of a final Project Atlas and final Watershed Management Plan, in the spring of 2010. The Preliminary Findings Report, Wetland Assessment Report, Detailed Assessment Report and LWP Fact Sheet can be found on the *EEP-Catawba River Basin webpage*.

Watershed Recommendations & Action Plans

Howards Creek is part of the Indian/Howards Creek's EEP *Local Watershed Plan* which started in 2006. This is discussed in greater detail in the Warrior Fork (0305010205) Watershed Recommendations & Action Plans section below.

Warrior Fork - Catawba River (0305010205)



Restoration Opportunities

Lower Indian Creek (030501020501)

Use Support: Impaired (6 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB187) (CB188)	Good-Fair (2008) Good-Fair (2008)
Fish Com (CF21)	Fair (2006)
AMS (C5170000)	Low pH - 15% Turbidity - 10.2% FCB - 37%

Indian Creek [AUs: 11-129-8-(6.5)]:
Indian Creek begins at the county line between Lincoln and Catawba County and flows 23 miles downstream to South Fork Catawba River [AU: 11-129-(3.7)]. This subwatershed drains mostly agricultural and forested lands. The creek was part of a Watershed Stressor Study[1] conducted by ESS in 2006 in which two benthic sites and one fish community site were sampled on Indian Creek. Of the two benthic sites, the one most upstream (CB187) rated significantly lower than the site downstream (CB188). The habitat scores for both sites were almost identical which indicates it is not significantly contributing to the degradation. In 2006, a fish community sample was taken at the same location as the lower benthic sample and it was rated Fair as well. The most significant impact to the fish community was the low flows from prolonged drought. Also, the dams located just upstream and downstream of the confluence with the South Fork Catawba River are impeding the recolonization of the fish community. The likely causes of the biological impairment is nonpoint source pollution (urban runoff, agricultural practices and historic stream channelization). For more specific details about the 2006 samples, see the Watershed Stressor Study[1].

Samples were also taken on Indian Creek in June and October of 2008 (outside the regular sampling cycle) to assist EEP with a Local Watershed Plan (see below) for Howard and Indian Creek. Both benthic sites were rated Good-Fair during that time. When comparing the samples from 2006 and 2008, which had very similar results, it suggests the sites may continue to vacillate between Fair and Good-Fair ratings. The 2008 study also indicates that water levels were even lower than during the 2006 study due to a more severe drought in 2007.

The AMS data indicated that the creek is suffering from low pH levels and excess turbidity. FCB levels were also higher than normal. A 5-in-30 study (five samples taken within 30 days) should be conducted to determine if the creek is impaired for FCB. The creek will remain on the Impaired Waters list for 2008 and 2010 for biological integrity, low pH and turbidity.

Protection Priorities

Beaverdam Creek (030501020503)

Use Support: Supporting (8 mi)	
2008 IR Cat.	2
2010 IR Cat.	2
Benthos (CB159)	Good (2006)
Fish Com (CF2)	Excellent (2006)

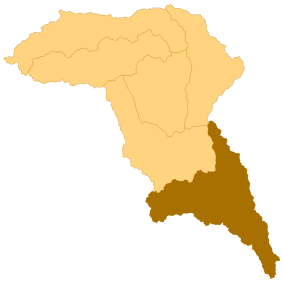
Beaverdam Creek [AU: 11-129-9-(0.7)]:
Beaverdam Creek is approximately 8 miles in length and begins in the southern portion of the City of Cherryville draining to the South Fork Catawba River [AU: 11-129-(3.7)]. This creek is fully supporting for both benthic and fish communities as sampled during this cycle. However, signs of sedimentation impacting the streams health are beginning to emerge. Considering the current high biological quality this creek, it is a top priority for protection. DWQ will investigate the source of the sedimentation during the next sampling cycle.

1 *Results of Biological Sampling from the Watershed Stressor Study in the Catawba River Basin: Burke, Catawba, and Lincoln counties, Subbasin 35 and 36 (BF-20061207).* Requests for a copy of this and other special studies must submitted to ESS via phone (919-743-8400) or e-mail (jay.sauber@ncdenr.gov).

Watershed Recommendations & Action Plans

Indian Creek is part of EEP's Indian/Howards Creek Local Watershed Plan, which started in 2008. NC DENR's Source Water Protection Program, the Catawba Lands Conservancy and local resource professionals in Lincoln and Gaston Counties are partnering with EEP to develop a consensus set of recommendations for watershed improvement and protection. The final Watershed Management Plan will be completed in spring of 2010. See *EEP's project website* for all LWP documents EEP will begin its implementation phase (acquisition, design and construction of priority stream and wetland restoration projects) by the summer of 2010. EEP will continue to work with Lincoln and Gaston County stakeholders to help implement other project opportunities, such as stormwater BMPs, identified within priority sub-watersheds. In total, 60 project sites (including approximately 13 miles of degraded streams and 200 acres of impacted wetlands) have been identified as potential mitigation projects within the final LWP Project Atlas. Visit *EEP's website* for more information about LWP initiative.

Lower South Fork Catawba River (0305010206)



Restoration Opportunities

Hoyle Creek (030501020601)

Hoyle Creek [AUs: 11-129-15-(6)]:

Use Support: Impaired (0.5 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB186)	Good (2006)
Fish Com (CF19)	Fair (2006)

Hoyle Creek begins on the east side of the City of Lincolnton, flowing south for 13.5 miles and drains mostly agricultural and residential lands before merging with the South Fork Catawba River [AU: 11-129-(14.5)]. The creek is split into five different segments [AUs: 11-129-15-(1), (1.5), (3.5), (4) & (6)]. The last half mile of Hoyle Creek [AU: 11-129-15-(6)] was biologically sampled in 2006 and received a Good benthic rating; however, the fish community sample at the same location received a Fair rating. The number of fish collected during 2006 was only one third of those collected in 2002 which was a low flow year. The species found in 2006 were all pollution tolerant with little diversity. Less than half a mile upstream of the sampling stations, Mauney Creek flows into Hoyle Creek which is the receiving waters for the Town of Stanley's WWTP. This facility has been listed as a possible cause of declining aquatic life in the Watershed Stressor Study[1] completed in 2006. During the next biological sampling cycle, DWQ will monitor the current sites as well as an additional site upstream of Mauney Creek to help identify the sources of stressors to the aquatic life in this creek.

Mauney Creek [AU: 11-129-15-5]:

Use Support: Impaired (4 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthic (CB195)	Poor (2006)

Mauney Creek is a four mile creek which runs along the west side of the Town of Stanley before its confluence with Hoyle Creek [AU: 11-129-15-(4)]. In 1997, the creek's benthic community was sampled twice, both receiving a Fair rating. The community was sampled again in 2006 as part of the Watershed Stressor Study[1] which resulted in a Poor rating. Toxic indicator species were abundant which suggests the rating was not due to poor habitat alone. Biologists noted that the gills of the caddisfly Cheumatopysche appeared as stumps instead of their usual branched morphology, a deformity caused by toxins. The source(s) and the actual agent(s) cannot be ascertained without additional biological and chemical sampling within the immediate catchment.

Mauney Creek is the receiving waters for the Town of Stanley's WWTP which received numerous NPDES permit violations. This facility also failed nine out of 31 aquatic toxicity tests between 2003 and 2007. These violations are due to lack of proper operations at the WWTP, and the facility has received multiple NOVs and penalty assessments. DWQ will continue to work with this facility to ensure compliance with its permit. This creek will continue to be monitored until the facility is in full compliance or until the benthic community has fully recovered. For more information about how the toxins in the facility's effluent are causing these deformities in caddisflies, refer to the Watershed Stressor Study[1].

1 *Results of Biological Sampling from the Watershed Stressor Study in the Catawba River Basin: Burke, Catawba, and Lincoln counties, Subbasin 35 and 36 (BF-20061207).* Requests for a copy of this and other special studies must submitted to ESS via phone (919-743-8400) or e-mail (jay.sauber@ncdenr.gov).

Upper & Lower Long Creek (030501020602 & 030501020603)

Long Creek [AUs: 11-129-16-(4)]:

Long Creek is approximately 20 miles long and is split into three segments [AUs: 11-129-16-(1), (2.3) & (4)]. The creek flows from the western Gaston County line to the South Fork Catawba River [AU: 11-129-(15.5)] and drains agricultural lands in the headwaters and dense urban areas in the lower portions. The lower 15 mile stretch of Long Creek [AU: 11-129-16-(4)] was placed on the 1996 Impaired Waters list for biological integrity and was delisted in 2000. The delisting was due to a variety of restoration efforts and verification by scientific investigations of the creek. This investigation/study was led by Gaston County Cooperative Extension Services and sponsored by 13 other agencies including DWQ. The study, which was completed in 2002, included in-depth monitoring and implementation of over 350 BMPs, as well as multiple educational projects. The final report, published in 2002, indicated that the installation of the 350 BMPs greatly reduced levels of nutrients, sediment and fecal coliform bacteria. More information about this project can be found in the *Final Report*.

Use Support: Impaired (15 mi)	
2008 IR Cat.	3a
2010 IR Cat.	5
Benthic (CB224) (CB218)	Good-Fair (2007) Good-Fair (2007)
Fish Com (CF29)	Excellent (2004)
AMS (C5900000)	Low pH - 12% FCB - 40%

Current biological sampling indicates the benthic community has yet to fully recover. A temporary benthic site (CB218), in addition to CB224, was evaluated in 2007. That site received the same Good-Fair rating; however, the diversity within the community had greatly decreased. This decline may be a result of the building and operating of the Apple Creek Executive Golf Course Club, which opened in 2006. The site should be adopted as a regularly monitored site to evaluate the effects of increased development. Less than a mile upstream of CB218, the AMS data showed the creek was Impaired for low pH and aquatic life was being impacted by sedimentation. Fecal coliform bacteria results were elevated in a large portion of the samples taken. A 5-in-30 study should be prioritized and conducted, if necessary, to determine if the creek is impaired for FCB. With in this subwatershed there are 14 impoundments and four dairy cattle farms with a rough total of over 600 head of cattle which drains into the 15 mile segment of Long Creek. DWQ will work with SWCD and Gaston County to assist in evaluating the need for additional BMPs or maintenance of existing BMPs. Further study is needed to determine the full impacts of a large number of impoundments in one subwatershed on the biological community during times of drought.

Dallas Branch [AUs: 11-129-16-7b]:

Dallas Branch is less than a mile long and flows along the southern portion of the Town of Dallas in the Lower Long Creek subwatershed (030501020603). This waterbody was first listed on the Impaired Waters list in 1992 due to a Fair benthic rating. It was sampled again in 2006 and received a rating of Not Rated due to a policy change stating that streams with less than a 3 square mile drainage area should not be given a rating. Biologist noted that if it was rated, it would have received a Poor or Fair rating. The extremely poor quality of this stream is mostly due to the fact that as of 2006 94% of the overall stream flow was effluent from the Town of Dallas' WWTP. This facility has received numerous NPDES permit violations and failed 16% of the aquatic toxicity tests between 2003 and 2007. DWQ worked closely with this facility to bring it back into permit compliance and help to reduce future violations.

Use Support: Impaired (0.6 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
Benthos (CB213)	Not Rated (2006)

Coley Creek-South Fork Catawba River (030501020604):

South Fork Catawba River [AU: 11-129-(10.5) & (14.5)]:

The South Fork Catawba River is just over 56 miles in total length which begins in subwatershed 030501020403 and drains into Lake Wylie just before reaching the City of Belmont. The river is split into eight different segments to better assess the river's ability to support its designated uses and health. The two segments within this subwatershed are combined 11 miles long. The first two miles of AU 11-129-(10.5) are within HUC 030501020504.

Use Support: Impaired (11 mi)	
2008 IR Cat.	3c
2010 IR Cat.	5
Gaston Co. (GAS15) (GAS16)	Turbidity - 17% Turbidity - 17%

In 2007, Gaston County began sampling physical/chemical parameters at 17 sites through out the county. The County submitted the data to DWQ in 2009 for inclusion in the 2010 use assessment process. Twelve samples each were taken at GAS15 and GAS16 (See *Appendix 2-D*) located on Hardin Road and Dallas Stanley Hwy. between October 2007 and September 2008. During this time period, data shows turbidity to be impairing the river. These sites provide valuable data in areas DWQ does not have the resources to monitor and greatly assists with efforts to prioritize restoration and protection needs. For more information about submitting data to DWQ, visit *DWQ's TMDL Modeling Unit website*. A map of all 17 sites monitored by Gaston County can be found in *Appendix 2-D*.

Duharts Creek-South Fork Catawba River (030501020605):

South Fork Catawba River [AU: 11-129-(15.5)]:

The South Fork Catawba River is just over 56 miles in total length which begins in subwatershed 030501020403 and drains into Lake Wylie just before reaching the City of Belmont. The river is split into eight different segments to better assess the river's ability to support its designated uses and health. The last stretch of the South Fork Catawba River is 18 miles long and receives drainage from some forested land but mostly dense urban areas.

Use Support: Impaired (18 mi)	
2008 IR Cat.	5
2010 IR Cat.	5
AMS (C6500000)	Low pH - 10.2% Turbidity - 12% FCB - 20%

This segment was last biologically monitored in 1997 and received a Good-Fair benthic rating. An Ambient Monitoring Systems (AMS) station is located in the center of the Town of McAdenville. Results from this AMS station indicates the river segment will be impaired for low pH and high turbidity. The listing for low pH is new to the 2010 Impaired Waters list; however the river has been listed for turbidity since 2006. Copper and zinc levels were elevated with 8% of samples above the standard for both parameters. Between 2004 and 2008, fecal coliform bacteria levels more than double what was monitored between 1998 and 2002. Elevated FCB appears to have been originating mainly from point sources with possible contributions from nonpoint sources further upstream.

Along this 18 mile stretch of the South Fork Catawba River, six NPDES discharger facilities discharge directly into the river. Two of these facilities (Spencer Mountain WWTP - NC0020966 & Pharr Yarns Industrial WWTP - NC0004812) discharge effluent just upstream of the AMS site C6500000 and are likely contributors of the higher FCB levels monitored between 2006 and 2008. The Spencer Mountain facility also had numerous chlorine violations between January and December of 2008. Two other facilities (Town of Cramerton's Eagle Road WWTP - NC0006033 & Town of McAdenville's WWTP - NC0020052) are located below the AMS site; therefore their effluent would not affect the results of this station's samples. However, FCB levels measured in the effluent of these two facilities were believed to be adding to the FCB loading within the River during this time period. As of mid to late 2008, three of the facilities (Eagle Road WWTP, McAdenville WWTP & Spencer Mountain WWTP) have corrected the excessive FCB levels as a result of state enforcement actions and facility upgrades.

Pharr Yarns Industrial WWTP (NC0004812):

Beginning in 2006, this facility has had trouble staying in compliance with its NPDES Discharge permit. The main parameter of noncompliance was FCB with the majority of violations occurring in 2008. The Mooresville Regional Office met with the facility in October of 2008 to discuss the issues the facility was having and how to prevent further noncompliance. After installing an upgraded disinfection system, FCB violations persisted. A second meeting with the facility and its consultant (WK Dickson & Company) in May of 2009 brought to light personnel issues, a 20% increase in dye influent and one of three filters was also offline. The Regional Office conducted a Technical Advisory visit the following month to make suggestions which also included hiring a consultant to troubleshoot. Again, violations persisted. Despite efforts to correct some issues causing the noncompliance, the continuous violations landed the facility on the EPA Watch List which lead to a Show Cause meeting in November 2009. Physical plant upgrades were then planned which included a possible change in the dechlorination chemical that could have been causing the sulfide violations. Since that time, the facility has had no FCB violations but seven violations for sulfide. The percent of the reported calculated value of sulfide has dropped from 348% to 34%, indicating the facility is still actively working on a solution.

Watershed Recommendations & Action Plans

South Fork Catawba River [AUs: 11-129-(3.7) & (10.5)]:

Two segments of the South Fork Catawba River, between Howards Creek and Hoyle Creek, have not been biologically sampled since the mid-1980's due to heavy rainfalls and deep runs. Biologist will make all efforts to take samples along these sections during the next sampling cycles. Due to new impairments upstream as well as overall new growth and development, it is critical to sample these two segments during the next sampling cycle. These additional samples will assist in evaluating areas of concern and areas to protect.

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 2-3: 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.

Suggested Studies for Upcoming Planning Cycle

Nutrient Load within the South Fork Catawba River

During the next planning cycle, DWQ will be working with other agencies to reevaluate the nutrient loading on the South Fork Catawba River to determine if the Lake Wylie TMDL is being met. Portions of this river are included in the Lake Wylie chlorophyll *a* TMDL (including the amendment of total phosphorus loading), which is discussed in-depth within the *Chain of Lakes Chapter*. There are several NPDES discharge facilities as well as runoff from agricultural land that could be impacting the nutrient loading within the lake. Additional nutrient sampling will provide critical information to the future direction of restoration efforts.

South Fork Catawba River Watershed Toxics Review

In the 1999 Catawba River Basinwide Plan discussed how copper and silver were thought to be a major issue within the South Fork Catawba River. A study was conducted by DWQ & USGS to evaluate the levels of copper and silver within Clark Creek which is a major tributary to the South Fork Catawba River. Results reported in the 2004 Catawba River Basinwide Plan indicated that copper and silver levels were not elevated enough for cause harm to human or aquatic life. Since that study was completed in 2003, copper levels have increased at two AMS sites within this subbasin. Site C4800000 increased the number of samples exceeding copper standards from 13% between 1997-2002 to 15.4% between 2004-2008 and site C7000000 increased to 70% of samples exceeding the standard between 2004-2008. It is suggested that a watershed stressor study be conducted to not only determine if copper is negatively impacting the South Fork Catawba River and its tributaries, but also to help pinpoint the source of the excessive levels. Main points of focus should be on these two stations as well as Long Creek.

Main potential sources of copper are urban runoff and industrial and/or municipal WWTPs. By determining the source of the copper, DWQ can work with municipalities to find better stormwater controls or place additional limits on facilities with excessive copper in their effluent.

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 2-E & 2-D*, respectively.

There are a total of 31 NPDES Dischargers within this subbasin. Eleven of those are Major Dischargers which means the facility discharges greater than one million gallons of wastewater a day (1 MGD). Twenty of the facilities are Minor facilities which discharge less than 1 MGD. The Major facilities discharge mainly to the major streams in this subbasin. 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 2-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.

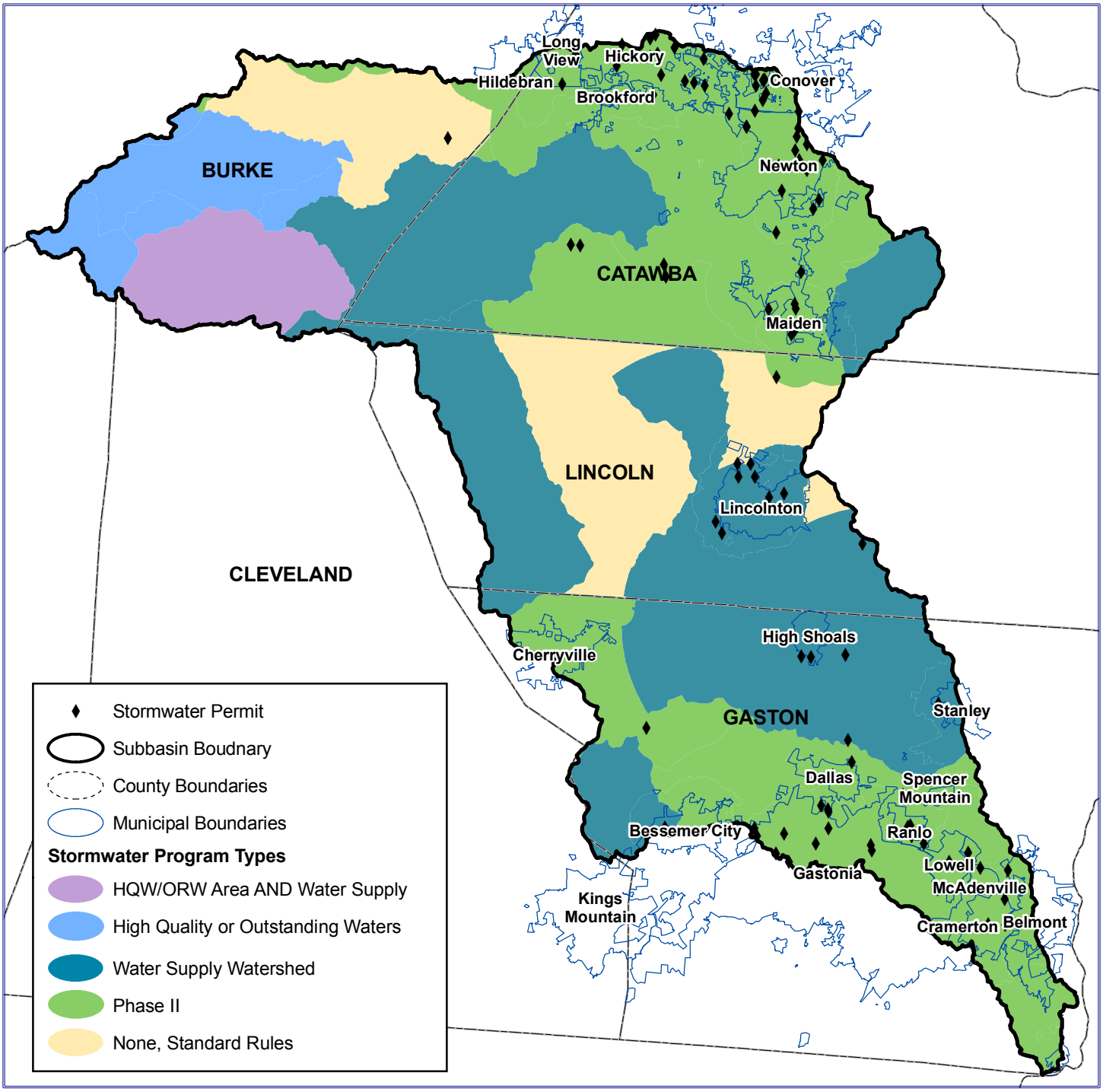
Nonpoint Source Contributors

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 2-12 indicates the different stormwater programs in this subbasin.

HQW/ORW Stormwater Program is implemented in the headwaters and Water Supply Watershed Stormwater Programs are scattered throughout this subbasin. Catawba and Gaston counties are covered under the NPDES Phase II Stormwater program as well as Cherryville, Hickory, Gastonia and surrounding cities. The Phase II programs are delegated to the counties in these areas. 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 2-12: Stormwater Program Areas in Subbasin 03050102



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 2-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 2-6). 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 2-6: 401 Permits Within the Catawba River Subbasin (03050102) Issued Between 2004 & 2009

Impact Category	Project Type	Approved Area
Open Water	Water Line	0.47 ac
Total Open Water		**0.47 ac**
Buffer	Residential	3,405 sq ft
Total Buffer		**3,405 sq ft**
Stream	Residential	702 ft
	Commercial	10,879 ft
	Roads	1,086 ft
	Sewer/Piping	2,457 ft
	Other	800 ft
Total Stream Feet		**15,924 ft**
Wetland	Commercial	2.1 ac
	Residential	0.3 ac
	Roads	0.6 ac
	Other	1.1 ac
Total Wetland Acres		**4.1 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 2-7) 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 2-7: 401 Mitigation Within the Catawba River Subbasin (03050102) Issued Between 2004 & 2005*

Impact Category	Mitigation Type	Amount
Buffer	WRP/EEP (Zone 1)	3,405 sq ft
Total Buffer Mitigation (Square Feet)		**3,405 sq ft**
Stream	Restoration	2,200 ft
	WRP/EEP	3,800 ft
	Preservation	3,755 ft
	Enhancement	2,250 ft
Total Stream Mitigation (Feet)		**12,005 ft**
Wetland	Enhancement	0.7 ac
	Preservation	7.0 ac
Total Wetland Mitigation (Acres)		**7.7 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 abundant 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 number of BMPs and benefits gained from them (Table 2-8 and Table 2-9 and Figure 2-13).

Table 2-8: List of BMPs Implemented by ACSP Between January 2003 to June 2009 in HUC 03050102

Purpose of BMP	Total Implemented	Cost-Shared Funds	Total Project Costs
Agri-Chemical Pollution Prevention	--	$18,073	$24,097
Number of Facilities	1	--	--
Drought Response	--	$33,685	$44,913
Well-Confined Supply	1	--	--
Irrigation Well	3	--	--
Conservation Irrigation	1600 feet	--	--
Erosion/Nutrient Loss Reduction from Fields	--	$179,345	$239,127
Acres Treated	4,476	--	--
Sediment/Nutrient Delivery Reduction from Fields	--	$27,503	$36,671
Stream Protection	--	$182,526	$243,368
Linear Feet Treated	29,722	--	--
Waste Management	--	$163,277	$217,703
Number of Units Installed	14	--	--
Grand Total	**35,895**	**$608,517**	**$811,356**

Table 2-9: BMP Benefits Gained Between January 2003 to June 2009 by 10-Digit HUC

10 Digit Hydrologic Unit	Acres Affected	Nitrogen Saved (lb.)	Phosphorus Saved (lb.)	Soil Saved (tons)	Waste-N Managed (lb.)	Waste-P Managed (lb.)
0305010201	322.6	978.0	--	5.1	19,015	49,647
0305010202	2,429.4	42,984.0	28,706.5	29,173.5	293,120	209,104
0305010203	682.6	121,861.6	41,572.0	2,922.3	--	--
0305010204	2,881.5	4,790.9	3,633.3	2,648.6	101,571	99,159
0305010205	1,409.6	8,114.5	8,284.9	5,090.0	49,832	64,079
0305010206	360.6	673.0	7.0	184.0	--	--

Animal Operations

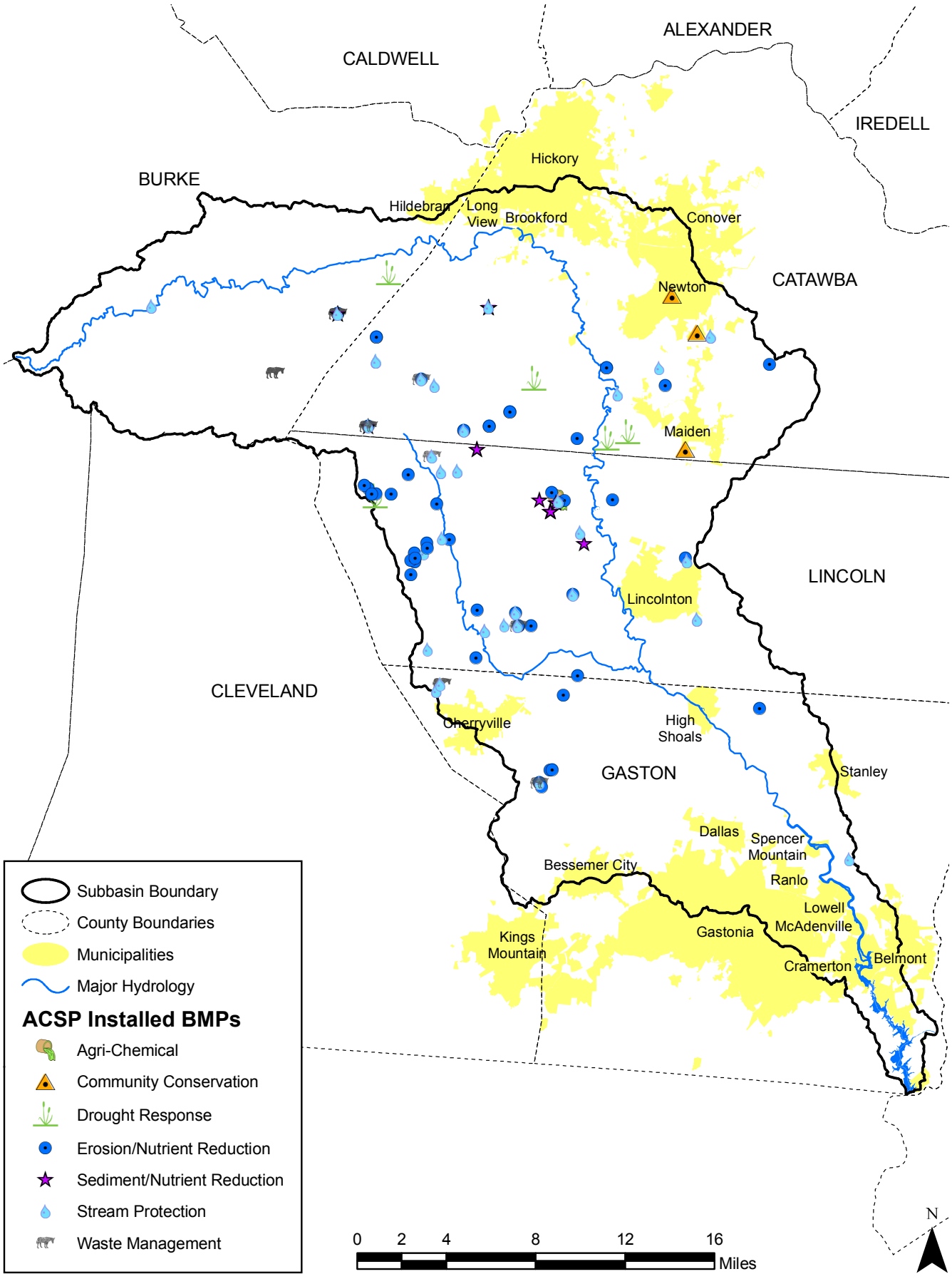
DWQ's Animal Feeding Operations Unit is responsible for the permitting and compliance activities of animal feeding operations across the state. Table 2-10 summarizes the number of registered livestock operations, total number of animals, number of facilities, and total steady state live weight (SSLW) in this subbasin. These numbers reflect only operations required by law to be registered, and therefore, do not represent the total number of animals in the 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*.

Table 2-10: Animal Operations in 03050102

Type	# of Facilities	# of Animals	SSLW
Cattle	11	5,115	6,746,350
Swine	0	0	0

*Steady State Live Weight (SSLW) is in pounds, after a conversion factor has been applied to the number of swine, cattle or poultry on a farm. Conversion factors come from the US Department of Agriculture, Natural Resource Conservation Service (NRCS) guidelines. Since the amount of waste produced varies by hog size, this is the best way to compare the sizes of the farms.

Figure 2-13: BMPs Implemented by ACSP Between January 2003 to June 2009 in HUC 03050102



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 170,981 people using 95,219 septic systems resulting in a nitrogen loading of 952,189 lbs/yr and nitrogen loading rate of 3,627 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 189,488. This estimate 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 for the land and water to assimilate wastes. Table 2-11 list the populations for the 10-Digit HUCs in this subbasin and the estimates for future population values.

Table 2-11: Population and Estimated Populations for 2000 to 2030 for Subbasin 03050102

10-Digit HUC	2000 Population	2000 Population Density (per sq mi)	2010 Estimated Population	2020 Estimated Population	2030 Estimated Population
0305010201	26,978	832	29,061	31,156	33,286
0305010202	10,459	205	11,410	12,364	13,335
0305010203	36,744	1,172	41,869	46,982	52,144
0305010204	9,375	319	10,949	12,516	14,081
0305010205	29,882	998	34,609	39,152	43,560
0305010206	76,050	2,450	83,293	89,547	95,188
Total	**189,488**	**5976**	**211,191**	**231,717**	**251,594**

* 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 2-12 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 South Fork of the Catawba River subbasin is just under 50% forested land. Total agricultural land is about 30% and developed land is about 18% (Homer, 2004).

Developed land accounts for a relatively small portion of this subbasin; however, the way the land is developed may have some of the largest impacts to water quality. 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 temperature, 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 2-D*.

Table 2-12: Land Cover Percentages

Land Cover Type	Percentage
Developed Open Space	8.7
Developed Low Intensity	6.9
Developed Medium Intensity	1.6
Developed, High Intensity	0.6
Total Developed	**17.8**
Deciduous Forest	37.9
Evergreen Forest	6.8
Mixed Forest	2.4
Total Non-Wetland Forest	**47.1**
Pasture/Hay	29.0
Cultivated Crops	0.6
Total Agriculture	**29.6**
Wooded Wetlands	0.5
Emergent Wetlands	0.0
Total Wetlands	**0.5**
Bare Earth or Transitional	0.1
Scrub/Shrub	1.5
Grasslands	3.4
Other	**5**

Restoration, Protection & Conservation Planning

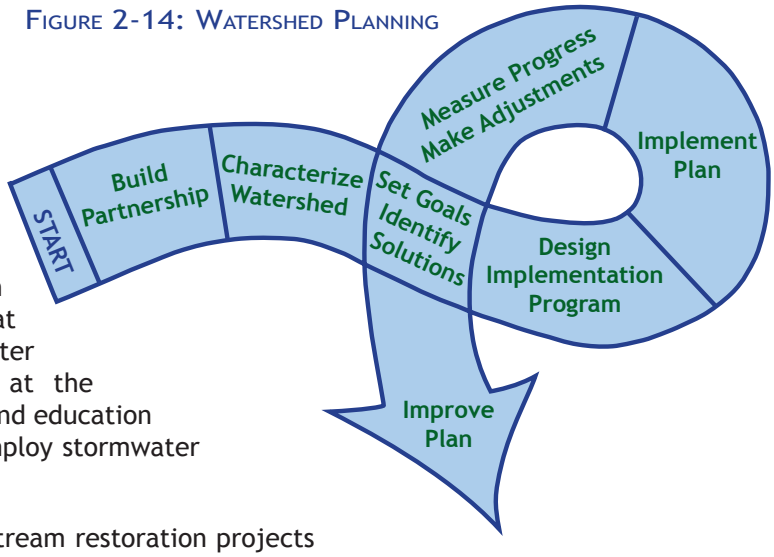
One NC Naturally Conservation Planning Tool

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. A link to the interactive map view is found in the *Conservation Planning Tool website*.

Watershed Planning

Figure 2-14 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 2-14: 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 program staff perform plan reviews and enforce compliance with plans within their jurisdictions. S&EC Local Programs in this subbasin include: Catawba County, Gaston County, Lincoln County and the City of Newton. Programs such as the one in Gaston County, can make a significant impact in reducing site runoff. The County has reviewed 1,835 soil and erosion control plans since 2003 and collected $267,720 in violation fines. Within the past year (April 2009 - April 2010) nearly 90% of all plans submitted had no recorded violations proving the Program to be successful in its continued efforts. More information about this program and its activities can be found in the *Local Initiative Chapter*. 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 2-13) must be eligible under title VI of the Clean Water Act. For more information, please see the *CG&L* website.

Table 2-13: Construction Grants & Loan Projects Between 2004 & 2009 in Subbasin 03050102

Location	Project Description	Date	~ Amount
Gastonia	Armstrong Sanitary Sewer Rehabilitation	2/19/2007	$173,500
Cherryville	Cherryville-Lincolnton Water interconnection	1/5/2009	$241,100
Gastonia, City of	Sewer Pipe Lining at Catawba River Pump Station	5/8/2009	$308,532
Hickory, City of	Cripple Creek Sewer Replacement	5/8/2009	$1,938,000
Total Funded:			**$2,661,132**

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 2-14 includes a list of recent (2004-2008) projects and their cost. These projects include several land acquisitions and WWTP upgrades.

Table 2-14: Clean Water Management Trust Fund Projects Between 2004 - 2008 in Subbasin 03050102

Application ID	Project Name	Project Description	County	Amount Funded
2004A-004	Catawba Lands Conservancy - Acq./ Pott Creek	Acquire through fee simple purchase 39 acres along Pott Creek. Purchase is part of a larger protection effort on the South Fork Catawba River and its tributaries.	Lincoln	$169,000
2004B-010	Catawba Lands Conservancy - Acq/ Northbrook Tract, South Fork Catawba	Protect through fee simple purchase 55.5 acres (including 55 riparian acres) along the South Fork Catawba River. This Northbrook tract is adjacent to other protected tracts and compliments an extensive acquisition effort in the watershed.	Gaston	$273,000
2005B-006	Catawba Lands Conservancy - Acq/ Jack Moore Nature Preserve, Hoyle Creek	Protect through fee simple purchase 92.4 acres along Hoyle Creek. CWMTF funds will be used to purchase 80.6 riparian acres. Landowner will donate 11.8 upland acres. Located just upstream of water intake.	Gaston	$461,000
2005D-012	Catawba Lands Conservancy - Donated Mini/ Waters Tract, Hoyle Creek (Withdrawn)	Minigrant to pay for transactional and stewardship costs for a donated conservation easement on 66.7 acres of the Waters tract on Hoyle Creek.	Lincoln	$17,000
2006B-511	Maiden, Town of - WW/ WWTP Upgrades, Clark Creek	Design, permit & construct major upgrades to the Town's antiquated 1 MGD WWTP which is not in compliance with permit limits. Significantly reduce BOD, TSS, and nutrient loadings to Clark Creek, a 303(d)-listed tributary to the South Fk Catawba River.	Catawba	$1,856,000
2007S-005	Dallas, Town of - Storm/ Mini/ South Fork		Gaston	$20,000
2008S-009	Lincolnton, City of - Mini/ Storm/ Planning/ S. Fork Catawba River		Lincoln	$50,000
2008S-005	Carolina Land & Lakes RC & D - Mini/Storm/Planning		Burke	$50,000
Total Funded:				**$2,896,000**

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 2-15). 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 2-15: 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 2-16 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 2-16: 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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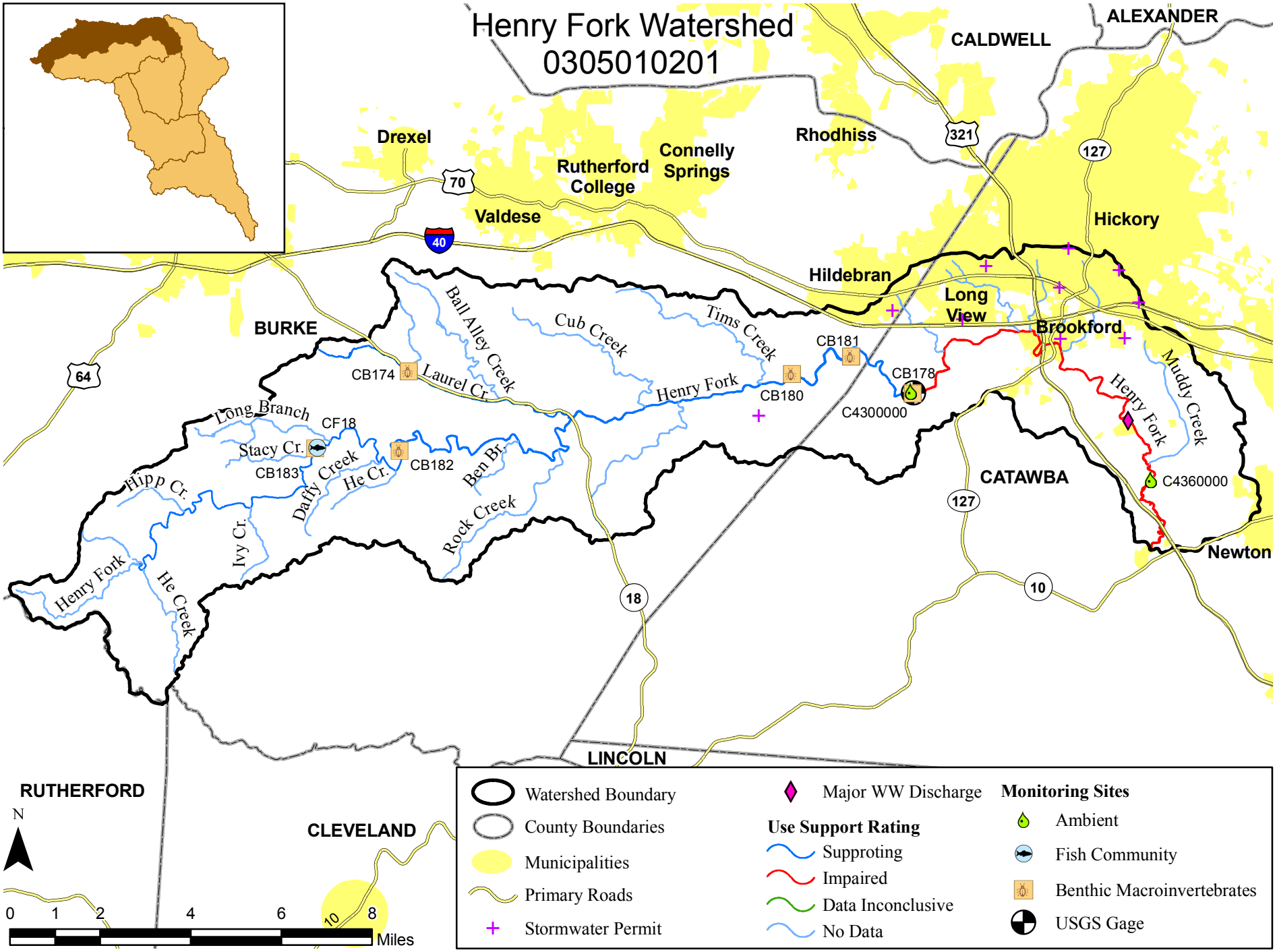
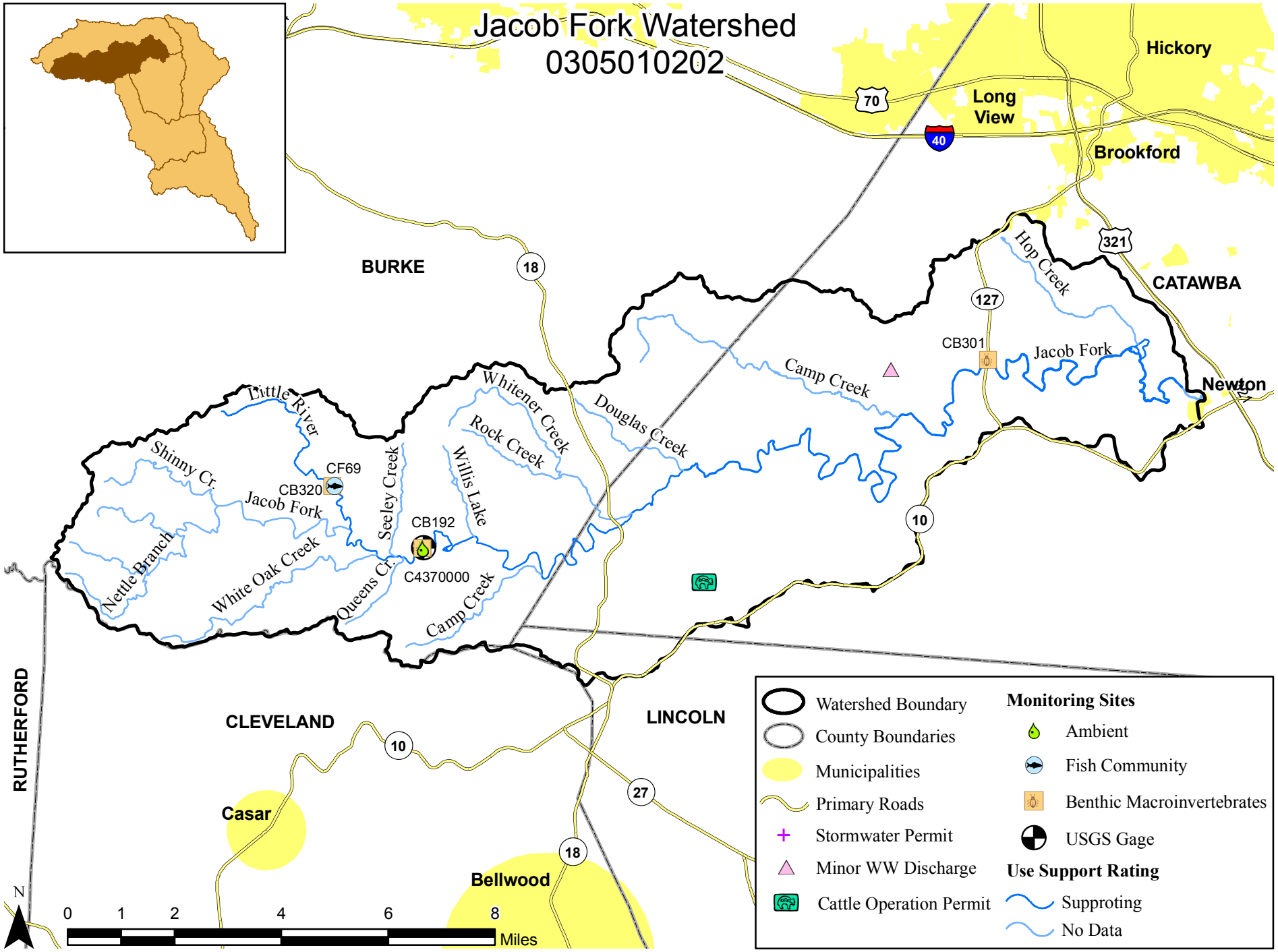

Henry Fork Watershed
0305010201
ALEXANDER
CALDWELL
Drexel
Rhodhiss
321
127
70
Rutherford College
Connelly Springs
Valdese
Hickory
40
Hildebran
Long View
Brookford
BURKE
64
Ball Alley Creek
Cub Creek
Tims Creek
CB181
CB174
Laurel Cr.
Henry Fork
CB180
CB178
C4300000
Long Branch
CF18
Stacy Cr.
CB183
Daffy Creek
He Cr.
CB182
Ben Br.
Rock Creek
Hipp Cr.
Ivy Cr.
Henry Fork
He Creek
Muddy Creek
C4360000
CATAWBA
127
Newton
18
10
LINCOLN
RUTHERFORD
CLEVELAND
N
0 1 2 4 6 8 10
Miles
Watershed Boundary
County Boundaries
Municipalities
Primary Roads
Stormwater Permit
Major WW Discharge
Use Support Rating
Supproting
Impaired
Data Inconclusive
No Data
Monitoring Sites
Ambient
Fish Community
Benthic Macroinvertebrates
USGS Gage


Jacob Fork Watershed
0305010202
Hickory
Long View
Brookford
Newton
CATAWBA
BURKE
CLEVELAND
LINCOLN
RUTHERFORD
Casar
Bellwood
70
40
18
321
127
10
27
Hop Creek
CB301
Jacob Fork
Camp Creek
Douglas Creek
Whitener Creek
Rock Creek
Willis Lake
Seeley Creek
Little River
Shinny Cr.
CF69
CB320
Jacob Fork
CB192
C4370000
Nettle Branch
White Oak Creek
Queens Cr.
Camp Creek
Watershed Boundary
County Boundaries
Municipalities
Primary Roads
Stormwater Permit
Minor WW Discharge
Cattle Operation Permit
Monitoring Sites
Ambient
Fish Community
Benthic Macroinvertebrates
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Supproting
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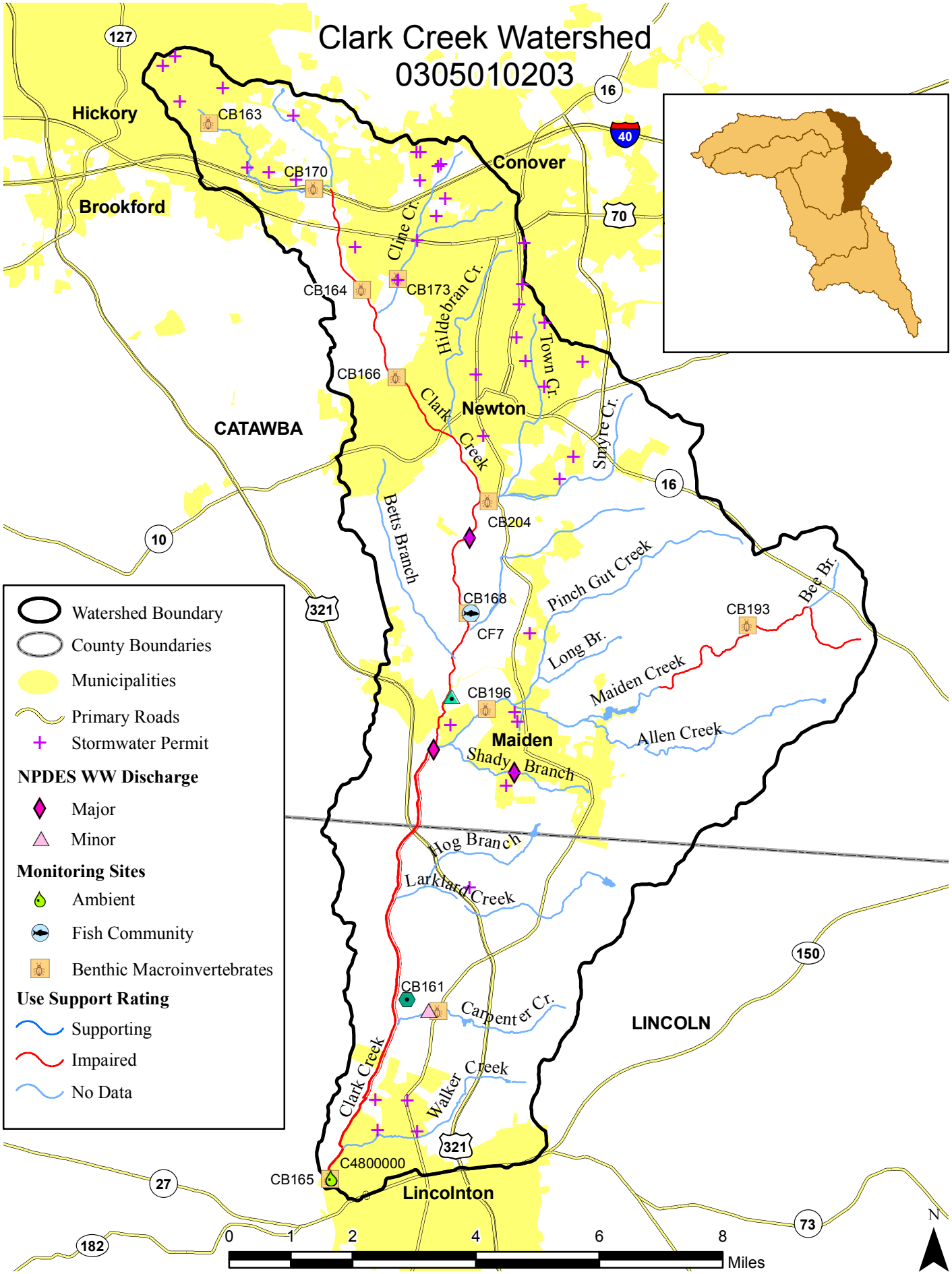
Miles


Clark Creek Watershed
0305010203
Hickory
Brookford
Conover
Newton
CATAWBA
LINCOLN
Lincolnton
Maiden
CB163
CB170
CB164
CB173
CB166
CB204
CB168
CF7
CB196
CB193
CB161
C4800000
CB165
Cline Cr.
Hildebran Cr.
Town Cr.
Smyre Cr.
Clark Creek
Betts Branch
Pinch Gut Creek
Bee Br.
Long Br.
Maiden Creek
Allen Creek
Shady Branch
Hog Branch
Larkland Creek
Carpenter Cr.
Walker Creek
127
16
40
70
10
321
150
27
182
73
Watershed Boundary
County Boundaries
Municipalities
Primary Roads
Stormwater Permit
NPDES WW Discharge
Major
Minor
Monitoring Sites
Ambient
Fish Community
Benthic Macroinvertebrates
Use Support Rating
Supporting
Impaired
No Data
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1
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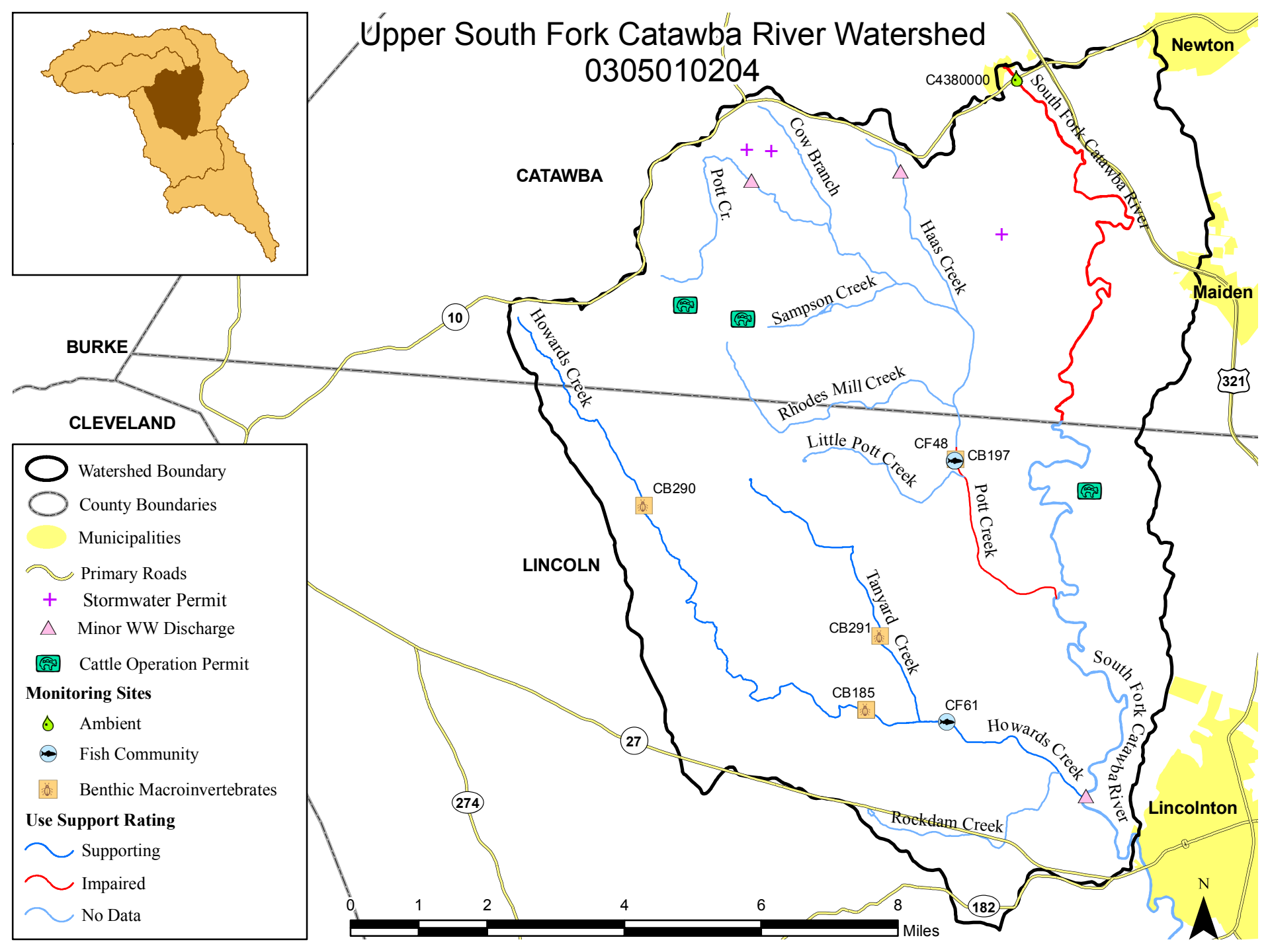
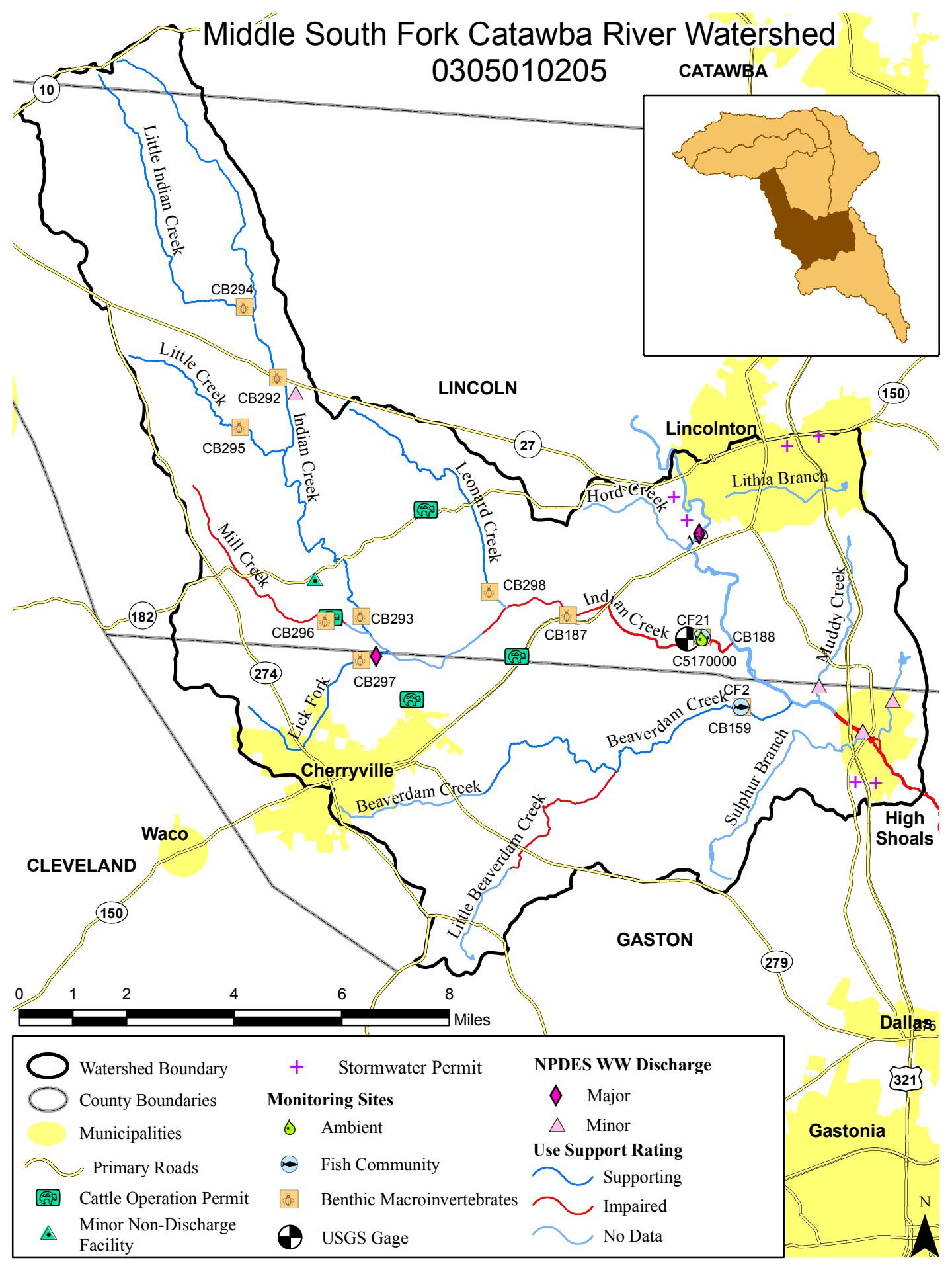
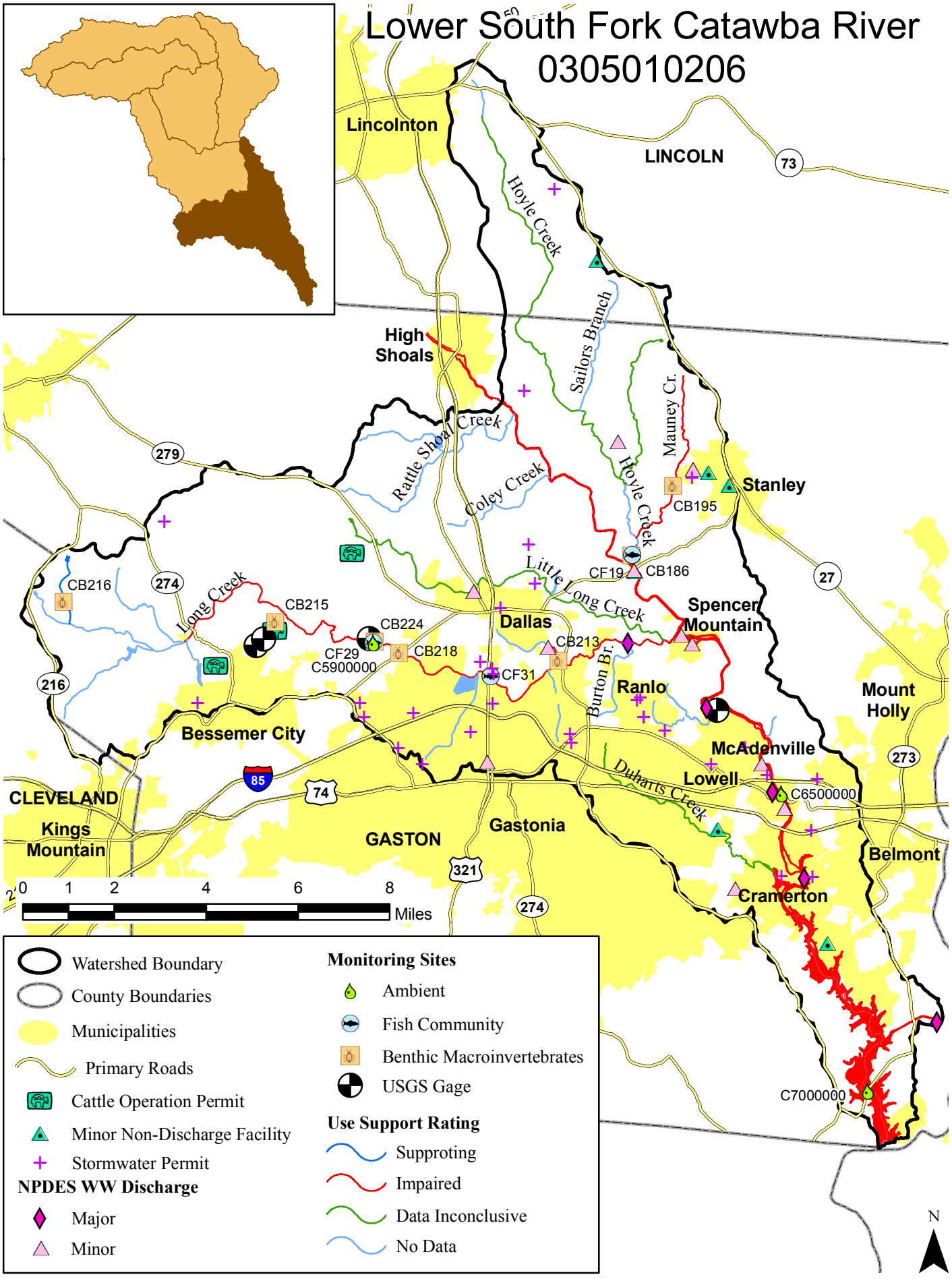
4
6
8
Miles
N


Upper South Fork Catawba River Watershed
0305010204
Watershed Boundary
County Boundaries
Municipalities
Primary Roads
Stormwater Permit
Minor WW Discharge
Cattle Operation Permit
Monitoring Sites
Ambient
Fish Community
Benthic Macroinvertebrates
Use Support Rating
Supporting
Impaired
No Data
CATAWBA
BURKE
CLEVELAND
LINCOLN
Newton
Maiden
Lincolnton
C4380000
South Fork Catawba River
Cow Branch
Pott Cr.
Haas Creek
Sampson Creek
Howards Creek
Rhodes Mill Creek
Little Pott Creek
CF48
CB197
Pott Creek
CB290
Tanyard Creek
CB291
CB185
CF61
Howards Creek
South Fork Catawba River
Rockdam Creek
10
321
27
274
182
0 1 2 4 6 8
Miles
N


Middle South Fork Catawba River Watershed
0305010205
CATAWBA
LINCOLN
CLEVELAND
GASTON
Lincolnton
Cherryville
Waco
High Shoals
Dallas
Gastonia
Little Indian Creek
Little Creek
Indian Creek
Leonard Creek
Mill Creek
Hord Creek
Lithia Branch
Muddy Creek
Lick Fork
Beaverdam Creek
Little Beaverdam Creek
Sulphur Branch
CB294
CB292
CB295
CB298
CB293
CB296
CB297
CB187
CF21
C5170000
CB188
CF2
CB159
10
27
150
182
274
279
321
0 1 2 4 6 8
Miles
N
Watershed Boundary
County Boundaries
Municipalities
Primary Roads
Cattle Operation Permit
Minor Non-Discharge Facility
Stormwater Permit
Monitoring Sites
Ambient
Fish Community
Benthic Macroinvertebrates
USGS Gage
NPDES WW Discharge
Major
Minor
Use Support Rating
Supporting
Impaired
No Data


Lower South Fork Catawba River
0305010206
Lincolnton
LINCOLN
73
Hoyle Creek
Sailors Branch
Mauney Cr.
High Shoals
Rattle Shoal Creek
Coley Creek
279
Stanley
CB195
CF19
CB186
Little Long Creek
27
CB216
274
Long Creek
CB215
CB224
CF29
C5900000
CB218
Dallas
CB213
Spencer Mountain
Burton Br.
Ranlo
Mount Holly
216
Bessemer City
McAdenville
273
85
74
Lowell
C6500000
Duharts Creek
CLEVELAND
Kings Mountain
GASTON
Gastonia
321
Belmont
Cramerton
274
0 1 2 4 6 8
Miles
C7000000
Watershed Boundary
County Boundaries
Municipalities
Primary Roads
Cattle Operation Permit
Minor Non-Discharge Facility
Stormwater Permit
NPDES WW Discharge
Major
Minor
Monitoring Sites
Ambient
Fish Community
Benthic Macroinvertebrates
USGS Gage
Use Support Rating
Supproting
Impaired
Data Inconclusive
No Data
N