

Section B - Chapter 2 Neuse River Subbasin 03-04-02

Crabtree Creek, Walnut Creek, Swift Creek and Marks Creek

2.1 Subbasin Overview

Subbasin 03-04-02 at a Glance

Land and Water Area
 Total area: 726 mi²
 Land area: 724 mi²
 Water area: 2mi²

Population Statistics
 2000 Est. Pop.: 547,580 people
 Pop. Density: 808 persons/mi²

Land Cover (percent)
 Forest/Wetland: 53.5
 Surface Water: 0.7
 Urban: 29.5
 Cultivated Crop: 13.1
 Pasture/
 Managed Herbaceous: 3.0

Counties
 Durham, Franklin, Johnston and Wake

Municipalities
 Raleigh, Wake Forest, Cary, Garner,
 Clayton, Smithfield and Knightdale

Population growth in this subbasin is one of the highest in the state. Population density is the highest in the basin (1,600-3,200 persons/mi²). The largest urbanized area is in the northern portion of the subbasin around Raleigh and Cary. New development can be seen in all areas of the subbasin, but especially along the I-40/Hwy 70 corridors and US 64 corridor.

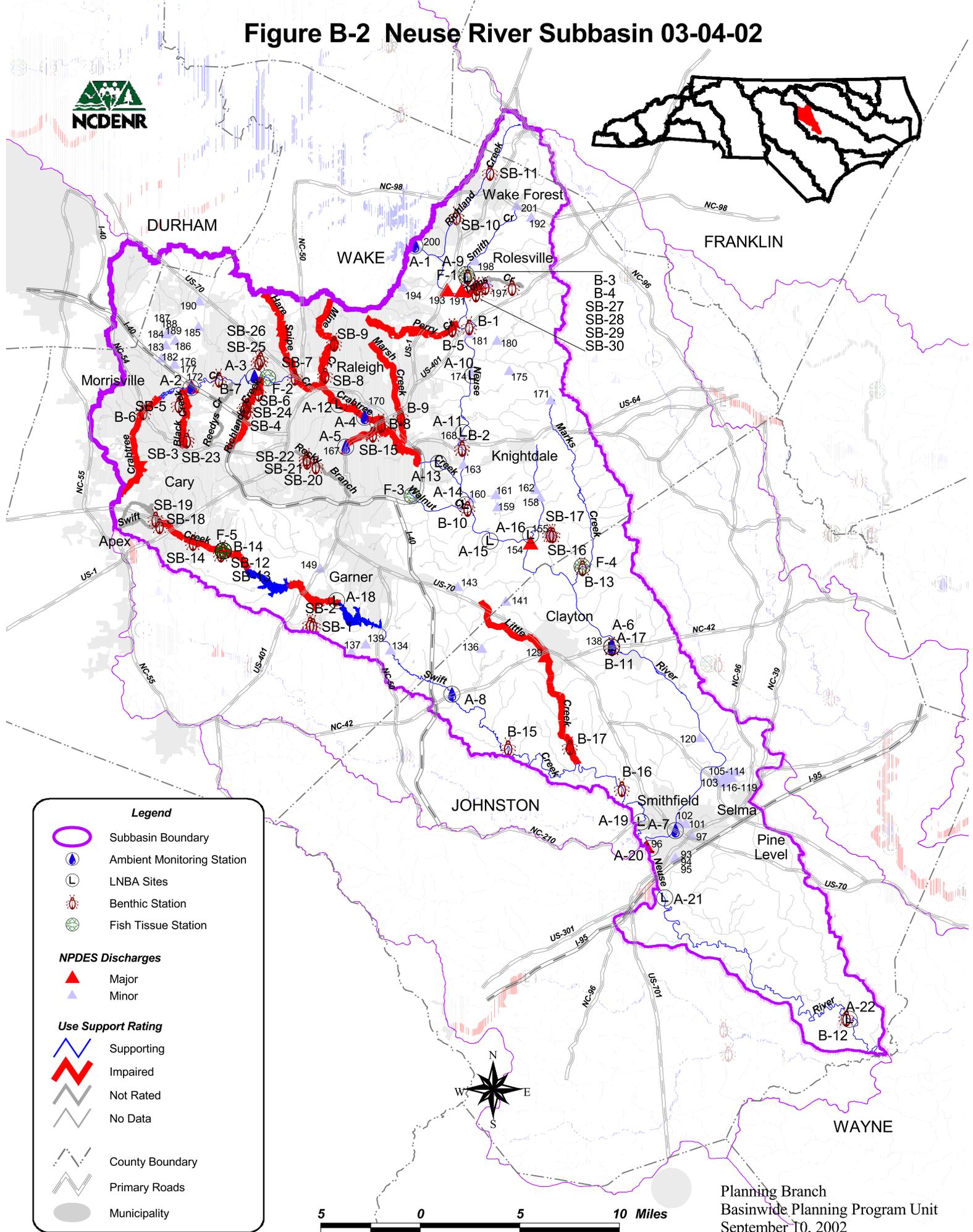
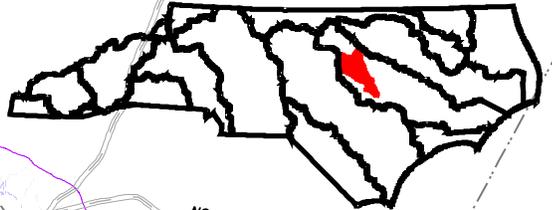
There are 19,345 acres of managed public lands in this subbasin, with Umstead Park and Schenk Forest being the largest. There are also smaller parks and several greenways in this subbasin.

There are 52 NPDES wastewater discharge permits in this subbasin with a permitted flow of 87 MGD (Figure B-2). The largest are Raleigh Neuse WWTP (60 MGD, map #154), Central Johnston WWTP (4.5 MGD, map #96), Cary North WWTP (12 MGD, map #172), Little Creek WWTP (1.9 MGD, map #129) and Wake Forest WWTP (2.4 MGD, map #191). There are also five individual NPDES stormwater permits in the subbasin. Refer to Appendix I for identification and more information on individual NPDES permit holders. Raleigh has a Phase I stormwater permit, and Cary, Apex, Garner, Durham

County and Wake County will be required to develop a stormwater program under Phase II (page 76). Smithfield and Johnston County, and the above communities, have also submitted model stormwater ordinances as required by the Neuse NSW strategy stormwater rules (page 64). Issues related to compliance with permit conditions are discussed below in Part 2.3 or Part 2.4 for impaired waters and in Part 2.5 for other waters. There are also nine registered animal operations in this subbasin.

There were 17 benthic macroinvertebrate community samples and five fish community samples (Figure B-2 and Table B-4) collected in 2000 as part of basinwide monitoring. Six sites improved, 13 sites remained the same, and two sites had lower bioclassifications. One site was monitored for the first time. There were also 30 special study samples collected in the subbasin during the assessment period. Data were collected from nine ambient monitoring stations as well.

Figure B-2 Neuse River Subbasin 03-04-02



Legend

- Subbasin Boundary
- Ambient Monitoring Station
- LNBA Sites
- Benthic Station
- Fish Tissue Station

NPDES Discharges

- Major
- Minor

Use Support Rating

- Supporting
- Impaired
- Not Rated
- No Data

County Boundary

Primary Roads

Municipality



Table B-4 DWQ Monitoring Locations in Subbasin 03-04-02

Benthic Macroinvertebrate Community Monitoring Sites					
Map #¹	Waterbody	County	Location	1995	2000
B-1	Neuse R ²	Wake	US 401	Good-Fair	Good-Fair
B-2	Neuse R ²	Wake	US 64	Good-Fair	Good-Fair
B-3	Smith Cr ²	Wake	SR 2045	Good-Fair	Fair
B-4	Toms Cr ²	Wake	SR 2044	Fair	Fair
B-5	Perry Cr	Wake	SR 2006	Fair	Fair
B-6	Crabtree Cr ²	Wake	NC 54	Poor	Poor
B-7	Crabtree Cr ²	Wake	Umstead Park	Good-Fair	Good-Fair
B-8	Crabtree Cr ²	Wake	US 1	Fair	Fair
B-9	Marsh Cr ²	Wake	near US 1	Fair	Poor
B-10	Walnut Cr ²	Wake	SR 2551	Fair	Good-Fair
B-11	Neuse R ²	Johnston	NC 42	Good-Fair	Good
B-12	Neuse R ²	Johnston	SR1201	Good	Good
B-13	Marks Cr ²	Johnston	SR 1714	Good-Fair	Good-Fair
B-14	Swift Cr ²	Wake	SR 1152	Fair	Fair
B-15	Swift Cr	Johnston	SR 1555	Good-Fair	Good-Fair
B-16	Swift Cr ²	Johnston	SR 1501	Good	Good
B-17	Little Cr ²	Johnston	SR 1562	Fair	Fair
SB-1	UT Swift Cr	Wake	Developed area	---	Poor
SB-2	UT SwiftCr	Wake	Control site	---	Good
SB-3	Swift CR	Wake	ab US 1 in MacGregor Center in park	---	Poor
SB-4	Richlands Cr	Wake	off Reedy Creek Rd; Raleigh	---	Fair
SB-5	Black Cr	Wake	Weston Parkway	---	Fair
SB-6	Richlands Cr	Wake	SR 1649	---	Fair
SB-7	Haresnipe Cr	Wake	US 70; nr Crabtree	---	Poor
SB-8	Mine Cr	Wake	Off N Hills Dr; Raleigh	---	Poor
SB-9	MineCr	Wake	1 mile ab lake	---	Fair
SB-10	Richland Cr	Wake	US 1	---	Good-Fair
SB-11	Richland Cr	Wake	SR 1931	---	Good-Fair
SB-12	Speight Cr	Wake	SR 1385	---	Not Rated
SB-13	Swift CR	Wake	SR 1152; Holly Springs Rd	---	Fair
SB-14	Swift CR	Wake	SR 1300; Hemlock Bluffs	---	Poor
SB-15	Pigeon House Cr	Wake	Fenton St; Raleigh	---	Poor
SB-16	UT Poplar Cr	Wake	ab WWTP nr SR 2509	---	Not Rated
SB-17	UT Poplar Cr	Wake	ab SR 2509	---	Not Rated
SB-18	Swift CR	Wake	McKenan Rd ab Williams Cr	---	Not Rated
SB-19	Williams Cr	Wake	ab US 64 in MacGregor West	---	Not Rated
SB-20	Rocky Br	Wake	nr Pullen Road	---	Not Rated
SB-21	Rocky Br	Wake	Dan Allen Drive	---	Not Rated
SB-22	RockyBr	Wake	Gorman Street	---	Not Rated
SB-23	Swift CR	Wake	ab US 1 in MacGregor Center in park	---	Not Rated

SB-24	Reedy Cr	Wake	Umstead State Park	---	Not Rated
SB-25	UT Turkey Cr	Wake	be Delta Ridge; at temporary road crossing	---	Not Rated
SB-26	UT TurkeyCr	Wake	ab Delta Ridge	---	Not Rated
SB-27	UT Toms Cr	Wake	SR 2044	---	Not Rated
SB-28	Toms Cr	Wake	off powerline trail	---	Not Rated
SB-30	Toms Cr	Wake	Toms Cr above the package plant discharge for Deerchase sbdivision on Kimbel Rd	---	Not Rated

Fish Community Monitoring Sites

Map # ¹	Waterbody	County	Location	1995	2000
F-1	Smith Cr	Wake	SR 2045	Good-Fair	Excellent
F-2	Crabtree Cr	Wake	SR 1664	---	Excellent
F-3	Walnut Cr ²	Wake	SR 2544	Fair	Good-Fair
F-4	Marks Cr ²	Johnston	SR 1714	Good	Excellent
F-5	Swift Cr	Wake	SR 1152	Poor	Fair/Good-Fair

Ambient Monitoring Sites

Map # ¹	Waterbody	County	Location	Station #	Noted Parameters ³
A-1	Neuse River	Wake	nr Falls Lake	J1890000	none
A-2	Crabtree Creek	Wake	SR 1795	J2850000	none
A-3	Crabtree Creek	Wake	SR 1649	J3000000	none
A-4	Crabtree Creek	Wake	SR 2000	J3251000	none
A-5	Pigeon House Cr	Wake	Dortch St	J3300000	none
A-6	Neuse River	Johnston	SR 1004	J4170000	none
A-7	Neuse River	Johnston	Smithfield	J4370000	none
A-8	Swift Cr	Johnston	NC 42	J4510000	none
A-9 ⁴	Smith Creek	Wake	SR 2045	J2230000	none
A-10 ⁴	Neuse River	Wake	SR 2215	J2330000	none
A-11 ⁴	Neuse River	Wake	Milburnie Dam	J2360000	none
A-12 ⁴	Crabtree Creek	Wake	Lassiter Mill Dam	J3210000	none
A-13 ⁴	Crabtree Creek	Wake	New Hope Road	J3470000	none
A-14 ⁴	Walnut Creek	Wake	SR2551	J3970000	none
A-15 ⁴	Neuse River	Wake	SR 2555	J4050000	none
A-16 ⁴	Poplar Creek	Wake	SR 2049	J4080000	none
A-17 ⁴	Neuse River	Johnston	NC 42	J4170000	none
A-18 ⁴	Swift Creek	Wake	SR 1152	J4414000	DO
A-19 ⁴	Swift Creek	Johnston	NC 210	J4590000	none
A-20 ⁴	Middle Creek	Johnston	Near Smithfield	J5030000	none
A-21 ⁴	Black Creek	Johnston	Near Smithfield	J5190000	none
A-22 ⁴	Neuse River	Johnston	SR 1201	J5250000	none

¹ B = benthic macroinvertebrates; F = fish community; A = ambient monitoring station; SB = benthic macroinvertebrates special study site; and SF = fish community special study site.

² Historical data available at this site. Refer to Appendix II.

³ Parameters are noted if in excess of state standards in greater than 10 percent of all samples.

⁴ LNBA Sites (page 220). Only dissolved oxygen, chlorophyll *a* and fecal coliform were analyzed.

Refer to *2001 Neuse River Basinwide Assessment Report* at <http://www.esb.enr.state.nc.us/bar.html> and Section A, Chapter 3 for more information on monitoring.

Use support ratings are summarized in Part 2.2 below. Recommendations, current status and future recommendations for waters that were impaired in 1998 are discussed in Part 2.3 below. Current status and future recommendations for newly impaired waters are discussed in Part 2.4 below. Supporting waters with noted water quality impacts are discussed in Part 2.5 below. Water quality issues related to the entire subbasin are discussed in Part 2.6. Unless otherwise noted, all discussions are for the aquatic life and secondary recreation use support category. Refer to Appendix III for a complete list of monitored waters by use support category and more information on supporting monitored waters.

2.2 Use Support Summary

Use support ratings (page 54) in subbasin 03-04-02 were assigned for aquatic life and secondary recreation, fish consumption, primary recreation and water supply. All waters in the subbasin are considered impaired on an evaluated basis because of fish consumption advisories (page 93). All water supply waters are supporting on an evaluated basis based on reports from DEH regional water treatment consultants.

There were 243 stream miles (47 percent) and 1,065 reservoir acres (95 percent) monitored during this assessment period in the aquatic life and secondary recreation use support category. Approximately 68 (28 percent) of the monitored stream miles are impaired. Refer to Table B-5 for a summary of use support ratings by use support category for waters in the subbasin. Use support ratings for waters that were monitored and impaired in at least one use support category or were impaired in 1998 are presented in Table B-6.

Table B-5 Summary of Use Support Ratings by Use Support Category in Subbasin 03-04-02

Use Support Rating	Basis	Aquatic Life and Secondary Recreation	Fish Consumption	Primary Recreation	Water Supply
Supporting	Monitored	163.5 mi 1,036.5 ac	0	12.2 mi 90.6 ac	0
	All Waters	163.5 mi 1,036.5 ac	0	12.2 mi 90.6 ac	130.8 mi 1,089.5 ac
Impaired	Monitored	68.3 mi	0	0	0
	All Waters	68.3 mi	512.3 mi 1,396.7 ac	0	0
Not Rated	Monitored	10.9 mi 28.8 ac	0	0	0
No Data	N/A (No Data)	269.5 mi 331.4 ac	0	14.6 mi 216.6 ac	0
Total	Monitored	242.8 mi 1,065.3 ac	0	12.2 mi 90.6 ac	0
	All Waters	512.3 mi 1,396.7 ac	512.3 mi 1,396.7 ac	26.7 mi 307.2 ac	130.8 mi 1,089.5 ac
	Percent Monitored	47.4% mi 76.3% ac	0%	45.7% mi 29.5% ac	0%

Note: All waters include monitored, evaluated and waters that were not assessed.

Table B-6 Previously or Currently Impaired Waters in Subbasin 03-04-02

Name	1998 Status	2002 Status	Use Support Category	Miles
Black Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	3.6
Crabtree Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	16.0
Hare Snipe Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	4.5
Little Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	11.4
Marsh Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	6.2
Mine Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	4.7
Perry Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	4.9
Pigeon House Branch	Impaired	Impaired	Aquatic Life/Secondary Recreation	2.9
Richlands Creek	Supporting	Impaired	Aquatic Life/Secondary Recreation	4.7
Swift Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	7.9
Toms Creek	Impaired	Impaired	Aquatic Life/Secondary Recreation	1.5
Walnut Creek	Impaired	Supporting/Not Rated	Aquatic Life/Secondary Recreation	N/A
			Total 2002 Impaired Miles	68.3

2.3 Status and Recommendations of Previously Impaired Waters

2.3.1 Black Creek

1998 Recommendations

Black Creek was partially supporting from the source to Crabtree Creek. It was recommended that the City of Raleigh address urban runoff impacts to this stream.

Current Status

Black Creek (3.6 miles) is currently impaired because of a Fair bioclassification at site SB-5. Habitat degradation from urban runoff is a likely cause of impairment.

2002 Recommendations

DWQ will continue monitoring Black Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Black Creek. Because of the water quality impairment noted above, Black Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Black Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.2 Crabtree Creek

1998 Recommendations

Crabtree Creek was not supporting from the source to I-40 and partially supporting and fully supporting from Highway 70 to the Neuse River. It was recommended that Cary and Raleigh address the stormwater impacts to Crabtree Creek. Development has continued in the Crabtree Creek watershed.

Current Status

Crabtree Creek (5.1 miles) from the source to Lake Crabtree is currently impaired because of a Poor bioclassification at site B-6. This segment is affected by urban runoff from Cary. From the Cary WWTP outfall to Hair Snipe Creek (14 miles), the creek is supporting because of a Good-Fair and Excellent bioclassifications at two sites in Umstead State Park (B-7 and F-2) indicating recovery of water quality through the undeveloped parkland. These sites are downstream of Cary WWTP and Crabtree Lake. The ambient monitoring station (A-3) in the park detected elevated turbidity and iron, indicating erosion of soils most likely from upstream construction sites and streambank erosion. From Hair Snipe Creek to 2.8 miles upstream of the Neuse River (10.9 miles), Crabtree Creek is impaired because of a Fair bioclassification at site B-8. This segment drains the highly urbanized watersheds of Raleigh. The ambient monitoring station (A-4) also detected elevated turbidity and iron. All the monitored tributaries to Crabtree Creek received Poor or Fair bioclassifications. Habitat degradation (page 89) is a likely cause of the impaired biological communities in these segments of Crabtree Creek.

2002 Recommendations

DWQ will continue monitoring Crabtree Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Crabtree Creek. DWQ will continue to support the City of Raleigh stormwater programs. Because of the water quality impairment noted above, Crabtree Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Crabtree Creek is typical of streams that run through urban areas. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

As can be seen by the water quality improvement in Umstead Park, undisturbed land with little impervious surface area can help to maintain aquatic habitats and the integrity of the biological community.

Current Water Quality Initiatives

The City of Raleigh has established the Capital Area Greenway (page 214) on segments of Crabtree Creek that will help to preserve buffers along the mainstem of the creek and provide recreational opportunities.

The Neuse River Foundation (page 214) has been monitoring the mouth of Crabtree Creek to investigate sediment and nutrient loading from the Crabtree Creek watershed into the Neuse River.

2.3.3 Hair Snipe Creek

1998 Recommendations

Hair Snipe Creek was partially supporting from the source to Crabtree Creek. It was recommended that the City of Raleigh address urban runoff impacts to this stream.

Current Status

The bioclassification of Hair Snipe Creek has dropped to Poor at site SB-7, indicating increased impacts from urban runoff. Hair Snipe Creek (4.5 miles) is currently impaired because of the Poor bioclassification, likely because of habitat degradation and urban runoff.

2002 Recommendations

DWQ will continue monitoring Hair Snipe Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Hair Snipe Creek. Because of the water quality impairment noted above, Hair Snipe Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Hair Snipe Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.4 Little Creek

1998 Recommendations

Little Creek was partially supporting from the source to Swift Creek. It was recommended that a more detailed study of the watershed be undertaken to determine possible causes of impairment.

Current Status

Little Creek (11.4 miles) is currently impaired because of a Fair bioclassification at site B-17. This stream has a noted lack of habitat, but may be improving as indicated by the presence of more intolerant macroinvertebrates than in previous monitoring. Little Creek drains the rapidly urbanizing watershed west of Clayton and may be impacted by development in the area.

2002 Recommendations

Little Creek watershed is under high development pressure. Sedimentation and erosion control plans should be followed during construction to minimize impacts to Little Creek and its tributaries. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Little Creek. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.5 Marsh Creek

1998 Recommendations

Marsh Creek was not supporting from the source to Crabtree Creek. It was recommended that the City of Raleigh address urban runoff impacts to this stream.

Current Status

The bioclassification of Marsh Creek has dropped to Poor at site B-9, indicating increased impacts from urban runoff. Marsh Creek (6.2 miles) is currently impaired because of the Poor bioclassification most likely because of habitat degradation from urban runoff.

2002 Recommendations

DWQ will continue monitoring Marsh Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Marsh Creek. Because of the water quality impairment noted above, Marsh Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Marsh Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.6 Mine Creek

1998 Recommendations

Upper Mine Creek was partially supporting, and Lower Mine Creek to Crabtree Creek was not supporting. It was recommended that the City of Raleigh address urban runoff impacts to this stream.

Current Status

Mine Creek (4.7 miles) from source to Crabtree Creek is currently impaired because of Poor and Fair bioclassifications at sites SB-8 and SB-9. Habitat degradation from urban runoff is the most likely cause of impairment in this stream.

2002 Recommendations

DWQ will continue monitoring Mine Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Mine Creek. Because of the water quality impairment noted above, Mine Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Mine Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.7 Perry Creek

1998 Recommendations

Perry Creek was partially supporting from the source to the Neuse River. No specific recommendations were made for Perry Creek in the 1998 basinwide plan.

Current Status

Perry Creek (4.9 miles) is currently impaired because of a Fair bioclassification at site B-5. Habitat degradation from urban runoff is the most likely cause of impairment.

2002 Recommendations

Perry Creek is in an urbanizing area of Wake County. DWQ will continue monitoring Mine Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Perry Creek. Because of the water quality impairment noted above, Perry Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Perry Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.8 Pigeon House Branch

1998 Recommendations

Pigeon House Branch was not supporting from the source to Crabtree Creek. It was recommended that the City of Raleigh address urban runoff impacts to this stream.

Current Status

Pigeon House Branch (2.9 miles) is currently impaired because of a Poor bioclassification at site SB-15. Habitat degradation from urban runoff is the most likely cause of impairment. At the ambient monitoring station (A-5), the geometric mean of fecal coliform bacteria was 900 colonies/100ml water. This stream drains downtown Raleigh and is under parking lots or large roadways for much of its length.

2002 Recommendations

DWQ will continue monitoring Pigeon House Branch. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Pigeon House Branch. Because of the water quality impairment noted above, Pigeon House Branch is a NCWRP targeted local watershed (page 203).

The impaired biological community in Pigeon House Branch is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.3.9 Swift Creek (including Williams Creek)

1998 Recommendations

Upper Swift Creek and Williams Creek were not supporting from their sources to Lake Wheeler. Swift Creek was partially supporting from Lake Wheeler to Lake Benson and fully supporting to the Neuse River. It was recommended that no new discharges be permitted into the creek.

Current Status

Upper Swift Creek and Williams Creek are currently not rated because these segments are too small to assign bioclassifications. Swift Creek (5.5 miles) from the confluence with Williams Creek to Lake Wheeler is currently impaired because of Poor and Fair bioclassifications at sites SB-3 and B-14.

Between Lake Wheeler and Lake Benson (2.4 miles), Swift Creek is also impaired because dissolved oxygen (site A-18) was below 4 mg/l in 10.1 percent of samples. Swift Creek is being investigated by the Watershed Assessment and Restoration Project (WARP) (page 213). Above Lake Wheeler, Swift Creek is adversely impacted by stormwater runoff from urban and developing areas of Raleigh and Cary.

2002 Recommendations

DWQ will continue monitoring Swift Creek. As part of the 303(d) list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment

in Swift Creek. DWQ will use the information in the WARP report on Swift Creek to develop recommendations to restore water quality in Swift Creek.

The impaired biological community in Swift Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

Lower Swift Creek, below the Lake Wheeler Dam, is being studied for preservation by the Triangle Land Conservancy. Because of the water quality impairment noted above and the preservation efforts, lower Swift Creek is a NCWRP targeted local watershed (page 203).

Current Water Quality Initiatives

There is Wake County Parks and Recreation and CWMTF restoration project (page 218) in the Swift Creek watershed. The Triangle Land Conservancy (page 219) has prepared a conservation assessment for the Conservation Trust for North Carolina (page 218) that identifies preservation and restoration opportunities in Swift Creek and the adjacent Neuse River watershed.

2.3.10 Toms Creek

1998 Recommendations

Toms Creek was partially supporting from the source to the Neuse River. No specific recommendations were made for Toms Creek in the 1998 basinwide plan.

Current Status

Toms Creek (1.5 miles) from Browns Lake to the Neuse River is currently impaired because of a Fair bioclassification at site B-4. Toms Creek was investigated by the Watershed Assessment and Restoration Project (WARP) (page 213) in 2001. The watershed assessment was valuable in defining the extent of impairment in Toms Creek and in determining the causes of impairment. Extensive monitoring completed during the project determined that high chlorine levels in the Deerchase WWTP (map #197) discharge and habitat degradation from high stormwater flows in the lower part of the creek are responsible for the impairment.

2002 Recommendations

In order to restore the biological community in Toms Creek, the discharger problems need to be addressed, and then aquatic habitat will need to be restored below the dam at Browns Lake. DWQ will work with Deerchase WWTP to reduce impacts to Toms Creek related to the discharge. Current NSW riparian buffer rules (page 64) and the NSW and NPDES Phase II (page 76) stormwater rules need to be fully enforced to prevent increased habitat degradation in Toms Creek. Because of the water quality impairment noted above and the current assessment efforts, Toms Creek is a NCWRP targeted local watershed (page 203).

2.3.11 Walnut Creek

1998 Recommendations

Walnut Creek was partially supporting from Lake Johnson to Lake Raleigh and from I-440 to the Neuse River. The segment between these was not supporting. It was recommended that no new discharges be permitted into the creek.

Current Status

Increases in bioclassification to Good-Fair at two sites below Lake Raleigh (B-10 and F-3) indicate some improvement in water quality lower on Walnut Creek. This segment is currently supporting because of the increased bioclassifications; however, there was noted habitat degradation with infrequent pools and riffles and indications of scour from high storm flows. The segments above I-440 are currently not rated because there was no monitoring, and the area drains heavily urbanized portions of Cary and Raleigh. Past benthic macroinvertebrate bioclassifications have been Poor upstream of site F-3. Upper Walnut Creek is heavily impacted from urban runoff.

2002 Recommendations

Although water quality in Walnut Creek appears to be improving in the lower segments, the watershed drains urbanized and urbanizing areas of Raleigh and Cary and the potential for degradation of instream habitat is very high. DWQ will reestablish a biological monitoring station above Lake Raleigh and Lake Johnson to better assess impacts from stormwater runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

There are currently two NCWRP restoration projects ongoing in the Walnut Creek watershed (page 213) designed to stabilize streambanks and reduce sedimentation. Because of the water quality impairment noted above and the current restoration projects, Walnut Creek is a NCWRP targeted local watershed (page 203).

2.4 Status and Recommendations for Newly Impaired Waters

2.4.1 Richlands Creek

Current Status

Richlands Creek was fully supporting but threatened in 1998, but is currently impaired (4.7 miles) because of two Fair bioclassifications in 1996 at sites SB-4 and SB-6. Habitat degradation from urban runoff is the most likely cause of impairment. Intensive grading and road building activity in this watershed, related to construction of the Raleigh Entertainment and Sports Arena (RESA), is likely to have increased habitat degradation.

2002 Recommendations

DWQ will continue monitoring Richlands Creek. As part of the 303(d)-list approach, DWQ will begin the process of identifying problem parameters that may be causing biological impairment in Richlands Creek. The NCWRP is initiating a riparian buffer restoration and streambank stabilization project on Richlands Creek at the RESA. Because of the water quality impairment

noted above and the current restoration efforts, Richlands Creek is a NCWRP targeted local watershed (page 203).

The impaired biological community in Richlands Creek is typical of streams that run through urban areas. As with Crabtree Creek and the other creeks draining urban Raleigh and Cary, great efforts will be needed to reduce impacts from urban runoff. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.5 Status and Recommendations for Waters with Noted Impacts

The surface waters discussed in this section are supporting designated uses (unless otherwise noted) based on DWQ's use support assessment and are not considered to be impaired. However, notable water quality problems and concerns have been documented for some waters based on this assessment. While these waters are not considered impaired, attention and resources should be focused on these waters to prevent additional degradation or facilitate water quality improvement.

2.5.1 Reedy Creek

Current Status and 2002 Recommendations

Reedy Creek was not rated in 1998 and is currently not rated. Site SB-24 did not meet the necessary criteria to assign a bioclassification. The watershed drains urbanizing portions of Raleigh. Refer to page 81 for a description of urban stream problems and recommendations for reducing impacts and restoring water quality.

2.5.2 Rocky Branch

Current Status and 2002 Recommendations

Rocky Branch is currently not rated. Sites SB-20, 21 and 22 did not meet the necessary criteria to assign bioclassifications. The watershed is in a heavily urbanized area of west Raleigh and runs through NCSU campus. Stream habitat is degraded, and the benthic macroinvertebrate community is heavily impacted from urban runoff. The stream is currently undergoing a large-scale restoration project funded in part by CWMTF (page 210).

2.5.3 Lake Crabtree

Current Status and 2002 Recommendations

Lake Crabtree has constantly high turbidity, most likely from urban runoff and development in the watershed. The watershed drains urban Cary and Raleigh-Durham International Airport. Lake Crabtree may actually help downstream water quality by processing sediment and nutrients and reducing turbidity. There was a blue green algal bloom in the lake in August 1999. DWQ will continue to monitor the lake to evaluate any future degradation in water quality.

Lake Crabtree (518 ac) is classified for and is supporting primary recreation based on a lake assessment completed in summer of 2000. Fecal coliform bacteria levels were well below the water quality standard for primary recreation.

2.5.4 Reedy Creek Lake, Big Lake and Sycamore Lake

Current Status and 2002 Recommendations

Reedy Creek Lake, Big Lake and Sycamore Lake have had problems with *Hydrilla*. The watersheds drain mostly forested areas of Umstead State Park. There are indications of increased nutrient loading to the lakes as development increases in the watershed areas just outside of the park boundaries. DWQ will continue to monitor these lakes to evaluate any future degradation in water quality that may be associated with development in these watersheds.

2.5.5 Apex Lake

Current Status and 2002 Recommendations

Apex Lake watershed has undergone dramatic development since 1995. Nutrient and sediment loading to the lake are increasing as a result of this development. Because of the rapid changes in land use in this watershed, DWQ will continue to monitor this lake to evaluate any future degradation in water quality that may be associated with development.

2.5.6 Lake Wheeler

Current Status and 2002 Recommendations

Lake Wheeler is an important recreational lake as well as a future Raleigh water supply. There are safety and pollution concerns related to the use of powerboats on the lake. There have been high levels of manganese detected in the lake, and *Hydrilla* infestations have also been a problem. Because of the rapid changes in land use in this watershed, DWQ will continue to monitor this lake to evaluate any future degradation in water quality that may be associated with development.

2.5.7 Lake Benson

Current Status and 2002 Recommendations

Lake Benson is a future Raleigh water supply. There have been high levels of manganese detected in the lake, and *Hydrilla* infestations have also been a problem. Because of the rapid changes in land use in this watershed, DWQ will continue to monitor this lake to evaluate any future degradation in water quality that may be associated with development.

2.5.8 Marks Creek

Current Status and 2002 Recommendations

Marks Creek is in rapidly developing areas of Wake and Johnston counties. There was logging noted at sites B-13 and F-4. Adherence to and enforcement of riparian buffer and stormwater rules will help to protect Marks Creek as this watershed is developed. Because of the water quality impacts noted above, the increasing development pressure and the availability of a conservation assessment in the watershed, Marks Creek is a NCWRP targeted local watershed (page 203).

The Triangle Land Conservancy (page 219) has prepared a conservation assessment for the Conservation Trust for North Carolina (page 218) that identifies preservation and restoration opportunities in Marks Creek and the adjacent Neuse River watershed (page 214).

2.5.9 Neuse River Bottomlands

Current Status and 2002 Recommendations

This section of the Neuse River is currently supporting based on a Good bioclassification at site B-12. This segment of the Neuse River is the best watershed for preservation in the upper Neuse River basin. More than 50 percent of the entire basin population live upstream of this site. This area has extensive wetlands and will be an important area to preserve to protect downstream water quality. The Neuse River floodplain broadens out to four miles wide through this area as it transitions from the piedmont to the coastal plain. This watershed has several Natural Heritage sites and has been prioritized by Johnston County as its most impressive natural area. The NCWRP has targeted this local watershed (page 203).

2.5.10 Richland Creek

Current Status and 2002 Recommendations

Richland Creek is in a rapidly developing area near Wake Forest. Two sites on Richland Creek had Good-Fair bioclassifications. Adherence to and enforcement of riparian buffer and stormwater rules will help to protect Richland Creek as this watershed is developed. Because of the increasing development pressure, this watershed is a NCWRP targeted local watershed (page 203).

2.6 Additional Water Quality Issues Within Subbasin 03-04-02

This section discusses issues that may threaten water quality in the subbasin that are not specific to particular streams, lakes or reservoirs. The issues discussed may be related to waters near certain land use activities or within proximity to different pollution sources.

2.6.1 Water Quality Threats to Streams in Urbanizing Watersheds

Most of the streams in this subbasin that are not already impaired from urban stormwater runoff are threatened by development pressure throughout this subbasin. In order to prevent aquatic habitat degradation and impaired biological communities, protection measures must be put in place immediately. Refer to page 81 for a description of urban stream water quality problems and recommendations for reducing impacts to and restoring water quality in these waters.

2.6.2 Wake County Watershed Task Force

Local governments have increasingly become involved in water quality issues within their jurisdictions. Wake County is centered in one of the most intensely developed subbasins in North Carolina. Wake County is engaged in a process to protect and restore water quality to streams in the county (page 218).