

Pasquotank River Subbasin 03-01-51

Including: Alligator River and portions of the Albemarle, Croatan and Roanoke Sounds

2.1 Subbasin Overview

Subbasin 03-01-51 at a Glance

Land and Water Area

Total area:	978 mi ²
Land area:	568 mi ²
Water area:	410 mi ²

Land Cover (percent)

Forest/Wetland:	53%
Surface Water:	39%
Cultivated Crop:	8%
Urban:	<1%
Pasture/ Managed Herbaceous:	<1%

Counties

Dare, Hyde and Tyrrell

Municipalities

Manteo

Monitored Waterbody Statistics

Aquatic Life:

Total:	8.8 mi/106,724.7 ac
Supporting:	8.8 mi/106,724.7 ac

Recreation:

Total:	8.8 mi/132,564.3 ac
Supporting:	8.8 mi/132,564.3 ac

Shellfish Harvesting:

Total:	54,628.7 ac
Supporting:	52,547.2 ac
Impaired:	2,081.5 ac

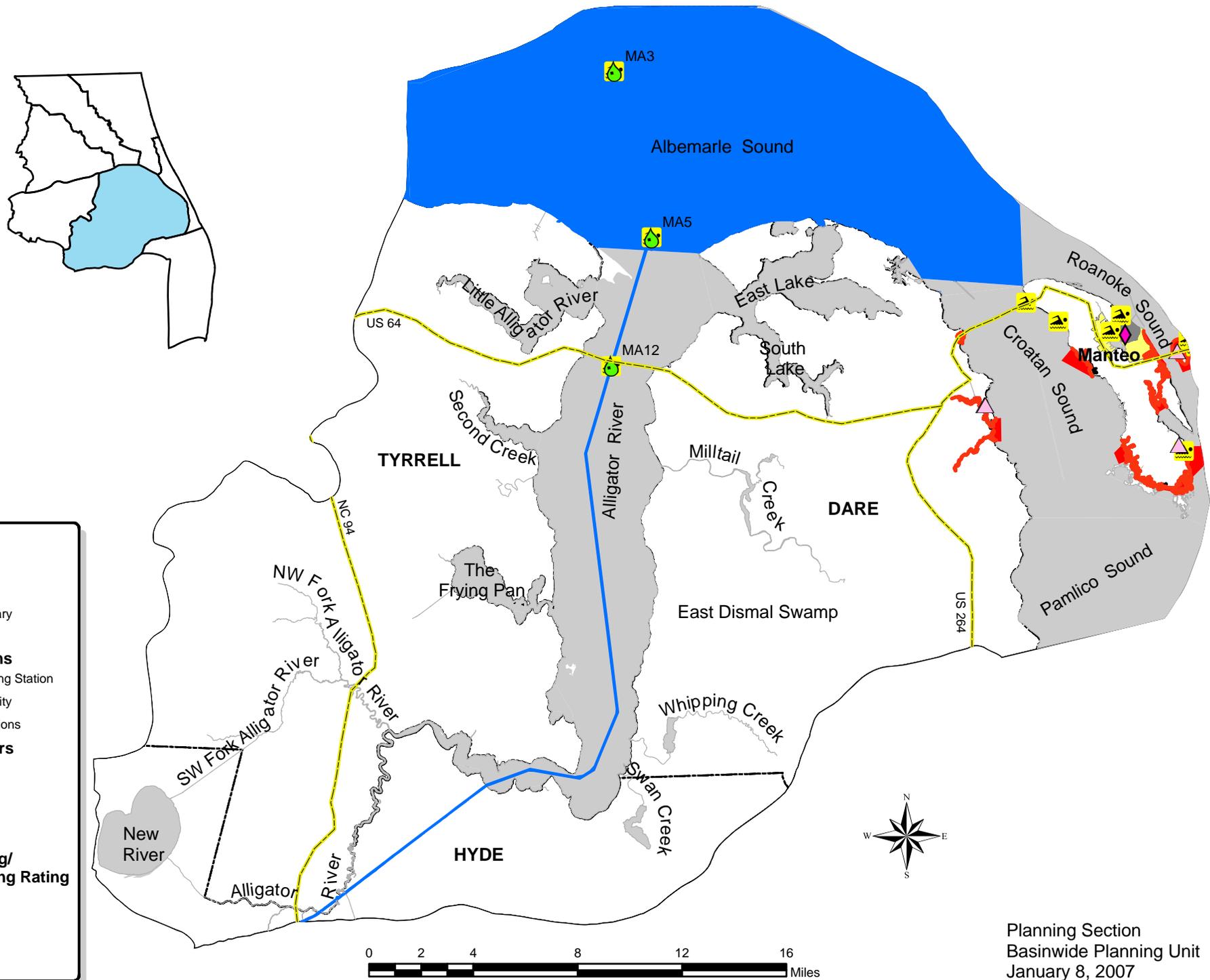
This subbasin contains the Alligator River and several tributaries. Most streams are of low relief and often swampy. Channelized ditches are common. Most waters in this subbasin are brackish estuarine, including Albemarle, Croatan and Roanoke Sounds, and the Alligator River to the Intracoastal Waterway (ICWW). Ecologically, the subbasin contains characteristics of the Chesapeake-Pamlico lowlands and tidal marshes, as well as nonriverine swamps and peatlands. Land cover generally consists of evergreen forests, mixed forests, forested wetlands and marshes.

The Alligator River upstream of US 64 and all of its natural tributaries (not canals, Alligator Lake or ICWW) are classified as Outstanding Resource Waters (ORW). Based on their designations by the Marine Fisheries Commission as primary nursery areas, two tributaries (upper Scarboro Creek and Doughs Creek) to Shallowbag Bay are classified as High Quality Waters (HQW).

This subbasin contains a mixture of public lands and Significant Natural Heritage Areas including Roper Island, Durant Island, Pocosin Lakes National Wildlife Reserve, the Alligator River National Wildlife Refuge and the Preyer Reserve. Portions of Dare, Hyde and Tyrrell Counties can be found in this subbasin with the highest concentration of urbanized areas located on Roanoke Island in the Towns of Manteo and Wanchese. Rapid population growth is occurring in Dare County and along coastal areas. Additional information regarding population and land use changes throughout the entire basin can be found in Chapter 11.

There is one major and five minor National Pollutant Discharge Elimination System (NPDES) discharges in this subbasin with a total permitted flow of 1.5 MGD. The major NPDES facility is the Manteo Wastewater Treatment Plant (WWTP) with a permitted flow of 1.0 MGD. The Manteo WWTP discharges to Shallowbag Bay [AU# 30-21-3] on Roanoke Island and significant noncompliance issues were identified during the last two years of the assessment period. There are two stormwater discharge permits in this subbasin. For the listing of NPDES permit holders, refer to Appendix III.

Figure 4 Pasquotank River Subbasin 03-01-51



Legend

- Municipality
- County Boundary
- Subbasin Boundary
- Primary Roads

Monitoring Stations

- Ambient Monitoring Station
- Benthic Community
- Recreation Locations

NPDES Dischargers

- Major
- Minor

Non-Dischargers

- Major
- Minor

Aquatic Life Rating/ Shellfish Harvesting Rating

- Impaired
- No Data
- Not Rated
- Supporting



Table 5 Pasquotank Subbasin 03-01-51

AU Number	Classification	Length/Area	Aquatic Life Assessment				Recreation Assessment			Shellfish Harvesting		Stressors	Sources
			AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	SH Rating	GA		
ALBEMARLE SOUND													
30b	SB	106,724.7	S Acres	S	MA3	NCE		S	MA3	NCE		Dioxin	Industrial Site
					MA5	NCE			MA5	NCE			
Portion of Albemarle Sound in subbasin 03-01-51. Waters of Albemarle Sound (All waters south and east of a line running in a southerly direction from Horniblow Point (North end of Norfolk-Southern Railroad Bridge) to a point of land on the east side of R													
Baum Creek													
30-20-5	SA;HQW	10.9	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria
From source to Croatan Sound													
Broad Creek													
30-21-7a	SA;HQW	126.0	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria Marina
DEH closed area at head of creek													
30-21-7b	SA;HQW	392.2	S Acres	ND				ND			S	APP	
Approved area at mouth of creek													
Callaghan Creek													
30-20-4	SA;HQW	24.8	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria
From source to Croatan Sound													
Cedar Bush Bay													
30-20-7	SA;HQW	207.8	S Acres	ND				ND			S	APP	
Entire Bay													

Table 5 Pasquotank Subbasin 03-01-51

AU Number	Classification	Length/Area	Aquatic Life Assessment			Recreation Assessment			Shellfish Harvesting		Stressors	Sources		
			AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	SH Rating			GA	
Croatan Sound														
30-20-(2)a	SA;HQW	24,496.4	S Acres	ND				S	N68 N69	NCE NCE	S	APP		
	From Northwest Point on Roanoke Island following a line west to Reeds Point on the Dare County mainland to a line running from a point of land just below Long Wretch Creek on Dare County mainland to the Southern tip of Smith Island south of Roanoke Island													
30-20-(2)b	SA;HQW	169.3	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria	
	The waters of Croatan Sound enclosed in a line beginning at a point near north shore of Spencer Creek at 35 degrees 51' 45" N- 75 degrees 44' 53" W; and thence 250 yards in an easterly direction to a point at 35 degrees 51' 45" n- 75 degrees 44' 43" west													
30-20-(2)c	SA;HQW	340.9	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria	
	The waters of Croatan Sound which include all waters within a line beginning at a point on the shore at 35 degrees 53' 56" N- 75 degrees 41' 36" W, thence WSW 800 yards to a point in the sound at 35 degrees 53' 38" N- 75 degrees 41' 53 W, thence 1975 yard													
30-20-(2)d	SA;HQW	156.3	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria	
	The waters of Croatan Sound which include all waters on the North shore of Baum Creek to a straight line to Fl. Beacon number 2 at 35 degrees 50' 27" n-75 degrees 40' 06" W, thence in a straight line tto a point on an island at 35 degrees 50' 05" N- 75 de													
30-20-(2)e	SA;HQW	92.2	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria	
	The waters of Croatan sound which include all waters below Oyster Creek southeast to Cut Through. DEH closed area Croatan Sound 5-e													
30-20-(2)f	SA;HQW	22.1	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria	
	DEH Closure Area at Mann's Harbor													
Cut Through														
30-20-8a	SA;HQW	128.6	S Acres	ND				ND			S	APP		
	From DEH closure line to Croatan Sound													
30-20-8b	SA;HQW	178.5	S Acres	ND				ND			I	PRO	Fecal Coliform Bacteria	
	From Roanoke Sound to DEH closure line													

Table 5 Pasquotank Subbasin 03-01-51

AU Number	Classification	Length/Area		Aquatic Life Assessment				Recreation Assessment			Shellfish Harvesting		Stressors	Sources
				AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	SH Rating	GA		
Description														
Doughs Creek														
30-21-3-2	SC;HQW	21.2	S Acres	ND					S	N86	NCE			
From source to Shallowbag Bay														
Hog I Creek														
30-20-9	SA;HQW	15.4	S Acres	ND					ND			S	APP	
Entire Creek														
Intracoastal Waterway (Pungo River-Alligator River Canal)														
30-16-12	SC;Sw	8.8	S Miles	S	MA12	NCE	Turbidity	9.6	S	MA12	NCE		Turbidity	Unknown
From Currituck-Fairfield Township line to Alligator River														
Johns Creek														
30-21-5	SA;HQW	10.7	S Acres	ND					ND			I	PRO	Fecal Coliform Bacteria
From source to Roanoke Sound														
Long Wretch Creek														
30-20-10	SA;HQW	1.7	S Acres	ND					ND			S	APP	
From source to Croatan Sound														
Mill Landing Creek (Mill Creek)														
30-21-8	SC	29.8	S Acres	ND					S	N67	NCE			
From source to Roanoke Sound														
Oyster Creek														
30-21-9	SA;HQW	84.2	S Acres	ND					ND			S	APP	
Entire Creek														
Oyster Creek (Croatan Sound)														
30-20-6	SA;HQW	62.8	S Acres	ND					ND			I	PRO	Fecal Coliform Bacteria
From source to Croatan Sound														
Pamlico Sound														
30-22j	SA;HQW	18,083.5	S Acres	ND					ND			S	APP	
Portion of Pamlico Sound (from Croatan and Roanoke Sounds to a line running from Sandy Point south of Stumpy Point Bay to the northeast tip of Ocracoke Island) in subbasin 03-01-51.														

Table 5 Pasquotank Subbasin 03-01-51

AU Number	Classification	Length/Area	Aquatic Life Assessment				Recreation Assessment			Shellfish Harvesting		Stressors	Sources
			AL Rating	Station	Result	Year/ Parameter % Exc	REC Rating	Station	Result	SH Rating	GA		
Spencer Creek													
30-20-3	SA;HQW	86.8 S Acres	ND					ND			I	PRO	Fecal Coliform Bacteria
From source to Croatan Sound													H-2

Use Categories:	Monitoring data type:	Results:	Use Support Ratings 2006:
AL - Aquatic Life	MF - Fish Community Survey	E - Excellent	S - Supporting, I - Impaired
REC - Recreation	MB - Benthic Community Survey	G - Good	NR - Not Rated
SH - Shellfish Harvesting	MA - Ambient Monitoring Site	GF - Good-Fair	NR*- Not Rated for Recreation (screening criteria exceeded)
	ML- Lake Monitoring	F - Fair	ND-No Data Collected to make assessment
	N- DEH RECMON	P - Poor	NR+-Not rated because draft criteria used for rating
		NI - Not Impaired	Results
GA - DEH SS Classification and Growing Area		S- Severe Stress	CE-Criteria Exceeded > 10% and more than 10 samples
APP- Approved		M-Moderate Stress	NCE-No Criteria Exceeded
CAO- Conditionally Approved-Open		N- Natural	Miles/Acres
CAC- Conditionally Approved-Closed			FW - Fresh Water
PRO- Prohibited			S- Salt Water

Aquatic Life Rating Summary			Recreation Rating Summary			Fish Consumption Rating Summary			Shellfish Harvesting Rating Summary		
S	m	8.8 S Miles	S	m	8.8 S Miles	I	m	106,724.7 S Acres	S	m	52,547.2 S Acres
S	m	106,724.7 S Acres	S	m	131,806.2 S Acres	I	e	9.9 S Miles	I	m	2,081.5 S Acres
NR	e	534.1 S Acres	ND		1.1 S Miles	I	e	126,031.2 S Acres			
ND		1.1 S Miles	ND		100,949.7 S Acres	I	e	497.2 FW Miles			
ND		125,497.0 S Acres	ND		497.2 FW Miles	I	e	4,980.6 FW Acres			
ND		497.2 FW Miles	ND		4,980.6 FW Acres						
ND		4,980.6 FW Acres									

A map including the locations of the NPDES facilities and water quality monitoring stations is presented in Figure 4. Table 5 contains a summary of assessment unit numbers (AU#) and lengths, streams monitored, monitoring data types, locations and results, along with use support ratings for waters in the subbasin. Appendix V provides definitions of the terms used throughout this basin plan.

No benthic samples were collected during this assessment period (2000 – 2005); however, data was collected from three ambient monitoring stations (MA3, MA5 and MA12). No water quality standards were exceeded.

Many of the waters in subbasin 03-01-51 are classified for shellfish harvesting (Class SA). Many also have the supplemental classification of High Quality Waters (HQW) or Outstanding Resource Waters (ORW). Several management strategies are in place to protect these waters.

Waters in the following sections and in Table 5 are identified by an assessment unit number (AU#). This number is used to track defined segments in the water quality assessment database, list 303(d) Impaired waters, and to identify waters throughout the basin plan. The AU# is a subset of the DWQ index number (classification identification number). A letter attached to the end of the AU# indicates that the assessment is smaller than the DWQ index segment. No letter indicates that the AU# and the DWQ index segment are the same.

2.2 Use Support Assessment Summary

All surface waters in the state are assigned a classification appropriate to the best-intended use of that water. Waters are regularly assessed by DWQ to determine how well they are meeting their best-intended use. Table 6 provides a summary of use support for waters in subbasin 03-01-51.

In subbasin 03-01-51, use support was assigned for aquatic life, recreation, fish consumption and shellfish harvesting categories. Waters are Supporting, Impaired, Not Rated, and No Data in the aquatic life and recreation categories on a monitored or evaluated basis. All waters are Impaired in the fish consumption category on an evaluated basis based on fish consumption advice issued by the Department of Health and Human Services (DHHS). There are no water supply watersheds designated in this subbasin.

Criteria for making use support determinations for the shellfish harvesting category were based on Division of Environmental Health (DEH) Sanitary Surveys (SS) growing area classifications. The problem parameter for all shellfish waters is the potential for fecal coliform water quality standard exceedances. Differences in acreage estimates between basin cycles are not just related to changes in water quality; they are also due to changes in acreage are related to more refined methods of estimating acreages, changes in growing area classifications, extension of closure areas as a result of additional boat slips, and changes in use support methodology.

For more information about use support determinations, refer to Appendix II or the *Supplemental Guide to North Carolina's Basinwide Planning: Support Document for Basinwide Water Quality Plans* found at DWQ's website <http://h2o.enr.state.nc.us/basinwide/SupplementalGuide.htm>.

Table 6 Summary of Use Support Ratings by Category in Subbasin 03-01-51

Use Support Rating	Aquatic Life		Recreation		Shellfish Harvesting	
	Freshwater	Saltwater	Freshwater	Saltwater	Freshwater	Saltwater
Monitored Waters						
Supporting	0	8.8 mi 106,724.7 ac	0	8.8 mi 131,806.2 ac	0	52,547.2 ac
Impaired*	0	0	0	0	0	2,081.5 ac (3.8%)
Total	0	8.8 mi 106,724.7 ac	0	8.8 mi 131,806.2 ac	0	54,628.7 ac
Unmonitored Waters						
Not Rated	0	534.1 ac	0	0	0	0
No Data	497.2 mi 4,980.6 ac	1.1 mi 125,497 ac	497.2 mi 4,980.6 ac	1.1 mi 100,949.7 ac	0	0
Total	497.2 mi 4,980.6 ac	1.1 mi 126,031.1 ac	497.2 mi 4,980.6 ac	1.1 mi 100,949.7 ac	0	0
Totals						
All Waters	497.2 mi 4,980.6 ac	9.9 mi 232,756 ac	497.2 mi 4,980.6 ac	9.9 mi 232,756 ac	0	54,628.7 ac

* The noted percent Impaired is the percent of monitored miles/acres only.

2.3 Status and Recommendations of Previously and Newly Impaired Waters

The following waters were either identified as Impaired in the previous basin plan (2002) or are newly Impaired based on recent data. If previously identified as Impaired, the water will either remain on the state’s 303(d) list or will be delisted based on recent data showing water quality improvements. If the water is newly Impaired, it will likely be placed on the 2008 303(d) list. The current status and recommendations for addressing these waters are presented below, and each is identified by an assessment unit number (AU#). Information regarding 303(d) listing and reporting methodology is presented in Chapter 15.

For more information about use support determinations for the Impaired Class SA waters presented in Table 7 below, refer to Appendix II or the *Supplemental Guide to North Carolina’s Basinwide Planning: Support Document for Basinwide Water Quality Plans* found at DWQ’s website <http://h2o.enr.state.nc.us/basinwide/SupplementalGuide.htm>. Refer to Figure 4 for a map of subbasin 03-01-51.

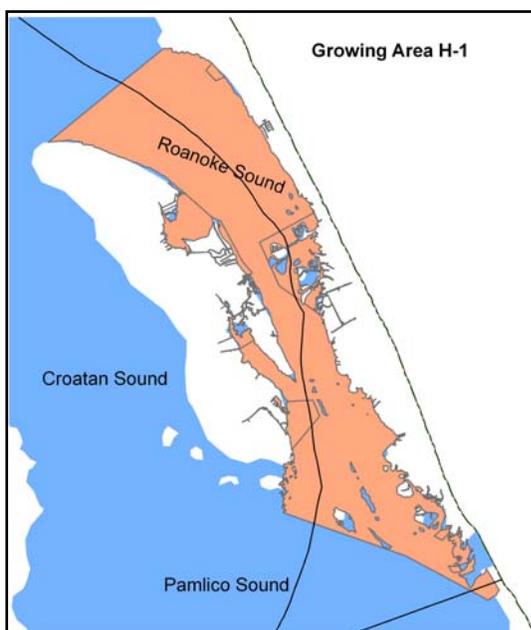
Table 7 Summary of DEH Growing Areas H-1, H-2 and I-2 Classifications in Subbasin 03-01-51

Class SA Waters	Assessment Unit #	Growing Area Classification	DEH Growing Area
Broad Creek	30-21-7a	PRO	H-1
	30-21-7b	APP	
Johns Creek	30-21-5	PRO	H-1
Pond Island	30-21-4a	PRO	H-1
Roanoke Sound	30-21a	APP	H-1, I-2
	30-21b	PRO	
	30-21c	PRO	
	30-21d	PRO	
Rockhall Creek	30-21-6	PRO	H-1

Sand Beach Creek	30-21-5-1	PRO	H-1
Baum Creek	30-20-5	PRO	H-2
Callaghan Creek	30-20-4	PRO	H-2
Croatan Sound	30-20-(2)a	APP	H-2, I-2
	30-20-(2)b	PRO	
	30-20-(2)c	PRO	
	30-20-(2)d	PRO	
	30-20-(2)e	PRO	
	30-20-(2)f	PRO	
Cut Through	30-20-8a	APP	H-2
	30-20-8b	PRO	
Oyster Creek (Croatan Sound)	30-20-6	PRO	H-2
Spencer Creek	30-20-3	PRO	H-2

PRO=Prohibited, CAC=Conditionally Approved Closed, CAO=Conditionally Approved Open

2.3.1 West Shore Roanoke Sound Growing Area H-1



The following DWQ Class SA waters and the Impaired assessment units associated with these waters are located within Growing Area H-1. If the entire Class SA water is located within more than one growing area it is noted in Table 7 or refer to the basinwide Growing Area map in the Executive Summary.

According to the *Sanitary Survey of Roanoke Sound, Area H-1* (DEH Shellfish Sanitation & Recreational Water Quality Section, October 2002 and August 2006), little change in bacteriological water quality has occurred since the last review in 2002; however, some water quality improvements have resulted in opening of shellfish waters. Area H-1 includes waters of the Roanoke Sound, Shallowbag Bay, Broad Creek, and Mill Creek. Roanoke Sound is bordered on the east by the Outer Banks and on the

west by Roanoke Island. H-1 is located in Dare County, which is undergoing rapid population growth with large influxes in seasonal populations. Manteo population is estimated at approximately 1,100 permanent residents and with a seasonal peak population of approximately 3,500 people (CAMA LUP-Town of Manteo, 2007). However, much of the survey area in area H-1 is uninhabited marshland. Wildlife and waterfowl are abundant in the marshland areas of this growing area.

Notable activities on Roanoke Island include new housing developments and the construction of wetlands. This area has had significant flooding with heavy rainfall events affecting low-lying areas and flooding septic systems. The growing Pirate's Cove subdivision also hosts the largest marina in the area with 181 boat slips. The survey reports all violations noted from previous surveys have been corrected. The Manteo Municipal WWTP is the only WWTP in H-1 that discharges to the sound. The discharge location is approximately 3,400 feet offshore in Shallowbag Bay. The WWTP has a history of exceeding its permit limits for fecal coliform, petroleum, and ammonia levels in its effluent.

As a result of the DEH 2006 survey report, approximately 45 acres around Manteo have been reclassified from Prohibited to Approved for shellfish harvesting and an additional 240 acres are classified as Approved in the Wanchese area. However, approximately 34 acres are Prohibited east of Wanchese Harbor due to development and observed pollution in runoff waters.

Broad Creek [AU# 30-21-7a]

Broad Creek (126 acres) is Impaired for shellfish harvesting. Broad Creek is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacteria levels. Broad Creek will remain on the state's 303(d) list of Impaired waters.

The marina along Broad Creek is limited to 29 boats with no boats over 24' in length. Runoff from boat maintenance and from the parking lot of the marina drains to Broad Creek and eventually to waters east of Wanchese Harbor. Constructed wetlands have recently been completed in the mouth of Broad Creek and were observed to be hosting an abundant waterfowl population with associated accumulated fecal matter. Further downstream (AU# 30-21-7b), 392 acres are classified as approved and supporting shellfish harvesting

Johns Creek [AU# 30-21-5]

Johns Creek (10.7 acres) is Impaired for shellfish harvesting. Johns Creek is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacterial levels. Johns Creek will remain on the state's 303(d) list of Impaired waters.

Pond Island [AU# 30-21-4a]

Pond Island (165.1 acres) is Impaired for shellfish harvesting. Pond Island is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacterial levels. Pond Island will remain on the state's 303(d) list of Impaired waters.

Roanoke Sound [AU# 30-21b, 30-21c and 30-21d]

Portions of the Roanoke Sound (590.8 acres) is Impaired for shellfish harvesting. Roanoke Sound is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacterial levels. Roanoke Sound will remain on the state's 303(d) list of Impaired waters. An additional 9,134.1 acres are classified as approved and supporting shellfish harvesting in area I-2.

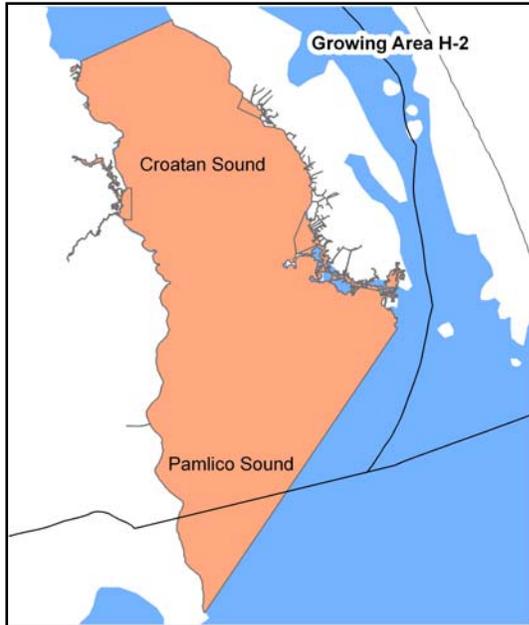
Rockhall Creek [AU# 30-21-6]

Rockhall Creek (5.7 acres) is Impaired for shellfish harvesting. Rockhall Creek is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacterial levels. Rockhall Creek will remain on the state's 303(d) list of Impaired waters.

Sand Beach Creek [AU# 30-21-5-1]

Sand Beach Creek (38.7 acres) is Impaired for shellfish harvesting. Sand Beach Creek is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacterial levels. Sand Beach Creek will remain on the state's 303(d) list of Impaired waters.

2.3.2 Croatan Sound Growing Area H-2



The following DWQ Class SA waters and the Impaired assessment units associated with these waters are located within Growing Area H-2. If the entire Class SA water is located within more than one growing area it is noted in Table 7 or refer to the basinwide Growing Area map in the Executive Summary.

According to the *Sanitary Survey of Croatan Sound, Area H-2 (DEH Shellfish Sanitation & Recreational Water Quality Section, December 2005)*, water quality remains good. The largest water quality issues are along the backside of Roanoke Island, near Manteo and Wanchese with high bacteria counts. Oyster production is limited to areas surrounding Wanchese and no clams are produced there. Area H-2 is bordered by Roanoke Island in the east and the mainland village of Manns Harbor to the west. The

permanent population is estimated at approximately 2,000 people, but drastically increases during the summer months.

Development is scattered throughout much of the area. In North Manteo, 100+ lots have been created, Sunnyside Subdivision in Manteo has extended to make room for an additional 30 units and several new residential units have been built in Skyco. With the exception of the houses connected to the Manteo WWTP, all the residences utilize onsite septic systems and seven violations were noted during the sanitary survey. Of these violations, one house had a crushed septic system with drainage to the sound and pipes from four mobile homes were disconnected and were found to be discharging directly onto the ground within 20 feet of the marsh.

Other possible water quality pollution sources include landfills, wildlife, and increased impervious surface runoff. Dredge material from Shallowbag Bay in area H-1 was deposited in a 30-acre site in area H-2. Several drainage ditches connect possible runoff from Dare County's demolition landfill to the sound. An illegal dumpsite was discovered in Manteo consisting of boats, appliances and other trash. Possible chemical pollutants may come from the NCDOT Marine Maintenance Facility located on Spencer Creek.

Baum Creek [AU# 30-20-5]

Baum Creek (10.9 acres) is Impaired for shellfish harvesting. Baum Creek is classified by DEH SS as prohibited in growing area H-2 due to potential fecal coliform bacterial levels. Baum Creek will remain on the state's 303(d) list of Impaired waters.

Callaghan Creek [AU# 30-20-4]

2002 Status

To evaluate the impact of a fire treatment berm at a Dare County landfill in 1998, DWQ monitored chemicals (metals), toxicity and benthic macroinvertebrates. One station failed

toxicity tests and metals were extremely high (i.e., silver, selenium, copper, zinc, arsenic, aluminum, lead, manganese and iron). Biologists noted some impacts to the benthic communities nearest the landfill. DWQ recommended that a follow-up study be conducted on Callaghan Creek. It was also recommended that DWQ regional office staff work with landfill managers to generate appropriate disposal options.

Current Status

Callaghan Creek (24.8 acres) is Impaired for shellfish harvesting. Callaghan Creek is classified by DEH SS as prohibited in growing area H-2 due to potential fecal coliform bacterial levels. Callaghan Creek will remain on the state's 303(d) list of Impaired waters.

DWQ sampled unnamed tributaries to Callaghan Creek and Billys Creek in October 2000 to assess the long-term impacts from the 1998 landfill fire. The sample sites were all channelized drainage ditches without bends or pools. Use of a non-standard sampling methodology precluded assignment of bioclassifications to these sites; however, this method collected enough taxa to make between site comparisons of the invertebrate communities. All sites had dissolved oxygen levels below 4.0 mg/l and no flow conditions existed. Substrate consisted of detritus-mud mixture. Macroinvertebrate communities at all sites in this study were very pollution tolerant. The sample site near the landfill showed a biotic community still impacted from the landfill fire; however, several taxa rarely found in DWQ collections were also found during the study (DWQ ESS, December 2000).

Croatan Sound [AU# 30-20-(2)b, 30-20-(2)c, 30-20-(2)d, 30-20-(2)e and 30-20-(2)f]

Croatan Sound (580.3 acres) is Impaired for shellfish harvesting. Croatan Sound is classified by DEH SS as prohibited in growing area H-2 due to potential fecal coliform bacterial levels. Croatan Sound will remain on the state's 303(d) list of Impaired waters.

Cut Through [AU# 30-20-8b]

Cut Through (178.5 acres) is Impaired for shellfish harvesting. Cut Through is classified by DEH SS as prohibited in growing area H-2 due to potential fecal coliform bacterial levels. Cut Through will remain on the state's 303(d) list of Impaired waters. An additional 128.6 acres are classified as approved and supporting shellfish harvesting in area H-2.

Oyster Creek [AU# 30-20-6]

Oyster Creek (62.8 acres) is Impaired for shellfish harvesting. Oyster Creek is classified by DEH SS as prohibited in growing area H-2 due to potential fecal coliform bacterial levels. Oyster Creek will remain on the state's 303(d) list of Impaired waters.

Spencer Creek [AU# 30-20-3]

Spencer Creek (86.8 acres) is Impaired for shellfish harvesting. Spencer Creek is classified by DEH SS as prohibited in growing area H-2 due to potential fecal coliform bacterial levels. Spencer Creek will remain on the state's 303(d) list of Impaired waters.

2.4 Status and Recommendations for Waters with Noted Impacts

The surface waters discussed in this section are not Impaired. However, notable water quality problems and concerns were documented for these waters during this assessment. Attention and resources should be focused on these waters to prevent additional degradation and facilitate water quality improvements. DWQ will notify local agencies of these water quality concerns and work with them to conduct further assessments and to locate sources of water quality protection funding. Additionally, education on local water quality issues and voluntary actions are useful tools to prevent water quality problems and to promote restoration efforts. The current status and recommendations for addressing these waters are presented below, and each is identified by an AU#. Nonpoint source program agency contacts are listed in Appendix IV.

2.4.1 Shallowbag Bay [AU#30-21-3]

Shallowbag Bay (534.1 acres) is Not Rated on an evaluated basis in the aquatic life category due to significant noncompliance issues with biochemical oxygen demand (BOD) and ammonia permit limits at the Manteo WWTP (Permit NC0079057). Manteo's WWTP is permitted to discharge 0.6 MGD and it has a phased NPDES permit under which it can expand to 1 MGD by obtaining an Authorization to Construct from DWQ. Many of the effluent violations with Manteo WWTP were results of mechanical malfunctions. In 2005 and 2006, there were two Notice of Violations issued against MWWTP and 9 Permit Enforcement penalties issued against the plant. In 2005, the Town of Manteo received a grant from the North Carolina Clean Water Management Trust Fund (CWMTF) to develop a feasibility study of nutrient removal options for wastewater discharged to Shallowbag Bay. The 2007 Manteo Land Use Plan states water quality conditions in Shallowbag Bay are concerns and recommends actions to improve their WWTP and reduce pollutants from stormwater runoff and marinas to improve water quality. BMPS are needed to reduce runoff from highly impervious areas of historic downtown Manteo to reduce stormwater runoff into Shallowbag Bay (CAMA LUP- Town of Manteo, 2007). The Town of Manteo prepared a stormwater management plan in 2000 with intentions to augment its zoning ordinance with stormwater management requirements. The 2005 Zoning Ordinance requires the runoff generated by new development to not exceed the predevelopment site volume for the first 1.5" and it shall be retained on the site. Residential and historic sites are exempt from this ordinance.

Shallowbag Bay is also monitored by the Division of Environmental Health (DEH) Recreational Monitoring Program (RECMON). Based on DEH monitoring data, the bay is Supporting in the recreation category.

2.5 Additional Water Quality Issues within Subbasin 03-01-51

The previous sections discussed water quality concerns for specific stream segments. The following 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.

The increase in impervious surfaces throughout the basin contributes to the growing water quality issues associated with stormwater runoff. An increase in the numbers of slips at marinas is a concern to water quality because of the limited number of marina facilities with pump out

capabilities. Establishing marinas that meet Clean Marina standards is essential to protect public health and water quality.

According to the *Sanitary Survey of Albemarle and Currituck Sounds, Areas I-1, I-3 through I-16* (DEH Shellfish Sanitation & Recreational Water Quality Section, December 2005), there has been little change in water quality since the last survey. The only shellfish found in this area is *Rangia* clams. No commercial shellfish harvesting occurs. Freshwater runoff is the most significant factor affecting water quality in this region and can be associated with agricultural runoff or natural runoff from swampwaters following heavy rains.

Area I-4 consists mainly of forest and swamps surrounding the Alligator River. Logging is the main industry in this region. There are some farming operations on the western side of the river. The eastern side of the river is part of the Alligator River National Wildlife Refuge.

According to the *Sanitary Survey of Eastern Albemarle Sound, Area I-2* (DEH Shellfish Sanitation Unit, June 2005), water quality has improved with a few exceptions. The only shellfish present in this area is *Rangia* clams. The estimated population of this area is 11,000 people, which is a 50 percent increase since the last survey. With the influx of tourists the population more than triples. There are 15 subdivisions, many of which are located along closed waters.

