Chapter 2 -
Pasquotank River Subbasin 03-01-51
Includes the Alligator River, Croatan Sound and a portion of Albemarle Sound Watershed

2.1 Water Quality Overview

Subbasin 03-01-51 at a Glance

Land and Water

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

Population Statistics

1990 Est. pop.:	9,240 people
Pop. density:	16 persons / mi^2

Land Cover (%)

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

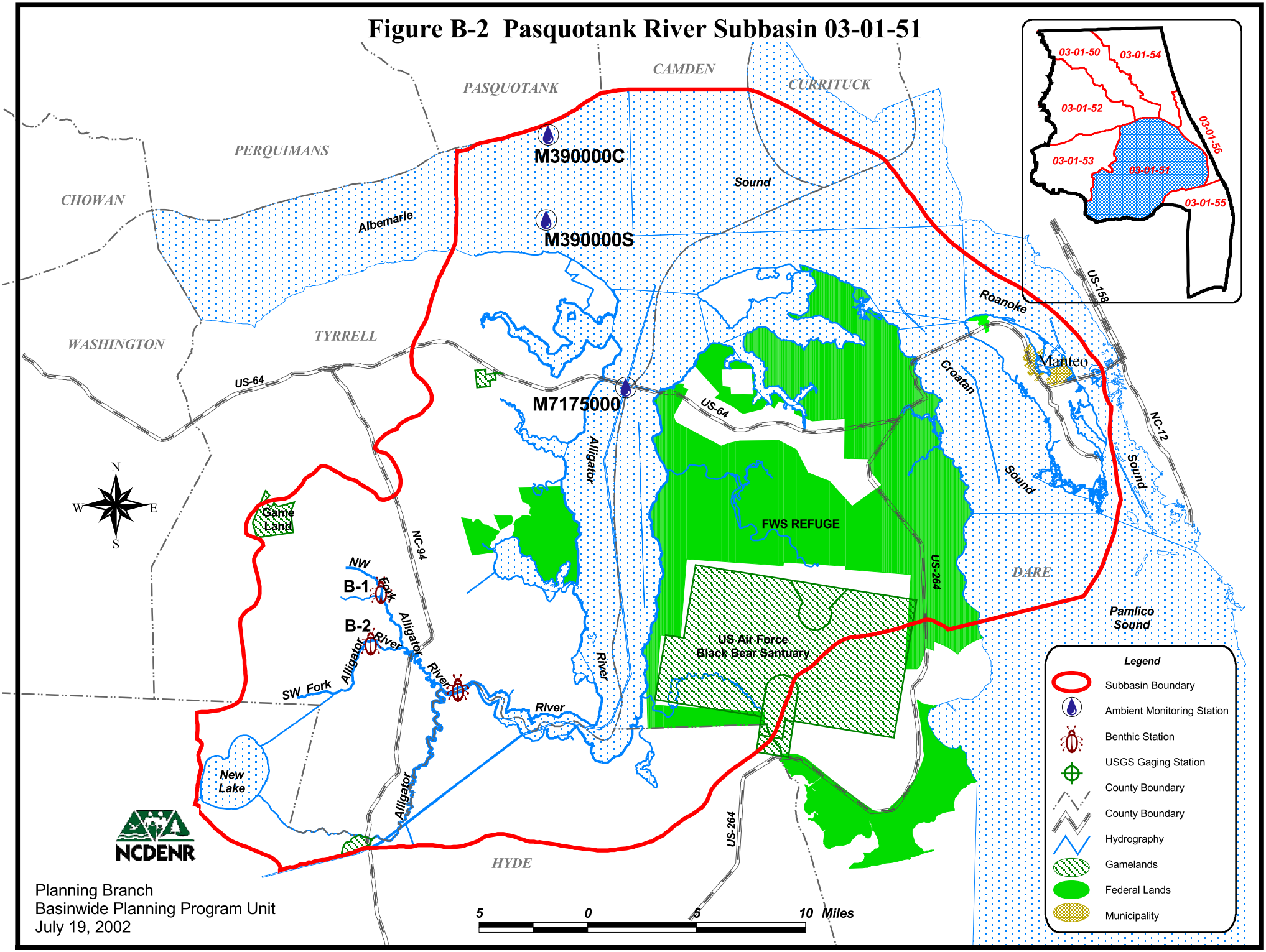
This subbasin consists of the Alligator River and its tributaries, Alligator (New) Lake, part of Albemarle Sound, Croatan Sound, Roanoke Island, and part of Roanoke Sound in Dare, Tyrrell and Hyde counties. Most waters in this subbasin are brackish estuarine, including Albemarle, Croatan and Roanoke Sounds, and the Alligator River to the Intracoastal Waterway (ICWW). A map of this subbasin including water quality sampling locations is presented as Figure B-2.

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. Two tributaries to Shallowbag Bay (upper Scarboro Creek and Doughs Creek) are classified as High Quality Waters based on their designations by the Marine Fisheries Commission as primary nursery areas.

DWQ conducted benthic macroinvertebrate, phytoplankton and ambient sampling in this subbasin. Biological ratings for these sample locations are presented in Table B-3. Table B-4 summarizes use support ratings in subbasin 03-01-51. Refer to Appendix III for a complete listing of monitored waters and for more information on use support ratings.

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. Roanoke Island, with the towns of Manteo and Wanchese, is the most developed area in this subbasin. This subbasin contains the lowest population density (16 persons/square mile) in the entire Pasquotank River basin. The basinwide average is 46 persons/square mile.

Figure B-2 Pasquotank River Subbasin 03-01-51



Planning Branch
Basinwide Planning Program Unit
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Table B-3 DWQ Monitoring Locations and Benthic Macroinvertebrate Bioclassifications (2000) for Pasquotank River Subbasin 03-01-51

Site	Stream	County	Location	Bioclassification
Benthic Macroinvertebrates				
Freshwater, Swamp				
B-1	NW Fork Alligator River	Tyrrell	Canoe Trail Mile 4	Not Rated
B-2	SW Fork Alligator River	Tyrrell	Canoe Trail Mile 2	Not Rated
Ambient Monitoring				***Problem Parameters***
M7175000	Alligator River	Tyrrell	at US 64 near Alligator	pH
M390000C	Albemarle Sound	Tyrrell	near Frog Island mid channel	None observed
M390000S	Albemarle Sound	Tyrrell	near Frog Island south shore	None observed

* Refer to Section A, Part 3.3 for more information on fish community and benthic macroinvertebrate bioclassifications.

Table B-4 Use Support Ratings Summary (2000) for Monitored and Evaluated[2] Freshwater Streams (Miles) in Pasquotank River Subbasin 03-01-51

Use Support Category	FS	PS	NS	NR	Total[1]
Aquatic Life/ Secondary Recreation[2]	124,679.0 estuarine ac	0	0	70.0 mi 5,747.4 fresh ac 109,828.1 estuarine ac	70.0 mi 5747.4 fresh ac 234,507.1 estuarine ac
Primary Recreation	149,130.1 estuarine ac	0	0	13,004.7 estuarine ac	162,134.8 estuarine ac
Shellfish Harvest	52,791.3 estuarine ac		1,959.3 estuarine ac	0	54,750.6 estuarine ac

[1] 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.

[2] These waters are impaired because of a regional fish consumption advisory. Refer to Section A, Part 4.3 for further information.

There are six permitted dischargers in the subbasin. The Town of Manteo's Wastewater Treatment Plant is the only major discharge, which discharges into Shallowbag Bay. The Manteo plant is the only facility required to perform whole effluent toxicity testing in the subbasin. Before 2000, the plant met their permit limit or met a target monitoring value, and it only failed to meet its permit limit or target value three times. In 2000, the facility had no toxicity testing failures. There are no permitted individual stormwater permits issued in the subbasin, but there are five general permits.

Benthos were collected at two freshwater sites and no estuarine sites within this subbasin; however, these data are not rated; and therefore, they currently offer little indication of the water quality status of the Pasquotank River basin (Table B-3). For more information, refer to Section A, Chapter 4.

Although the benthos sampling sites were not rated, the field visits relay information crucial to water quality determinations. The upper reaches of the Alligator River were found to have elevated nitrogen concentrations, low pH and low dissolved oxygen concentrations. The low pH values suggested that much of the oxygen problem was related to drainage from Hollow Ground Swamp, but possible effects from agricultural runoff around New Lake could not be ruled out. Some of the tributary streams in Dare County were sampled in 1999 and 2000, and the sampling indicated that the ditches and canals had a limited macroinvertebrate fauna, were dominated by pollution tolerant species, and displayed low DO.

The Northwest Fork of the Alligator River had a low dissolved oxygen and low pH, indicative of natural conditions. The Southwest Fork of the Alligator River had a higher conductance, less macrophytes, and more filamentous algae than the Northwest Fork, indicating a greater enrichment at this site.

During the last five years, phytoplankton monitoring has been confined to a single station in Albemarle Sound near Frog Island. A series of tropical storms in 1999 led to increased phytoplankton biovolumes in August and September. Though the total phosphorous and inorganic and organic nitrogen measurements recorded during the sampling period did not change much, the phytoplankton biovolume fluctuated at the Frog Island sampling site.

For more detailed information on sampling and assessment of streams in this subbasin, refer to the *Basinwide Assessment Report-Pasquotank River Basin* (NCDENR-DWQ, January 2002), available from DWQ Environmental Sciences Branch at http://www.esb.enr.state.ncu.us/bar.html or by calling (919) 733-9960.

2.2 Status and Recommendations for Previously Impaired Waters

The 1997 Pasquotank River Basinwide Plan identified no impaired stream segments in this subbasin.

2.3 Status and Recommendations for Newly Impaired Waters

No additional stream segments were rated as impaired in this subbasin based on recent DWQ monitoring (1995-2000). Class SA waters are discussed below in Section 2.4.

2.4 Impaired Class SA Waters

There are 54,750.6 acres of Class SA waters in this subbasin that were assessed in the shellfish harvesting use support category. In this subbasin, 1,959.3 (3.6%) are considered impaired for the shellfish harvesting use support category. Refer to Figure B-3 to identify locations of DEH SS growing areas and growing area classifications. The larger water areas in this subbasin are described below with reference to DEH SS growing areas. The problem parameter for all waters listed below is fecal coliform bacteria contamination. Refer to page 61 for recommendations to address impairment in Class SA waters.

The differences in acreage estimates between basinwide cycles are not necessarily related to changes in water quality, but to different methods of estimating acreage and changes in use support methodology. For more information on changes in use support methodology, refer to Appendix III and page 59. For a complete listing of monitored Class SA waters, refer to Appendix III.

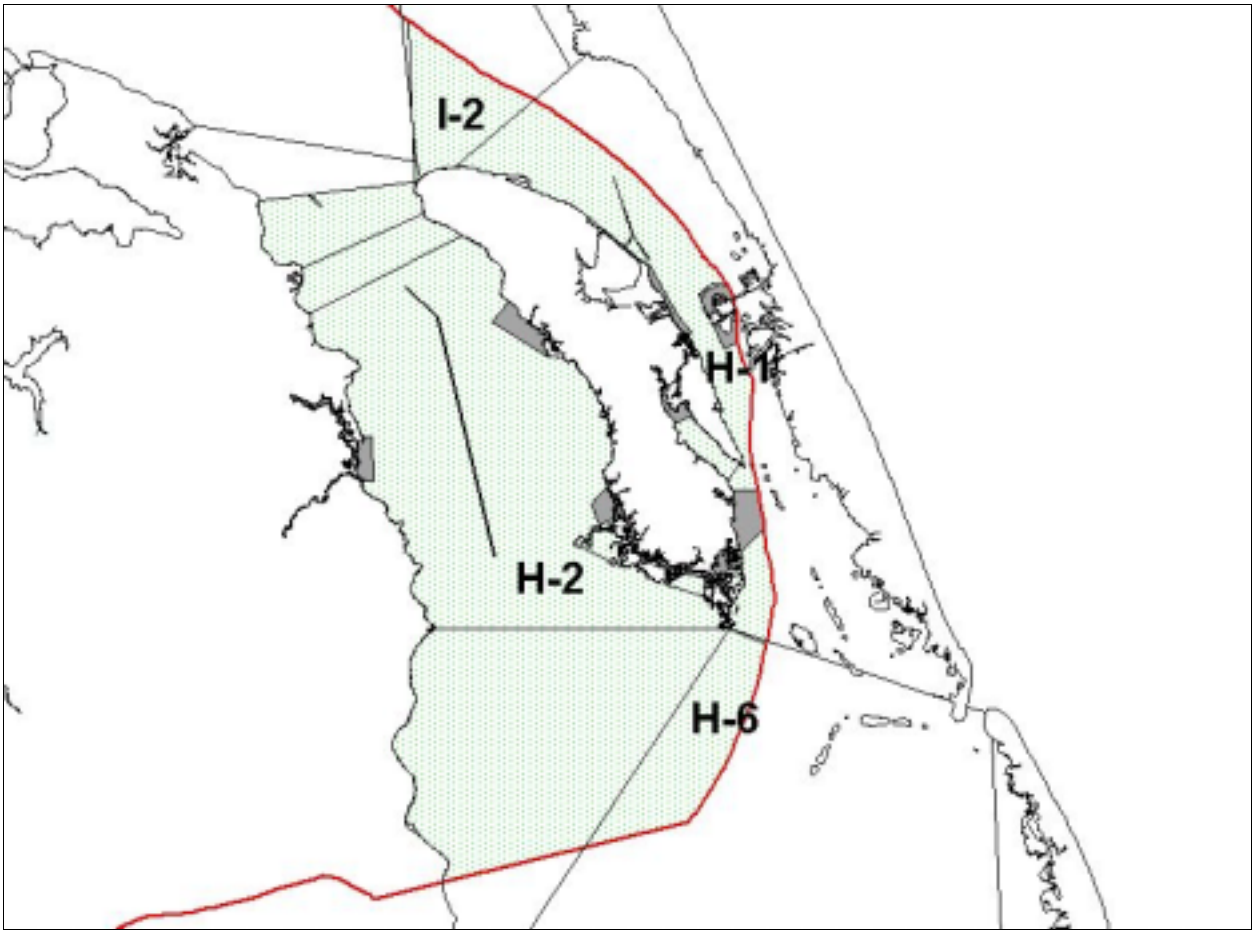

Figure B-3 DEH Shellfish Growing Area Classifications in SA Waters of Subbasin 03-01-51

West Shore of Roanoke Sound (Area H-1)

DEH Growing Area H-1 contains the waters of the Roanoke Sound. Class SA waters currently prohibited for commercial shellfish harvesting include portions of The Cut Through, Broad Creek, Roanoke Sound, Sand Beach Creek and John's Creek. Contamination sources included nonpoint source pollution from adjacent land uses. Little change in water quality occurred throughout the area between 1993-1999 (NCDENR-DEH, H1).

The Wanchese Harbor Project is permitted for discharge into Mill Creek (SC). DWQ has concerns about the potential impacts of the project on adjacent SA waters of Roanoke Sound once the facility is operational. These waters are currently prohibited to shellfish harvesting.

A proposed marina is seeking a permit near Wanchese on the eastern side of Roanoke Island in the Roanoke Sound. The facility would close 250 acres of SA waters in accordance with rule. This area is currently a commercially productive, open area with shellfish leases and potential water quality impacts could result due to the associated development. The project received a Finding of No Significant Impact (FONSI) when reviewed under the National Environmental Policy Act Environmental Assessment process.

2002 Recommendations
DWQ will review the Wanchese Harbor Project's discharge permits to include fecal coliform monitoring requirements in the SA waters at the mouth of Mill Creek. DWQ, DEH and the permittees will discuss monitoring locations, frequency and parameters. DWQ recommends that the applicant develop an Environmental Impact Statement given the closure of SA waters to commercial shellfish harvest uses.

Croatan Sound (Area H-2)

Waters currently prohibited for commercial shellfish harvesting include portions of Manns Harbor, Spencer Creek, Callaghan Creek and a couple of large areas in Croatan Sound. Contamination sources included nonpoint source pollution from adjacent land uses. Little change in water quality occurred throughout the area between 1990-1998 (NCDENR-DEH, H2).

2.5 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, these 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.

2.5.1 Shallowbag Bay

Current Status
Shallowbag Bay is currently not rated. In 1986, DWQ received a request from the Town of Manteo for reclassification of Shallowbag Bay from SC to SB waters. In 1988, the town requested that Shallowbag Bay be reclassified from Class SC to Class SA waters. In 1990, DWQ informed the Town of Manteo that a reclassification to Class SA was not possible due to the existing wastewater treatment plant discharge into the bay. The Town of Manteo completed building a new plant and dismantled the old plant several years ago. DEH Recreational Water Quality Monitoring Program has not posted closures in Shallowbag Bay. Shallowbag Bay is currently prohibited to shellfish harvesting.

Shallowbag Bay experienced a dredge spill in a tidal creek near Wanchese. The state continues to clean up the spoils. Some of the material was placed on a local beach; however, the particle size is not appropriate for the beach.

2002 Recommendations

DWQ will discuss reclassification of Shallowbag Bay from SC waters to SB waters with the Town of Manteo.

DWQ recommends that dredge spoil analysis consider the full range of particle sizes within potential spoils rather than focusing on the average particle size within the spoil. Projects designed for the average particle size of the dredge spoil can negatively impact local water quality.

2.5.2 Callaghan Creek

In December 1998, the DWQ Regional Office requested a study involving fire response efforts at the Dare County landfill located in subbasin 03-01-51. Construction materials in the landfill had caught fire and burned for several weeks in the fall of 1998, requiring a great deal of water to address the fire. The regional office was interested in determining the effects of any runoff from the fire into waters of the state. Manns Harbor Fire Department built a berm around the burning portion of the landfill, flooded it with 0.5-1 m of water, and then, pushed portions of the burning pile through the water and into a new, extinguished pile. On one or two occasions, the berm was breached to let some water out, but minimal water was thought to have escaped into the adjacent canal system. Water in this canal could possibly flow into a nearby field and around the dikes, potentially affecting Callaghan Creek.

DWQ conducted an on-site assessment and collected water samples for toxicity testing, chemical sampling and macroinvertebrate sampling. Only two of the sites tested for toxicity failed their tests: Station 1 inside the burning landfill; and the reference site, Station 8. Since these two sites had the highest salinity, it is possible that salt is a major factor causing the toxicity. However, the extremely high metal levels inside the berm were also having an impact at Station 1. These metals included Silver, Selenium, Copper, Zinc, Arsenic, Aluminum, Lead, Manganese and Iron.

Phenol and methyl phenol were the only semi-volatile compounds released by the fire. Elevated levels of most of these parameters appeared to be confined to Dare County property; however, there is a chance that continued operation of the firewater pump could spread the contaminants to a larger area. Periodic sampling may be required to verify that significant levels of metals are not leaving the property.

There are some impacts to the macroinvertebrate community by runoff from the landfill fire, but these appear to have been confined to waters nearest the landfill. Appropriate disposal options for water inside the berm need to be considered.

2002 Recommendations

In response to the special study conducted at the Dare County Landfill in December 1998, DWQ will conduct a follow-up study on Callaghan Creek to determine if the fire response effects were contained and diminished. In addition, DWQ Washington Regional Staff will work with Dare County and the Landfill Managers to generate appropriate disposal options for water inside the berm as well as a fire response plan.