Chapter 7
Pasquotank River Subbasin 03-01-56
Including: Roanoke Sound and small portion of Albemarle and Currituck Sound

7.1 Subbasin Overview

Subbasin 03-01-56 at a Glance

Land and Water Area

Total area:	109 mi²
Land area:	37 mi²
Water area:	72 mi²

Land Cover (percent)

Surface Water:	70%
Forest/Wetland:	22%
Urban:	7%
Cultivated Crop:	<1%
Pasture/ Managed Herbaceous:	2%

Counties
Dare

Municipalities
Kill Devil Hills, Nags Head, Kitty Hawk, Southern Shores

Monitored Waterbody Statistics

Recreation:

Total:	134.9 mi/22,216.2 ac
Supporting:	134.5 mi/22,211.5 ac
Impaired:	0.5 mi/4.7 ac

Shellfish Harvesting:

Total:	21,045.2 ac
Supporting:	19,258.3 ac
Impaired:	1,786.9 ac

This subbasin includes the Outer Banks from the northern portion of Dare County south to Oregon Inlet. It also includes portions of Currituck Sound, Albemarle Sound and Roanoke Sound. Ecologically, it is within the Carolinian Barrier Islands and Coastal Marshes ecoregions. Land cover generally consists of beaches, marshes, forested wetlands and evergreen forests with scattered urbanized areas, wildlife habitat and recreational areas. Several public lands and significant natural heritage areas can be found in this subbasin, including Jockey's Ridge State Park, Nags Head Woods Preserve, Run Hill State Natural Area, Wright Brothers National Memorial and Kitty Hawk Woods Coastal Reserve.

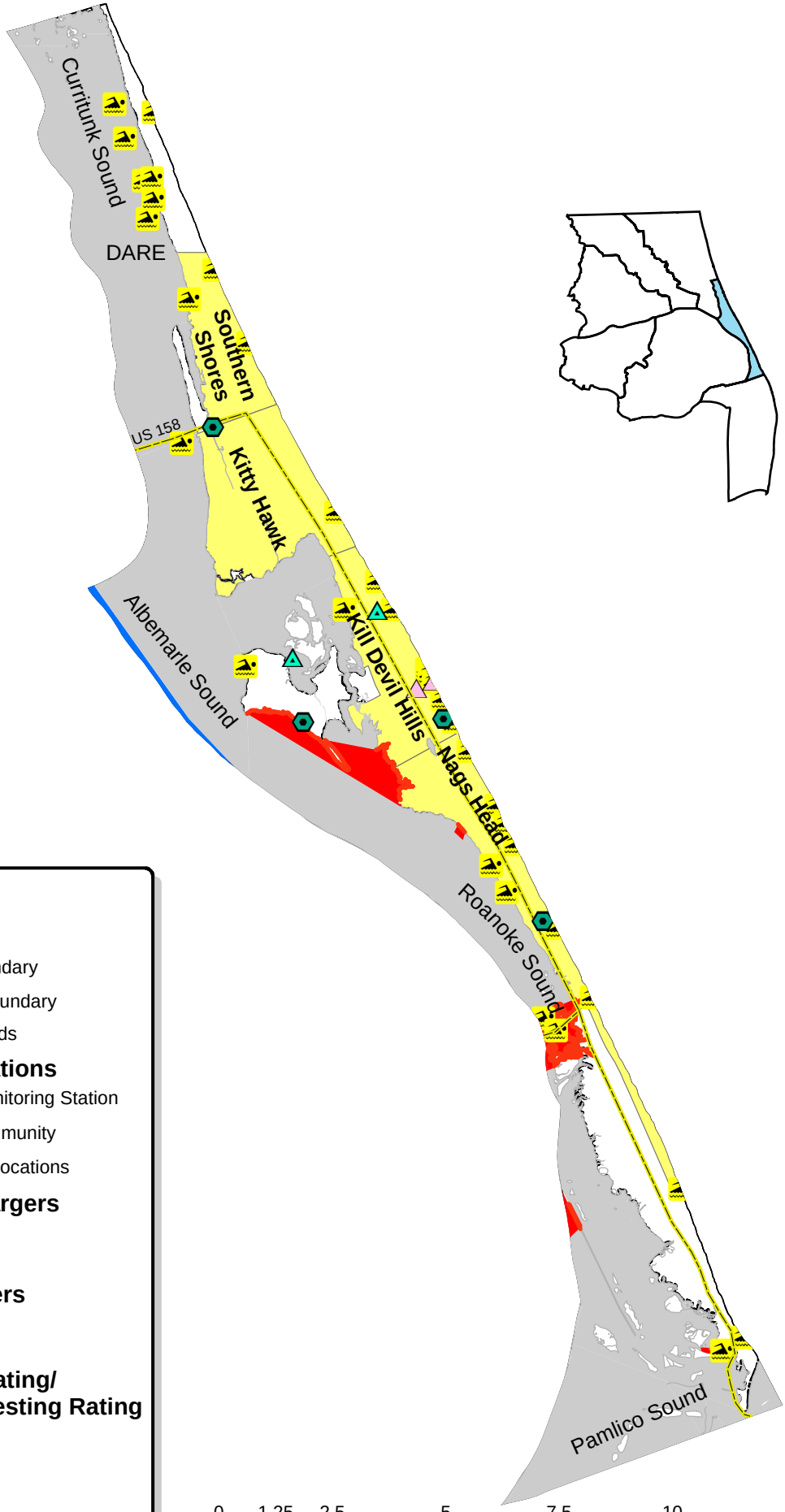
Portions of Currituck and Dare Counties are in this subbasin. The Outer Banks have experienced rapid population growth and development with the Towns of Kill Devil Hills and Nags Head experiencing growth estimated at an increase of 39 and 47 percent by 2020, respectively. Refer to Chapter 11 for more information about population growth and trends.

Water quality in areas with growing populations would benefit from individual or community implementation of backyard wetlands, rain gardens, bioretention areas, conversion of impervious surfaces, use of cisterns, streambank protection and restoration.

The Kill Devil Hills Reverse Osmosis (RO) Water Treatment Plant (WTP) holds the only National Pollutant Discharge Elimination System (NPDES) minor permit in the subbasin with a permitted discharge of 0.03 MGD. The permit specifies that the facility monitor whole effluent toxicity (WET). During the last two years of the assessment period, WET tests show that the facility has failed to meet its 90 percent acute toxicity target effluent concentration on three occasions for both outfalls (outfall 001 and outfall 002). More information can be found in Section 7.4.1. There are six non-discharge permits and two stormwater discharge permits in this subbasin. For the listing of NPDES permit holders, refer to Appendix III.

A map including the locations of the NPDES facilities and water quality monitoring stations is presented in Figure 9. Table 18 contains a summary of assessment unit numbers (AU#) and

Figure 9 Pasquotank River Subbasin 03-01-56



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

Planning Section
Basinwide Planning Unit
January 8, 2007

Table 18 Pasquotank Subbasin 03-01-56

AU Number	Classification	Length/Area		Aquatic Life Assessment					Recreation Assessment			Shellfish Harvesting			
Description				AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	SH Rating	GA	Stressors	Sources
ALBEMARLE SOUND															
30f1	SB	7,713.5	S Acres	ND					**S**	N9A	NCE			Fecal Coliform Bacteria	Marina
Portion of Albemarle Sound in subbasin 03-01-56. 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															
30f2	SB	0.1	S Acres	ND					**I**	N91	CE			Fecal Coliform Bacteria	Marina
Colington Harbor swimming beach														Enterrococcus	Unknown

Table 18 Pasquotank Subbasin 03-01-56

AU Number	Classification	Length/Area	Aquatic Life Assessment					Recreation Assessment			Shellfish Harvesting			
Description			AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	SH Rating	GA	Stressors	Sources
Atlantic Ocean														
99-(7)a	SB	110.1 Coast Miles	ND					**S**	N1	NCE				
									N12	NCE				
									N12A	NCE				
									N12B	NCE				
									N14	NCE				
									N14A	NCE				
									N15	NCE				
									N16A	NCE				
									N17	NCE				
									N17A	NCE				
									N18	NCE				
									N1A	NCE				
									N2	NCE				
									N23	NCE				
									N25	NCE				
									N26	NCE				
									N26B	NCE				
									N27	NCE				
									N29B	NCE				
									N3	NCE				
									N30	NCE				
									N32	NCE				
									N34	NCE				
									N37	NCE				
									N4	NCE				
									N40	NCE				
									N5A	NCE				
									N7	NCE				
									N7A	NCE				
									N85A	NCE				
									N19	NCE				

The waters of the Atlantic Ocean contiguous to that portion of Pasquotank River Basin that extends from the North Carolina-Virginia State Line to the northeast tip of Ocracoke Island

Table 18 Pasquotank Subbasin 03-01-56

AU Number	Classification	Length/Area	Aquatic Life Assessment					Recreation Assessment			Shellfish Harvesting			
Description			AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	SH Rating	GA	Stressors	Sources
99-(7)b	SB	0.5 Coast Miles	ND					I	N22	CE			Enterrococcus	Unknown
Coastline 0.25 miles north and south of RECMON station N22 near Old Oregon Rd and NC12														
99-(7)c	SB	0.5 Coast Miles	NR					S	N85	NCE			Toxic Impacts	WWTP NPDES
Coastline 0.25 miles north and south of NC0070157														
Blossie Creek														
30-21-12	SA;HQW	33.3 S Acres	ND					ND			S	APP		
Entire Creek												H-1		
Colington Creek														
30-19-1a	SC	758.1 S Acres	ND					S	N13A	NCE			Fecal Coliform Bacteria	Marina
From Kill Devil Hills Bridge north to Kitty Hawk Bay														
30-19-1b	SC	0.4 S Acres	ND					I	N13	CE			Fecal Coliform Bacteria	Marina
Wildlife Ramp on Bayview Dr.													Enterrococcus	
													Enterrococcus	Unknown
Fresh Water Lake at Kill Devil Hills														
30-23	WS-III;CA	23.8 FW Miles	ND					S	N16	NCE				
Entire Lake														
Georges Creek														
30-21-10	SA;HQW	3.0 S Acres	ND					ND			S	APP		
From source to Roanoke Sound												H-1		
Lighthouse Bay														
30-21-11	SA;HQW	19.3 S Acres	ND					ND			S	APP		
Entire Bay												H-1		
Pamlico Sound														
30-22i	SA;HQW	5,150.1 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 03-01-56												H-6		

Table 18 Pasquotank Subbasin 03-01-56

AU Number	Classification	Length/Area		Aquatic Life Assessment					Recreation Assessment			Shellfish Harvesting			
Description				AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	SH Rating	GA	Stressors	Sources
Pond Island															
30-21-4b	SA;HQW	40.3	S Acres	ND					**S**	N20A	NCE	**I**	PRO	Fecal Coliform Bacteria	
The waters surrounding the Island within 1,000 feet from shore within subbasin 03-01-56													H-1		
Roanoke Sound															
30-21e1	SA;HQW	14,052.7	S Acres	ND					**S**	N24	NCE	**S**	APP		
										N88A	NCE				
Those waters in 03-01-56 in the eastern portion of Roanoke Sound, from a line running from Northwest Point on Roanoke Island northward to Rhodoms Point on Colington Island, thence a line running eastward through Wright Memorial Monument, to a line running													I-2		
30-21e2	SA;HQW	4.2	S Acres	ND					**I**	N88	CE			Enterrococcus	Stormwater Runoff
Jockey's Ridge Soundside Access															
30-21f	SA;HQW	1,177.4	S Acres	**NR**					ND			**I**	PRO	Total Suspended Solids	WWTP NPDES
DEH closed area northeast of a line from Rhodams Point to Mann Point including Buzzard bay														Fecal Coliform Bacteria	WWTP NPDES
														Fecal Coliform Bacteria	Marina
													I-2		
30-21g	SA;HQW	26.3	S Acres	**NR**					ND			**I**	PRO	Low Dissolved Oxygen	WWTP NPDES
The waters of Roanoke sound which include those waters around the Villa Condominium STP Outfall beginning at a point 35 degrees 57' 54" N- 75 degrees 38' 46" W, thence 200 yards in a southwesterly direction to a point in the sound at 35 degrees 57' 48" N-														Fecal Coliform Bacteria	
													H-1		
30-21h	SA;HQW	405.0	S Acres	ND					**S**	N21B	NCE	**I**	PRO	Fecal Coliform Bacteria	WWTP NPDES
DEH closed area east of Pond Island adjacent ot HWY 264 bridge													H-1		
30-21i	SA;HQW	100.7	S Acres	ND					ND			**I**	PRO	Fecal Coliform Bacteria	
DEH closed area adjacent to Mill Landing in subbasin 03-01-56													H-1		
30-21j	SA;HQW	37.1	S Acres	ND					ND			**I**	PRO	Fecal Coliform Bacteria	
DEH closed area in southern portion of Roanoke Sound adjacent to Big Tim Island													H-1		

Table 18 Pasquotank Subbasin 03-01-56

AU Number	Classification	Length/Area	Aquatic Life Assessment					Recreation Assessment			Shellfish Harvesting			
Description			AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	SH Rating	GA	Stressors	Sources

Use Categories:
AL - Aquatic Life
REC - Recreation
SH - Shellfish Harvesting

Monitoring data type:
MF - Fish Community Survey
MB - Benthic Community Survey
MA - Ambient Monitoring Site
ML- Lake Monitoring
N- DEH RECMON

GA - DEH SS Classification and Growing Area
APP- Approved
CAO- Conditionally Approved-Open
CAC- Conditionally Approved-Closed
PRO- Prohibited

Results:
E - Excellent
G - Good
GF - Good-Fair
F - Fair
P - Poor
NI - Not Impaired
S- Severe Stress
M-Moderate Stress
N- Natural

Use Support Ratings 2006:
S - Supporting, I - Impaired
NR - Not Rated
NR*- Not Rated for Recreation (screening criteria exceeded)
ND-No Data Collected to make assessment
NR+-Not rated because draft criteria used for rating

Results
CE-Criteria Exceeded > 10% and more than 10 samples
NCE-No Criteria Exceeded

Miles/Acres
FW- Fresh Water
S- Salt Water

Aquatic Life Rating Summary

NR	e	1,203.7	S Acres
NR	e	0.5	Coast Mile
ND		28,466.3	S Acres
ND		23.8	FW Miles
ND		110.6	Coast Mile

Recreation Rating Summary

S	m	22,969.7	S Acres
I	m	4.7	S Acres
S	m	23.8	FW Miles
S	m	110.6	Coast Mile
I	m	0.5	Coast Mile
ND		6,695.6	S Acres

Fish Consumption Rating Summary

I	e	29,670.0	S Acres
I	e	23.8	FW Miles
I	e	111.1	Coast Mile

Shellfish Harvesting Rating Summary

S	m	19,258.3	S Acres
I	m	1,786.9	S Acres

lengths, streams monitored, monitoring data types, locations and results, along with use support ratings for waters in the subbasin.

Many of the waters in subbasin 03-01-56 are classified for shellfish harvesting (Class SA). Many are also classified as High Quality Waters (HQW) or Outstanding Resource Waters (ORW). Several management strategies are in place to protect these waters.

Neither benthic samples nor ambient stations are located in this subbasin; however, there are several recreational monitoring stations (RECMON) located throughout the subbasin. These stations are evaluated by the NC Division of Environmental Health (DEH). Long-term trends in water quality cannot be assessed in this subbasin. Refer to the *2006 Pasquotank River Basinwide Assessment Report* http://h2o.enr.state.nc.us/esb/Basinwide/PASQUOTANK2006Final.pdf and Appendix I for more information on monitoring.

Waters in the following sections and in Table 18 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 is used 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.

7.2 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 19 provides a summary of use support for waters in subbasin 03-01-56.

In subbasin 03-01-56, use support was assigned for aquatic life, recreation, fish consumption and shellfish harvesting. 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 standards exceedances. Differences in acreage estimates between basin cycles are not just related to changes in water quality. 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 to 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. Appendix V provides definitions of the terms used throughout this basin plan.

Table 19 Summary of Use Support Ratings by Category in Subbasin 03-01-56

Use Support Rating	Aquatic Life		Recreation		Shellfish Harvesting	
	Freshwater	Saltwater	Freshwater	Saltwater	Freshwater	Saltwater
Monitored Waters						
Supporting	0	0	23.8 mi	110.6 mi 22,969.7 ac	0	19,258.3 ac
Impaired*	0	0	0	0.5 mi 4.7 ac (0.02%)	0	1,786.9 ac (8.5%)
Total	**0**	**0**	**23.8 mi**	**111.1 mi 22,974.4 ac**	**0**	**21,045.2 ac**
Unmonitored Waters						
Not Rated	0	0.5 mi 1,203.7 ac	0	0	0	0
No Data	23.8 mi	110.6 mi 28,466.3 ac	0	6,695.6 ac	0	0
Total	**23.8 mi**	**111.1 mi 28,771.4 ac**	**0**	**6,695.6 ac**	**0**	**0**
Totals						
All Waters	**23.8 mi**	**111.1 mi 28,771.8 ac**	**23.8 mi**	**111.1 mi 29,670 ac**	**0**	**21,045.2 ac**

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

7.3 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 AU#. Information regarding 303(d) listing and reporting methodology is presented in Chapter 15.

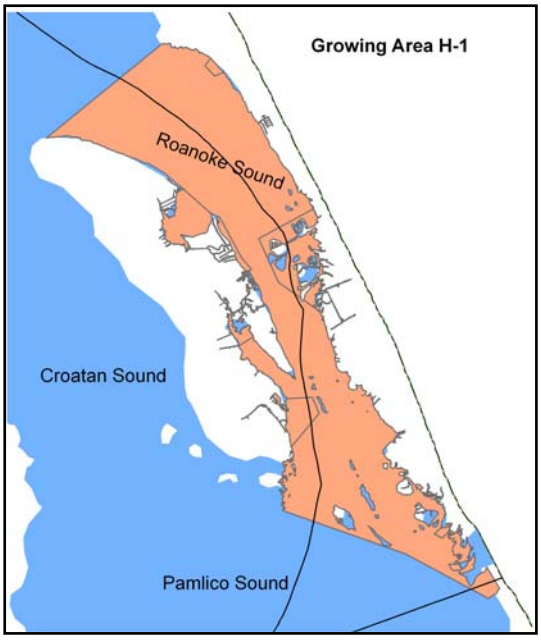
For more information about use support determinations for the Impaired Class SA waters presented in Table 20 below, refer to Appendix II or the *Supplemental Guide to North Carolina's Basinwide Planning: Support Document for Basinwide Water Quality Plans* found at DWQ's website http://h2o.enr.state.nc.us/basinwide/SupplementalGuide.htm. Refer to Figure 9 for a map of subbasin 03-01-56.

Table 20 Summary of DEH Growing Areas H-1, I-2 Classifications in Subbasin 03-01-56

Class SA Waters	Assessment Unit #	Growing Area Classification	DEH Growing Area
Pond Island	30-21-4b	PRO	H-1
Roanoke Sound	30-21e1 30-21e2 30-21f 30-21g 30-21h 30-21i 30-21j	APP APP PRO PRO PRO PRO PRO	H-1, I-2

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

7.3.1 Eastern Shore of 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 20 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 changes in water quality were detected. 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, undergoing rapid population growth and large influxes in seasonal populations. Nags Head has an estimated permanent population of 3,200 with an increase to over 60,000 during summer months.

Nags Head area continues to have significant construction of seasonal residences and retail businesses adding to impervious surface cover. Much of the construction ties into the municipal wastewater treatment system with land application disposal or package plants with low-pressure pipe drain fields for final effluent disposal. One of the two septic systems operated by the US National Park Service was found to be failing during the 2006 survey.

As a result of the 2002 survey an additional 10 acres of shellfishing waters were closed at the canals of Old Nags Head Cove.

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

Pond Island (40.3 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 bacteria levels. Pond Island will remain on the state's 303(d) list of Impaired waters.

Roanoke Sound (Jockey's Ridge Soundside) [AU# 30-21e2]

Roanoke Sound at Jockey's Ridge State Park (4.2 acres) is Impaired in the recreation category based on RECMON exceedences at site N88 for enterococci bacteria. The sampling location is near the storm drain just south of Jockey's Ridge. This section of the Roanoke Sound will be added to the state's 303(d) list of Impaired recreational waters.

Roanoke Sound [AU# 30-21g]

2002 Status
DEH posted a swimming advisory for a portion of the Roanoke Sound centered around the discharge associated with the Villas Association, Inc. The Villas is a residential/resort

community in the Town of Nags Head. The advisory was posted in 1998. In 2002, the Villas Association received a non-discharge permit to eliminate the direct discharge to Roanoke Sound. The facility is now utilizing a land application method for its treated wastewater.

Current Status
Roanoke Sound (26.3 acres) is Impaired for shellfish harvesting. This section of the sound is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacteria levels. This section of the Roanoke Sound will be remain on the state's 303(d) list of Impaired waters for shellfish harvesting.

This segment of the Roanoke Sound [AU# 30-21g] is Not Rated for recreation due to concerns with the previous WWTP discharges and will remain on the 303(d) list until further bacterial assessment is completed. No RECOM samples were collected in this section of the Roanoke Sound. The RECMON sampling location closest to the Villas is near the storm drain just south of Jockey's Ridge. DEH has had 35 advisory days at this location since the 2004 swimming season.

Roanoke Sound [AU# 30-21h, 30-21i and 30-21j]

Current Status
These segments of the Roanoke Sound (542.8 acres) are Impaired for shellfish harvesting. This portion of the Roanoke Sound is classified by DEH SS as prohibited in growing area H-1 due to potential fecal coliform bacteria levels. Roanoke Sound will remain on the state's 303(d) list of Impaired waters.

7.3.2 Eastern Shore of Roanoke Sound Growing Area I-2

The following DWQ Class SA waters and the Impaired assessment units associated with these waters are located within Growing Area I-2. If the entire Class SA water is located within more than one growing area it is noted in Table 20 or refer to the basinwide Growing Area map in the Executive Summary.

According to the ***Sanitary Survey of Eastern Albemarle Sound, Area* I-2** (*DEH Shellfish Sanitation & Recreational Water Quality Section*, 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 in this area more than triples. There are 15 subdivisions, many of which are located along waters closed for shellfish harvesting.

Roanoke Sound (Buzzard Bay) [AU# 30-21f]

Roanoke Sound (1,177.4 acres) is Impaired for shellfish harvesting. This impaired section runs from Rhodams Point to Mann Point and includes Buzzard Bay. It is classified by DEH SS as prohibited in growing area I-2 due to potential fecal coliform bacteria levels. This section of the Roanoke Sound will remain on the state's 303(d) list of Impaired waters.

7.3.3 Previously or Currently Impaired Freshwater and Non-Shellfish Harvesting Waters

Albemarle Sound [AU# 30f2]

The Colington Harbor Swimming Beach in the Albemarle Sound (0.1 acres) is Impaired in the recreation category based on recreational monitoring (RECMON) exceedances at site N91. This section of Albemarle Sound will be added to the state's 303(d) list of Impaired recreational waters.

Atlantic Ocean [AU# 99-(7)b]

This 0.5 mile of coast line is Impaired in the recreation category based on RECMON exceedences at site N22. This section of the Atlantic coastline will be added to the state's 303(d) list of Impaired recreational waters.

Colington Creek [AU# 30-19-1b]

Colington Creek (0.4 acres) is Impaired in the recreation category based on recreational monitoring (RECMON) exceedances at site N13. During the assessment period extreme elevated bacteria counts were detected. Shore birds and other waterfowl are abundant in this area. The predominant southwest winds lead to limited flushing rates and often the waters become stagnant adjacent to the shoreline. Also, a dock was being built at the end of Dock Street, which was the location of the sampling site. During construction, sediments that include bacteria were being re-suspended in the water column by the pumping of pilings and the use of heavy equipment. This sampling station (N13) has now been dropped and replaced with a station (N13a) about 200 yards offshore.

7.4 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.

7.4.1 Atlantic Ocean [AU# 99-(7)c]

The Dare County Reverse Osmosis (RO) WTP (Permit NC0070157) for Kill Devil Hills discharges to an unnamed tributary that reaches this 0.5-mile section of the Atlantic coastline. The permit specifies that the facility monitor whole effluent toxicity (WET). During the last two years of the assessment period, WET tests show that the facility has failed to meet its 90 percent acute toxicity target effluent concentration on three occasions for both outfalls (outfall 001 and outfall 002). DWQ regional office staff report that outfall 001 is currently in compliance per the

permit; however, outfall 002 is showing high levels of chlorine. DWQ staff is working with the facility to ensure that both outfalls are in compliance per permit limits.

7.5 Additional Water Quality Issues within Subbasin 03-01-56

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.

Several pump stations contribute to the Kill Devil Hills WWTP non-discharge system (Permit WQ0002829), which have been non-compliant because of maintenance issues. Improved operational management and the possible consolidation of ownership of the pump stations would make inspections easier and maintenance issues could possibly be resolved. The facility is also expanding from 300,000 GPD to 500,000 GPD.

Town of Nags Head

In the fall of 2000, the Town of Nags Head implemented the Septic Health Initiative to improve management of septic systems and to reduce a potential source of microbes. This initiative includes four major programs including a public education program, septic tank inspection and pumping, water quality monitoring and the development of a long term decentralized wastewater management plan. This voluntary program is designed to encourage homeowners to have their septic systems inspected and pumped on a regular basis by providing refunds for inspection costs and utility credits for septic pumping. A homeowner low interest loan program also promotes the replacement of failing systems. The development of a decentralized wastewater management plan is Nags Head's long-term strategy in protecting water quality while allowing the continued use of on-site wastewater systems. (http://www.townofnagshead.net)