Chapter 8 -
Roanoke River Subbasin 03-02-08
Includes Roanoke Rapids Lake and 55 miles of the Roanoke River

8.1 Water Quality Overview

Subbasin 03-02-08 at a Glance

Land and Water Area

Total area:	513 mi^2
Land area:	473 mi^2
Water area:	40 mi^2

Population Statistics

1990 Est. Pop.:	43,392 people
Pop. Density:	91 persons / mi^2

Land Cover (%)

Forest / Wetland:	65.2
Surface Water:	2.8
Urban:	1.5
Cultivated Crop:	28.4
Pasture / Managed Herbaceous:	2.0

The upper portion of this subbasin, including Roanoke Rapids Lake, lies within the piedmont region, while the middle and lower portions are in the coastal plain. The coastal plain portion includes approximately 50 miles of the Roanoke River. The major tributaries in this subbasin are Chockoyette, Quankey, Occoneechee and Bridgers Creeks; and Conoconnara, Kehuku, Gumberry and Cypress Swamps. Municipalities include Gaston, Roanoke Rapids, Weldon, Garysburg and Halifax, as well as portions of Scotland Neck, Rich Square and Lewiston-Woodville. A map of this subbasin including water quality sampling locations is presented in Figure B-8.

Bioclassifications for sample sites in this subbasin are presented in Table B-20. Use support ratings for each applicable category in this subbasin are summarized in Table B-21 and B-22. Refer to Appendix III for a complete listing of monitored waters and further information about use support ratings.

With the exception of the Gaston, Roanoke Rapids and Weldon urban area, most of the land in this subbasin is forested (65 percent) or in agriculture (30 percent). The majority of the agricultural land is cultivated cropland (cotton, peanuts, tobacco and soybeans), but there are many animal operations in the area as well.

There are eleven NPDES permitted dischargers in this subbasin. The largest facilities are Champion International, Perdue Farms and the Roanoke Rapids, Weldon and NC Department of Correction's (DOC) Caledonia Prison WWTPs. All of these facilities discharge directly into the Roanoke River. DOC's Caledonia facility has significant compliance problems with BOD, fecal coliform and total suspended solids. This facility is discussed further in Part 8.5.1.

Seven facilities are required to perform toxicity tests on their discharge. Toxicity problems were observed at the Town of Halifax WWTP (discharges into Quankey Creek) and the Panda-Rosemary Corporation facility (discharges into Chockoyotte Creek) over the past two years.

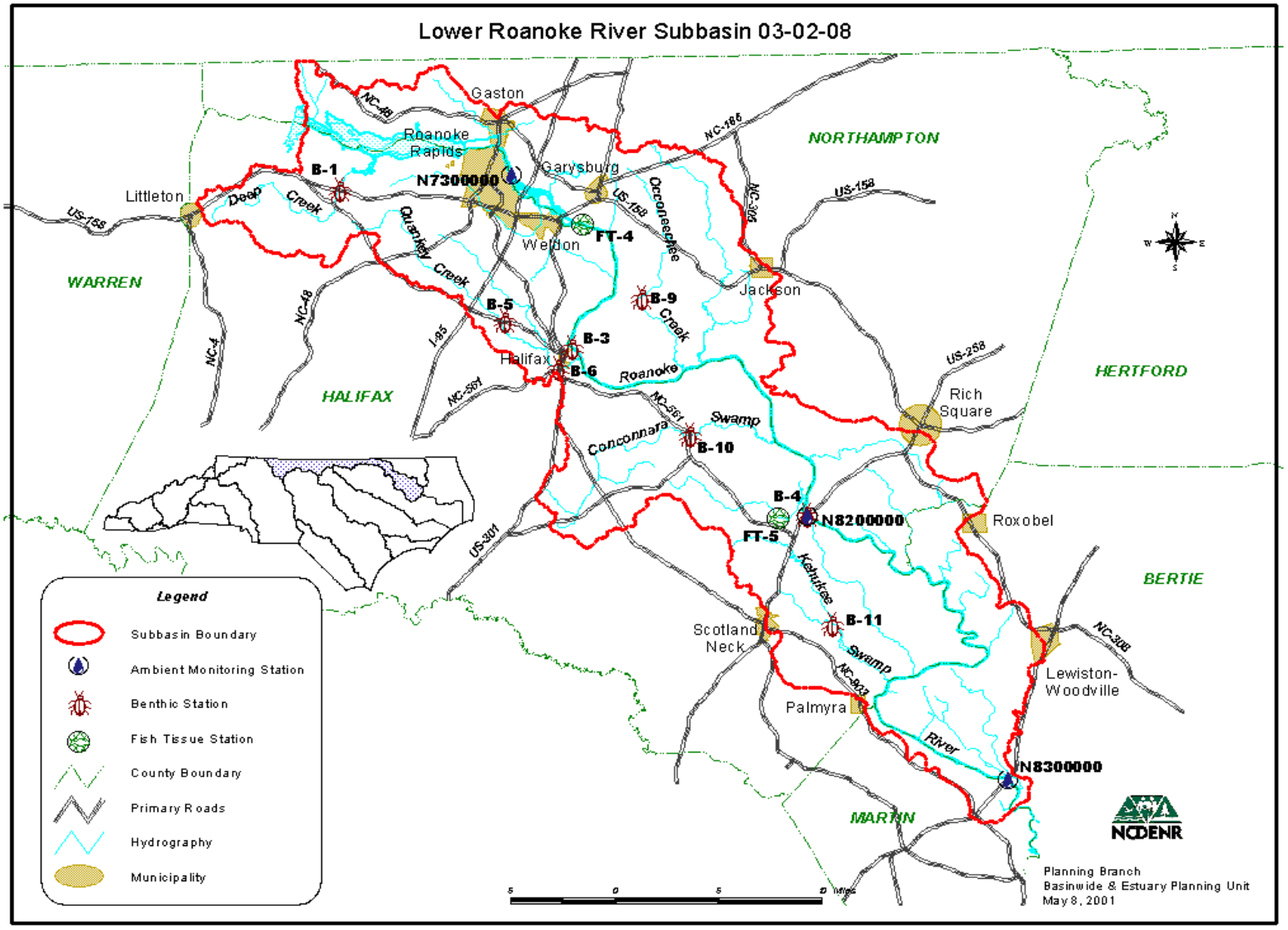

Figure B-8 Sampling Locations within Subbasin 03-02-08

Table B-20 DWQ Monitoring Locations and Benthic Macroinvertebrate Bioclassifications (1999) for Roanoke River Subbasin 03-02-08

Site	Stream	County	Location	Bioclassification
Benthic Macroinvertebrates				
B-1	Deep Creek	Halifax	Weldon	Not Rated
B-3	Roanoke River	Halifax	Halifax	Good
B-4*	Roanoke River	Halifax	Scotland Neck	Good
B-5	Quankey Creek	Halifax	NC 903	Not Rated
B-6*	Quankey Creek	Halifax	NC 561	Fair
B-9	Occoneechee Creek	Northampton	SR 1126	Not Rated
B-10	Conoconnara Swamp	Halifax	NC 561	Not Rated
B-11	Kehukee Swamp	Halifax	SR 1804	Not Rated
Fish Tissue				
FT-4	Roanoke River	Halifax	Weldon	N/A
FT-5	Roanoke River	Halifax	Scotland Neck	N/A
Ambient Monitoring				
N7300000	Roanoke River	Halifax	Roanoke Rapids	N/A
N8200000	Roanoke River	Halifax	Scotland Neck	N/A
N8300000	Roanoke River	Martin	NC 11	N/A

* Historical data are available; refer to Appendix II.

Extensive evaluation, conducted by DWQ, of swamp streams across eastern North Carolina suggests that different criteria should be used to assess the condition of water quality in these systems. Swamp streams are characterized by slower flow, lower dissolved oxygen, lower pH, and sometimes very complex braided channels and dark-colored water. DWQ has developed draft biological criteria that may be used in the future to assign bioclassifications to these streams (as is currently done for other streams and rivers across the state). However, DWQ believes that there has been insufficient sampling of reference swamp streams to assign bioclassifications to them and use them for use support determinations in the Roanoke River basin at this time. DWQ continues to work toward preparing these criteria for future use.

The Roanoke River at Halifax was sampled for the first time in 1999 and received a Good bioclassification for benthic macroinvertebrates. The Roanoke River at Scotland Neck maintained a Good bioclassification as well. In 1994, the river also received a Good benthic bioclassification below Weldon.

The biological community in the lower portion of Quankey Creek, below the Town of Halifax WWTP, received a Fair bioclassification in both 1992 and 1999. The upper portion is swampy, and the site was not rated; but no potential impacts to water quality were observed. The lower

section of Quankey Creek is only partially supporting aquatic life/secondary recreation and is discussed in more detail in the following sections. Deep Creek, Occoneechee Creek, Conoconnara Swamp and Kehukee Swamp were not rated using macroinvertebrate data because of their swampy nature. However, some habitat degradation was noted at each site. Please refer to Section A, Chapter 4 for further discussion of habitat degradation in the Roanoke River basin.

Fish community data were collected and a mussel survey was conducted in 1995 and 1996 by Dominion (formerly North Carolina Power Company) as part of its relicensing efforts for the Lake Gaston and Roanoke Rapids hydroelectric project. Eight of the fifteen mussel species that had been historically documented or believed to be present in the lower Roanoke River were collected from a single 10-mile stretch (DENR-DWQ, May 2000).

Fish tissue samples were collected by DWQ from two sites on the Roanoke River in 1995 and 1999. Six bowfin samples from the river at Weldon had mercury concentrations greater than the EPA screening value. Metals concentrations in 21 samples of other fish species were less than federal and state criteria for fish consumption. At Scotland Neck, 23 fish were tested for mercury contamination. One largemouth bass and one bowfin had concentrations greater than EPA consumption criteria.

Roanoke Rapids Lake was the only lake monitored in this subbasin. The lake has extensive growths of nuisance aquatic macrophytes. More than 30 percent of the lake's surface area is covered with *Hydrilla* (DENR-DWQ, May 2000). Other species are also present in the lake. Secondary recreation activities, such as boating and water-skiing, are impaired in this lake, and the lake is discussed in more detail in the following sections.

Water chemistry samples are collected monthly from three sites on the Roanoke River in this subbasin: at Roanoke Rapids, near Scotland Neck and just above Hamilton. Although there was no indication of substantial water quality problems, total suspended solids and nitrate nitrogen concentrations increased in a downstream manner from Roanoke Rapids to Hamilton.

For more detailed information on sampling and assessment of streams in this subbasin, refer to the *Basinwide Assessment Report - Roanoke River Basin* (DENR-DWQ, May 2000), available from DWQ Environmental Sciences Branch at http://www.esb.enr.state.nc.us/bar.html or by calling (919) 733-9960.

Table B-21 Use Support Ratings Summary (1999) for Monitored Lakes (acres) in Roanoke River Subbasin 03-02-08

Use Support Category	FS	PS	NS	Total[2]
Aquatic Life/ Secondary Recreation	0	4,893	0	4,893
Fish Consumption[3]	0	4,893	0	4,893
Primary Recreation	4,893	0	0	4,893
Water Supply	4,893	0	0	4,893

Table B-22 Use Support Ratings Summary (1999) for Monitored and Evaluated[1] Freshwater Streams (miles) in Roanoke River Subbasin 03-02-08

Use Support Category	FS	PS	NS	NR	Total[2]
Aquatic Life/ Secondary Recreation	167.9	3.4	0	180.6	351.9
Fish Consumption	0	123.7	0	0	123.7
Primary Recreation	0	0	0	0	0
Water Supply	20.5	0	0	0	20.5

[1] For the fish consumption use support category, only monitored stream miles are presented.

[2] Total stream miles/acres assigned to each use support category in this subbasin. Column is not additive because some stream miles are assigned to more than one category.

[3] These waters are impaired because of a statewide fish consumption advisory for bowfin. Refer to Section A, Part 4.8.4 for further information.

8.2 Status and Recommendations for Previously Impaired Waters

This section reviews use support and recommendations detailed in the 1996 basinwide plan, reports status of progress, gives recommendations for the next five-year cycle, and outlines current projects aimed at improving water quality for each water. The 1996 Roanoke River basin plan identified three impaired waters in this subbasin. Roanoke Rapids Lake, Quankey Creek and Conoconnora Swamp are discussed below.

8.2.1 **Roanoke Rapids Lake** (4,893 acres)

1996 Recommendation(s)

In 1996, Roanoke Rapids Lake was partially supporting designated uses due to infestation of invasive aquatic plants. The lake was described as having prolific growths of aquatic macrophytes, especially *Hydrilla*, that hindered secondary recreation activities such as boating and water-skiing on large portions of the lake. Nutrient levels were moderate and the recommendation, as in the case of Lake Gaston (subbasin 03-02-07), was to assess the need for a nonpoint source pollution nutrient management plan.

Status of Progress

In recent years, there has been an increase in invasive aquatic macrophytes in Roanoke Rapids Lake. More than 30 percent of the surface area is affected by these nuisance plants (DENR-DWQ, May 2000). Moderate levels of nutrients were again observed during DWQ's 1999 lake monitoring; however, studies have shown that the most prevalent plant, *Hydrilla*, does not respond to nutrient reduction. Secondary recreation remains impaired (partially supporting) in this lake. Citizens have formed the Roanoke Rapids Lake Management Council to work toward reducing aquatic weeds in the lake.

2001 Recommendations

DWQ will work the Roanoke Rapids Lake Management Council and DWR to reduce aquatic weeds. Water quality could also benefit from nutrient reduction in this lake. Additionally, a public education campaign is recommended so that introduction of additional aquatic macrophytes from boats that have been in other waters is minimized. Refer to Section C for information about funding sources that are available for water quality improvements and education in impaired waters.

8.2.2 **Quankey Creek** (19.4 miles from source to the Roanoke River)

1996 Recommendation(s)

Two sites, above and below the Town of Halifax WWTP, were sampled during the last basin cycle at the lower end of Quankey Creek. The biological community at both sites received a Fair bioclassification. The 1996 recommendation was to evaluate impacts from a rest area along I-95 upstream.

Status of Progress

In 1999, two sites, downstream of I-95 and downstream of the Town of Halifax WWTP, were sampled by DWQ. The biological community below the Halifax WWTP again received a bioclassification of Fair. This facility has experienced compliance problems over the past decade and failed 25 percent of whole effluent toxicity tests between 1997 and 1999. Conductivity was 117 umhos (compared to 70 umhos upstream), reflecting the influence of the point source discharge. However, there is significant habitat degradation caused by channel alterations contributing to impairment of aquatic life (partially supporting) in the lower section of Quankey Creek.

The benthic community at the upstream site (that was chosen to evaluate the effects of the I-95 rest area) was not rated because the site exhibited swamp characteristics. However, the site received the highest habitat quality score of any tributary sampled in the coastal plain area of the basin. A large number of insects were collected as well as a good variety of pollution intolerant species. There was no indication of water quality impacts at this location. Based on this additional monitoring effort, the number of impaired stream miles has been reduced from 19.4 to 3.4 (from the confluence with Little Quankey Creek to the mouth at Roanoke River).

2001 Recommendations

DWQ will continue to work with the Town of Halifax to resolve problems with the WWTP discharge. The town received a grant in March 2000 to begin addressing the most critical maintenance problems at the facility, but more funding is needed to complete collection system rehabilitation and construction of new sewer lines to eliminate failing septic systems in the Town of Halifax. Refer to Part 8.5.1 for further details about NPDES discharges in this subbasin.

Additionally, DWQ will continue to monitor Quankey Creek and, as resources allow, sample Little Quankey Creek during the next basinwide sampling to assess its contribution to degraded water quality in this watershed.

8.2.3 **Conoconnora Swamp** (17.7 miles from source to the Roanoke River)

1996 Recommendation(s)
This stream was rated as impaired during the last basin cycle by using fish community data that resulted in a Fair bioclassification. The recommendation was to evaluate the contribution of agricultural runoff in the watershed and implement best management practices as necessary.

Status of Progress
Fish community data was not collected from this stream during this basin cycle. The benthic macroinvertebrate community was not rated and will remain not rated until assessment criteria can be used with confidence (refer to previous sections). While aquatic life/secondary recreation in this stream is not currently considered impaired, lower total numbers and diversity of pollution intolerant species of aquatic insects were observed during the 1999 sampling.

8.3 Status and Recommendations for Newly Impaired Waters

The majority of the lower Roanoke River in North Carolina was rated as impaired based on fish consumption advisories and recent DWQ fish tissue monitoring (1995-1999). This section outlines the potential causes and sources of impairment and provides recommendations for improving water quality.

8.3.1 **Roanoke River** (128.5 miles from the Roanoke Rapids dam to Williamston)

Current Status
The Roanoke River, from the Roanoke Rapids dam to the Albemarle Sound, is impaired because of fish consumption advisories. In this particular section of the river, from the dam to Williamston, the only advisory is due to elevated levels of mercury in bowfin (blackfish). Bowfin with levels of mercury that exceed consumption criteria were collected by DWQ in the Roanoke River near Weldon and Williamston in 1995 and 1999. Because of this advisory, this portion of the river is only partially supporting the fish consumption category. (Note: This is not a new advisory, but improved use support methodology now bases impairment for the fish consumption use support category on fish consumption advisories. See Appendix III for more information regarding use support ratings.)

2001 Recommendation(s)
DWQ will continue to monitor fish tissue in the Roanoke River and will work to identify sources of mercury. Given the global scale of mercury cycling, it may be difficult for DWQ to recognize significant reductions of mercury in fish over the short-term. The NC Department of Environment and Natural Resources (DENR) has established a Mercury Task Force that includes staff from DWQ, Division of Air Quality, Hazardous Waste, Pollution Prevention and Wildlife Resources. In addition, DWQ has established an internal Water Quality Section Work Group to stay abreast of mercury issues. Section A, Part 4.8 provides more details about mercury in the environment.

8.4 Section 303(d) Listed Waters

Currently in this subbasin, two waters are listed on the state's year 2000 §303(d) list: Roanoke Rapids Lake and Quankey Creek. Roanoke Rapids Lake is listed on Part I of the 2000 §303(d) list requiring DWQ to develop a TMDL/management strategy. Quankey Creek is biologically impaired. Both waters are discussed in more detail in the previous sections. The Roanoke River, along with all other waters in the basin, will likely be added to the list in 2002 based on the statewide bowfin consumption advisory. Refer to Appendix IV for more information on the state's §303(d) list and listing requirements.

8.5 Other Issues and Recommendations

The surface waters discussed in this section are fully supporting designated uses (or not rated) based on recent DWQ monitoring; however, data revealed some impacts to water quality. Although no action is required for these streams, voluntary implementation of BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies of water quality concerns regarding these waters and work with them to conduct further monitoring and to locate sources of water quality protection funding. Additionally, education on local water quality issues is always a useful tool to prevent water quality problems and to promote restoration efforts. Nonpoint source program agency contacts are listed in Appendix VI.

Although aquatic communities in the section of Roanoke River contained in this subbasin are currently in good condition, there are several discharges and other impacts in this portion that are likely contributing to a decline in water quality downstream. These impacts are discussed in the following paragraphs.

8.5.1 NPDES Discharges

As was mentioned in this chapter's overview, the NC Department of Correction's (DOC) Caledonia Prison WWTP discharge, which is permitted to release 0.8 million gallons per day to the Roanoke River, continued to experience compliance problems over the past five years. Parameters that exceed permitted limits include BOD, fecal coliform and total suspended solids. DWQ has been working with DOC for the past eight years to correct problems with this discharge. Almost $8,000 in civil penalties have been assessed dating back to June 1993. DOC has plans to build a new constructed wetlands treatment system by December 2002. Final compliance with permit limits for this new discharge is required by July 2003.

The Town of Halifax's WWTP discharge, permitted to release up to 0.7 MGD to Quankey Creek just upstream of the Roanoke River, continued to experience both compliance (BOD and total suspended solids) and toxicity problems over the past five years. DWQ has been working with the town for more than a decade to resolve problems with this deteriorating facility. More than $8,000 in civil penalties have been assessed dating back to June 1991. The town received a grant in March 2000 to begin addressing the most critical maintenance problems at the facility, but more funding is needed to complete collection system rehabilitation and construction of new sewer lines to eliminate failing septic systems in the Town of Halifax.

8.5.2 Eroding Streambanks

There are several large areas along the Roanoke River, as well as smaller tributaries where the banks are eroding. In some areas, this erosion is severe, contributing large amounts of sedimentation to the Roanoke River. One landowner, with several hundred feet of riverbank, has agreed to work with the Albemarle-Pamlico National Estuary Program's (APNEP) Roanoke Regional Council to provide alternative water sources and fence livestock out of the Roanoke River. That project will serve as a demonstration site, once it is complete. Refer to Part 1.2.2 of Section C for details about the Roanoke Regional Council.

The DOC Caledonia facility is a prison farm, and cattle at this facility have had access to the Roanoke riverbank for several hundred feet. The Division of Soil and Water Conservation has been working with DOC to select and implement BMPs at this facility, including cattle exclusion and bank stabilization.

Section A, Chapter 4 discusses sedimentation, streambank erosion and best management practices for controlling them. Appendix VI contains descriptions of and contact information for nonpoint source pollution programs in North Carolina.

8.5.3 Phase II Stormwater Requirements

Amendments were made to the Clean Water Act in 1990 (Phase I) and most recently in 1999 (Phase II) pertaining to permit requirements for stormwater discharges associated with storm sewer systems. Part of Phase II requires some municipal storm sewer systems serving populations under 100,000, which are located in larger urbanized areas and/or that have a high population density to obtain an NPDES stormwater permit. The municipal permitting requirements are designed to lead into the formation of comprehensive stormwater management programs for municipal areas. Roanoke Rapids will be considered for inclusion under the Phase II rules because of a population greater than 10,000 and/or a population density greater than 1,000 persons per square mile. DWQ is currently developing criteria that will be used to determine whether this and other municipalities will be required to obtain a NPDES permit. Refer to Section A, Part 2.7.2 for further information.

8.5.4 Chockoyette Creek

This stream flows through and around Roanoke Rapids and Weldon in the northwestern portion of this subbasin. The stream is currently impacted by collection system overflows in Roanoke Rapids, but there is also potential for serious habitat degradation to occur as this urban area continues to grow. Roanoke Rapids is diligently working to correct the wastewater collection system problems, which essentially amounts to a complete replacement. DWQ will continue to work with the city over the next five years toward completion of this task. DWQ will also plan to sample this stream during this basinwide cycle, as resources allow.

Stormwater issues need to be addressed by Roanoke Rapids, Gaston and Weldon. This urban area is not automatically covered by the EPA's Phase II stormwater rules, based on total population and density (see part 8.5.3). However, these municipalities could begin to develop a stormwater program that addresses stormwater runoff.