New Jersey Department of Environmental Protection
Land Use Management
Water Monitoring and Standards
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Sanitary Survey

Northern Barnegat Bay (BB1)

May 1, 2006 – April 30, 2010

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New Jersey Department of Environmental Protection
Bob Martin
COMMISSIONER

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EXECUTIVE SUMMARY

The Northern Barnegat Bay is made up of the waters from Bay Head to Bay Shore, which includes the Metedeconk River and a large section of the Barnegat Bay. The sampling strategy for this area is Systematic Random Sampling. Data were analyzed from May 1, 2006 to April 30, 2010 for total coliform (TC). All 73 sampling stations in the Northern Barnegat Bay area (BB1) remain in compliance with their respective classification criteria. The water quality of the Northern Barnegat Bay fits the current shellfish growing area classification as specified by the National Shellfish Sanitation Program (NSSP) criteria. An upgrade of 503 acres, from *Prohibited* to *Special Restricted*, in the Metedeconk River is recommended in this report because of water quality levels that are consistently under NSSP criteria.

Currently, the headwaters of the Metedeconk River down past Sandy Point and Beaver Dam Creek are classified as *Prohibited*, and the remaining waters of Metedeconk River down to the Herbert Street Bridge are classified as *Special Restricted.* A portion of the waters south of the Herbert Street Bridge are classified as *Seasonal (Nov-Apr)* before the waters turn to an *Approved* section of the Barnegat Bay. Kettle Creek and Silver Bay are classified as *Special Restricted*, with buffers of *Seasonal (Nov-Apr)* waters before the waters turn to *Approved* in the Barnegat Bay. Many of the small coves along the shoreline, like Haven's Cove, and Long Island Cove are classified as *Seasonal (Nov – Apr).* However, some of the more southern coves, like Applegate Cove, Shelter Cove, and Goose Creek are classified as *Special Restricted.* The eastern portion of the Barnegat Bay from Middle Thoroughfare to the Tunney-Mathis Bridge is also classified as *Special Restricted.* Between this *Special Restricted* area on the eastern shore and the *Special Restricted* area of Goose Creek there is a section of *Seasonal (Nov-Apr)* waters. This growing area ends at the Tunney-Mathis Bridge, where the Central Barnegat Bay begins. Apart from marina buffers, the rest of the Barnegat Bay in this growing area is classified as *Approved* (see Figure 1). All lagoons are classified as *Prohibited.* There are no direct discharges into the waters of the Northern Barnegat Bay.

The upgrade is being made to a portion of the Metedeconk River (see Figure 2). The headwaters of the river will remain *Prohibited* to around Eagle Point. From just east of Eagle Point to the Herbert Street Bridge will now be a *Special Restricted* shellfish classification (see **Recommended Classification Changes** for further information) .

FIGURE 1: NORTHERN BARNEGAT BAY CLASSIFICATION

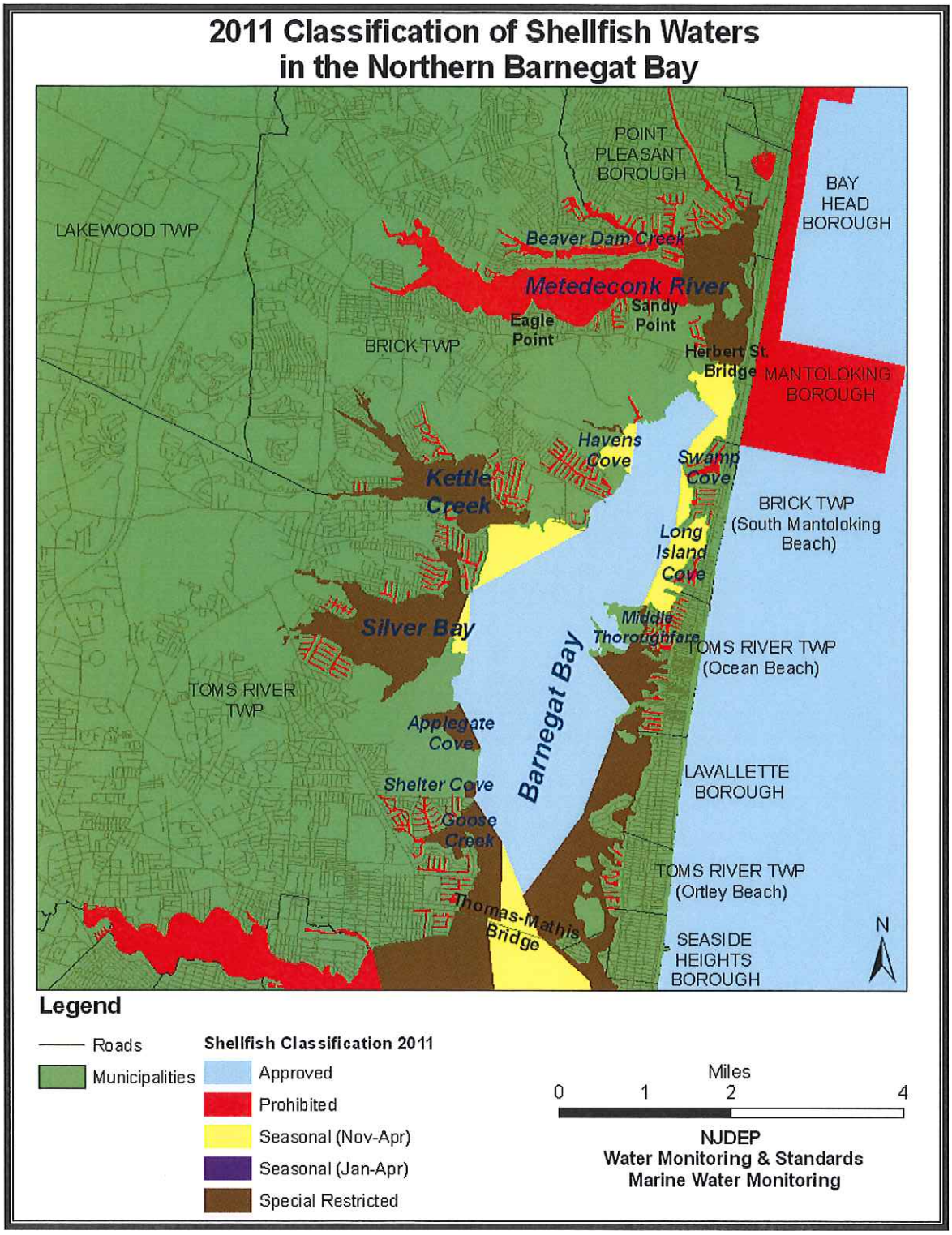
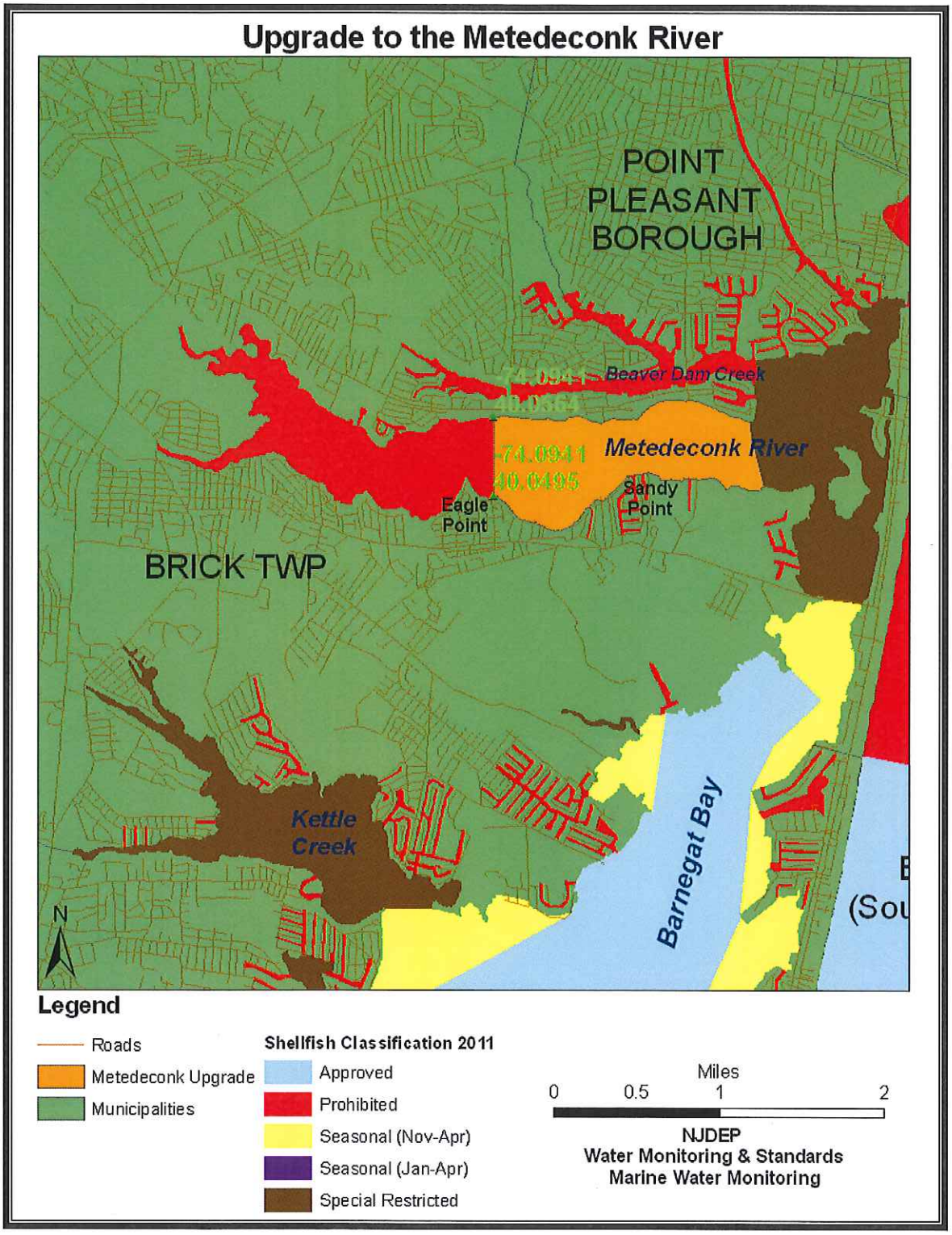


FIGURE 2: UPGRADE TO THE METEDECONK RIVER



INTRODUCTION

PURPOSE

The primary purpose of this report is to comply with the guidelines of the National Shellfish Sanitation Program (NSSP) that are established by the Interstate Shellfish Sanitation Conference (ISSC). Reports generated under this program form the basis for classifying shellfish waters for the purpose of harvesting shellfish for human consumption. As such, they provide a critical link in protecting human health.

FUNCTIONAL AUTHORITY

The authority to carry out these functions is divided between the Department of Environmental Protection (DEP), the Department of Health and Senior Services and the Department of Law and Public Safety.

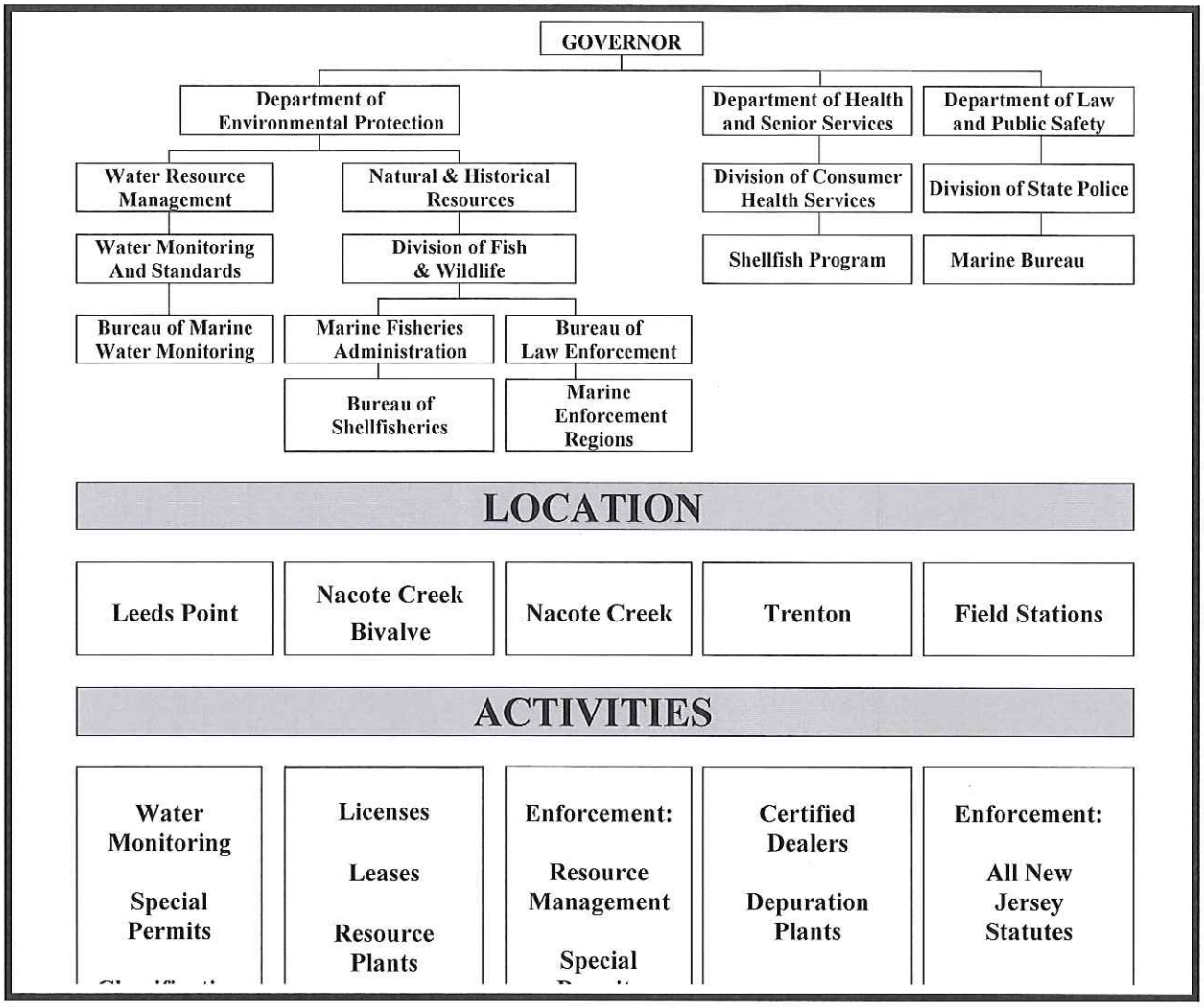
The Bureau of Shellfisheries, in the Division of Fish and Wildlife, issues harvesting licenses and leases for shellfish grounds under the Authority of N.J.S.A. 50:2 and N.J.A.C. 7:25. This Bureau, in conjunction with the Water Monitoring's Bureau of Marine Water Monitoring (BMWM), is responsible for administering and or suspension of the Hard Clam Relay Program.

The Bureau of Law Enforcement, in the DEP (Division of Fish and Wildlife), and the Division of State Police, in the Department of Law and Public Safety, enforce the provisions of the statutes and rules mentioned above.

The Department of Health and Senior Services is responsible for the certification of wholesale shellfish establishments and, in conjunction with the BMWM, administers the depuration program.

The division of authority between the three agencies can be seen in Figure 3.

FIGURE 3: STATE OF NEW JERSEY SHELLFISH AGENCIES



INTRODUCTION TO THE SANITARY CONTROL OF SHELLFISH

Emphasis is placed on the sanitary control of shellfish because of the direct relationship between pollution of shellfish growing areas and the transmission of diseases to humans. Shellfish borne infectious diseases are generally transmitted via a fecal-oral route. The pathway is complex and quite circuitous. The cycle usually begins with fecal contamination of the shellfish growing waters. Sources of such contamination are many and varied. Contamination reaches the waterways via runoff and direct discharges.

Clams, oysters and mussels pump large quantities of water through their bodies during the normal feeding process. During this process the shellfish also concentrate microorganisms, which may include pathogenic microbes, and toxic heavy metals/chemicals. It is imperative that a system is in place to reduce the human health risk of consuming shellfish from areas of contamination.

Accurate classifications of shellfish growing areas are completed through a comprehensive sanitary survey. The principal components of the sanitary survey report include:

1. An evaluation of all actual and potential sources of pollution,
2. An evaluation of the hydrography of the area and
3. An assessment of water quality. Complete intensive sanitary surveys are conducted every 12 years with interim narrative evaluations completed on a three year basis. If major changes to the shoreline or bacterial quality occur, then the intensive report is initiated prior to its 12 year schedule.

The following narrative constitutes this bureau's assessment of the above mentioned components to comply with the three year reappraisal. Additionally, a partial shoreline survey was completed for the purpose of upgrading and reclassifying a portion of the shellfish growing waters.

After assessment of the growing area, the accurate classification can be determined. The possible classifications are *Approved, Seasonal, Special Restricted*, and *Prohibited. Approved* waters can be harvested for shellfish all year round. *Seasonal* waters can be harvested for all, or part, of the winter; there is a *Seasonal (Nov-Apr)* classification and a *Seasonal (Jan-Apr)* classification. *Special Restricted* waters are approved for harvest, followed by depuration or relay, which help to cleanse bacteria from the shellfish. Depuration is a process that purifies the shellfish by pumping UV treated bacteria-free water through clam holding tanks for a minimum of 48 hours, which will, "render the depurated shellfish alive, and microbiologically acceptable within the meaning of State statutes and regulations" (N.J.A.C. Chapter 12 7:12-1.2, 12-3). Relaying means taking the market size shellfish from *Special Restricted* waters for replanting in *Approved* areas where they purge for a minimum of 30 days. Harvesting clams for either depuration or relay requires issuance of a Special Permit, acquired at the Bureau of Marine Water Monitoring; however, the relay program is temporarily suspended. No harvest is allowed in *Prohibited* waters.

If, over time, the data supports improving water quality and the results are within the requisite criteria, then an upgrade in classification can likely be made. However, if the data show values exceeding criteria, then the downgrading of that particular area is required.

According to harvesting regulations, there can be no shellfish taken from waters before sunrise or after sunset or on Sundays, except as provided in N.J.S.A. 50:2-1 (NJDEP Shellfish Growing Water Classification Charts). Only those who hold a Commercial Clam License may catch more than 150 clams a day or sell or offer the clams for sale. All hard clams harvested must be at least 1½ inches in length (NJDEP Shellfish Growing Water Classification Charts).

PROFILE OF GROWING AREA

LOCATION OF GROWING AREA

This growing area, Northern Barnegat Bay, is located in Ocean County and includes the waters of Metedeconk River and the northern section of the Barnegat Bay (see Figure 4). For the designation of shellfish growing areas, the waters of the entire Barnegat Bay are broken up into northern, central, inlet, and southern sections. This growing area is referred to as the Northern Barnegat Bay. The northern boundary is within the Point Pleasant Canal and the southern boundary is the Tunney/Mathis Bridge (see Figure 4). The last Reappraisal for this area was written with data from January 1, 2001 to June 30, 2006 and the last Sanitary Survey was completed in September 2000. This Sanitary Survery report analyzes data from May 1, 2006 to April 30, 2010.

Eight municipalities surround this growing area; Toms River Township, Brick Township, Point Pleasant Borough, Bay Head Borough, Mantoloking Borough, Berkeley Township, Lavallette Borough, and Seaside Heights Borough (see Figure 5). This area is displayed on charts #5 and #6 of the current State of New Jersey Shellfish Growing Water Classification Chart (2011).

FIGURE 4: NORTHERN BARNEGAT BAY

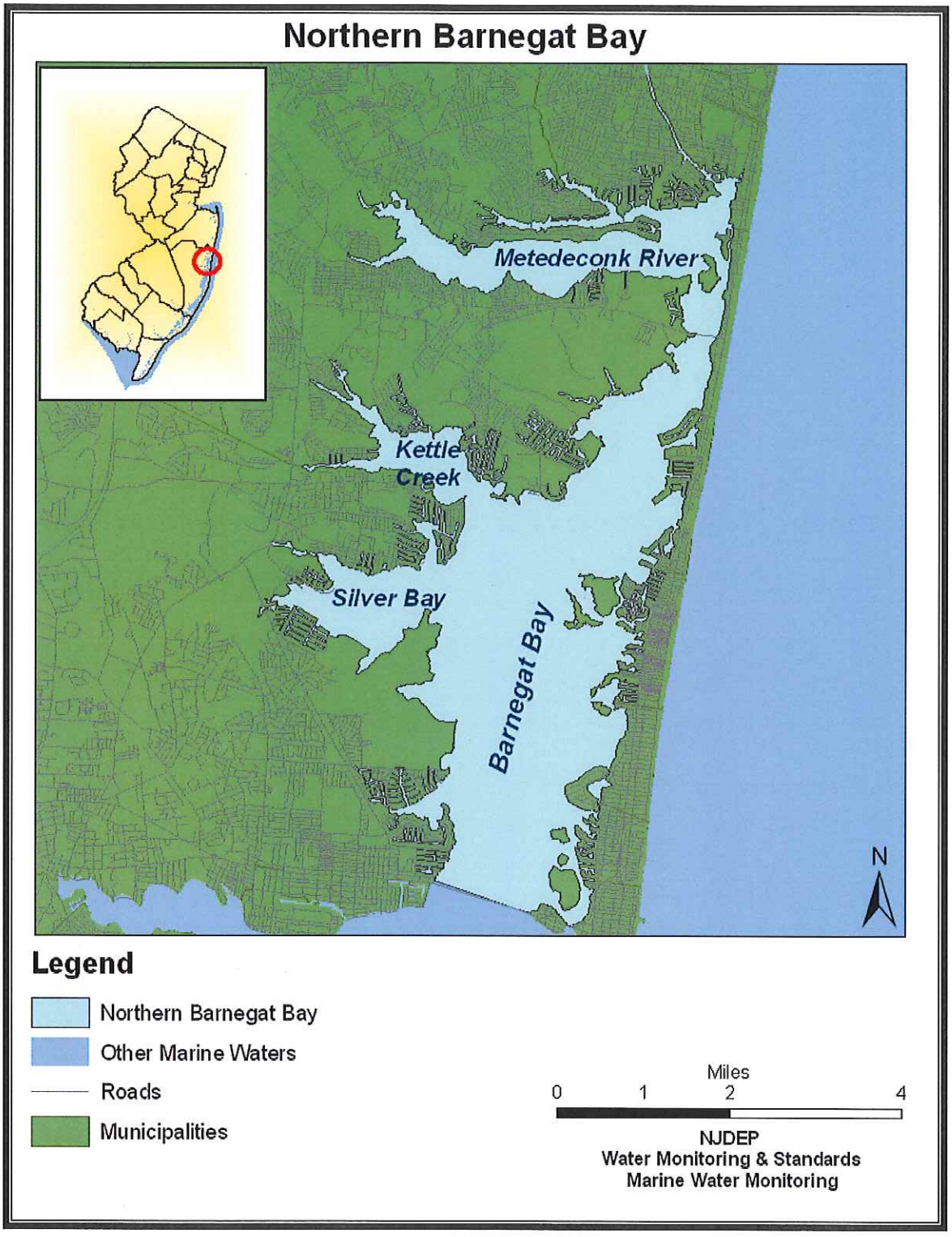
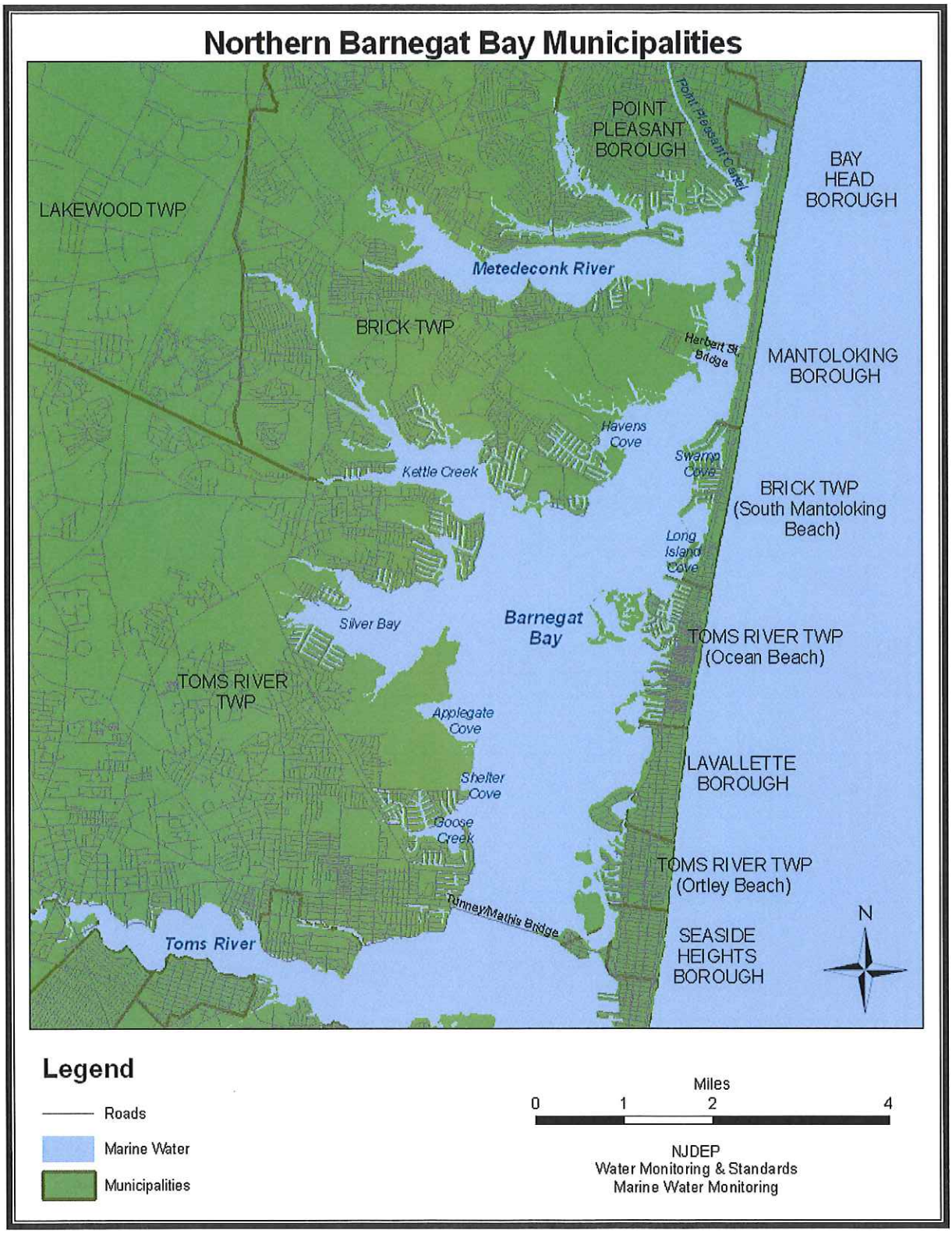


FIGURE 5: MUNICIPALITIES SURROUNDING NORTHERN BARNEGAT BAY



DESCRIPTION OF GROWING AREA

The Northern Barnegat Bay region includes the waters of Metedeconk River and a large section of Barnegat Bay.

The Barnegat Bay estuary is about 64-square miles and drains approximately 1,350-square miles (US Fish and Wildlife Service, 1997). The average depth of the estuary is 5-feet; therefore, it is considered a shallow estuary (US Fish and Wildlife Service, 1997).

Metedeconk River is a large waterway surrounded by urban areas. The inland waters of Metedeconk River are *Prohibited* for harvesting shellfish. The eastern portion of Metedeconk River is *Special Restricted.* The Metedeconk River is surrounded by urban land use and a number of marinas.

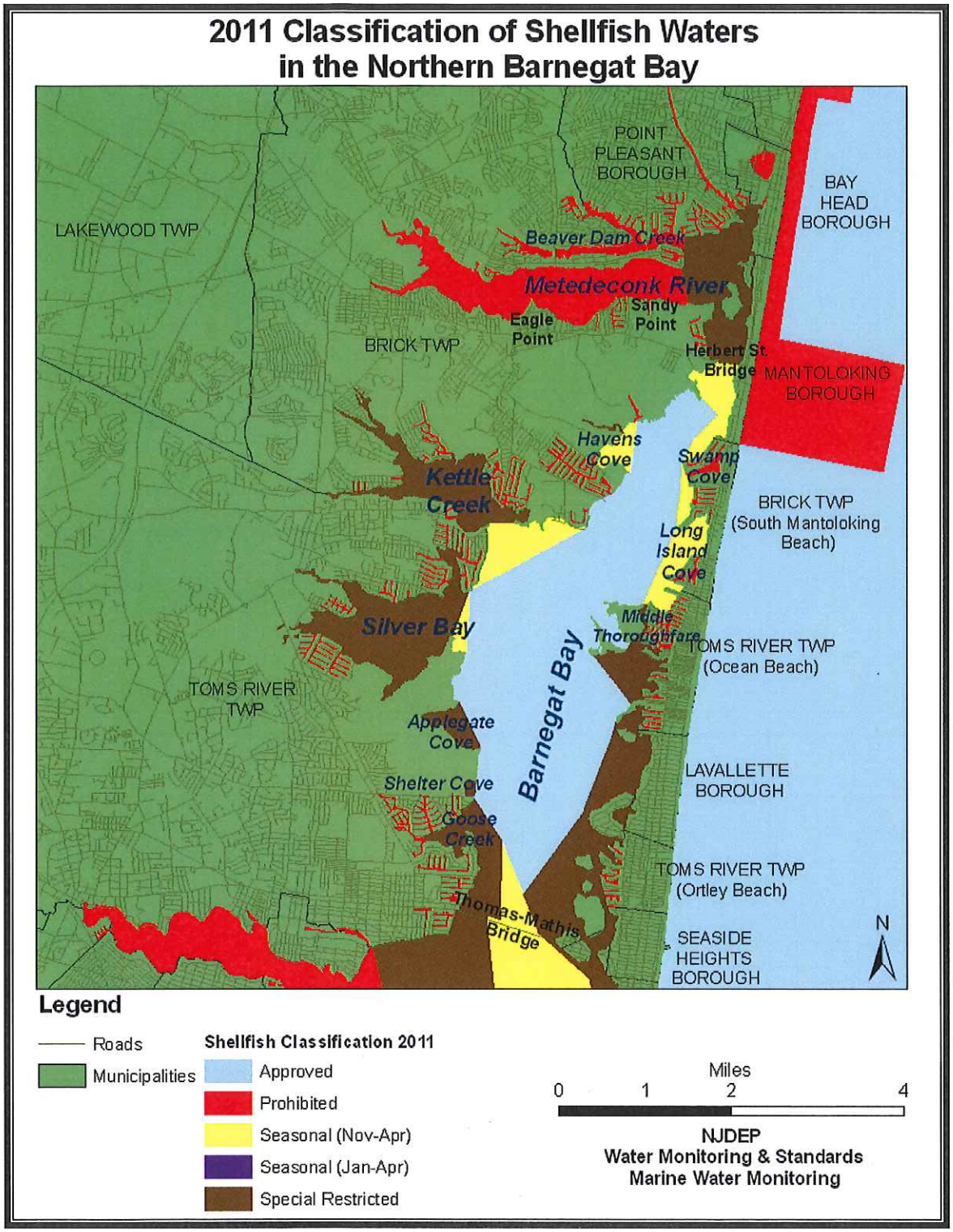
There are many small tributaries that flow into the headwaters of the Northern Barnegat Bay, which include Beaver Dam Creek, Cedar Bridge Creek, and North Branch Creek. However, Toms River, which is located just south of this growing area, is the greatest freshwater influence to the Barnegat Bay (U.S. Fish and Wildlife Service, 1997). These freshwater inputs mix with the salt water of the bay to create an estuary. The Barnegat Bay Inlet can be found just north of Barnegat Light, approximately twelve miles southeast of the Tunney-Mathis Bridge. The inlet governs the tides in Barnegat Bay and provides a tidal flush for the bay water.

Many sections along the western coastline of the Northern Barnegat Bay are wetlands. However, there are also many urban areas along the coastline, including many lagoon systems. The forest and agricultural areas typically lie further inland. The eastern coastline of the Barnegat Bay has high urban land use and endures a spike in population during the summer months. Amongst the urban areas there are many marinas, which have significant high use in the summer months due to the influx of tourists.

Although there are minimal amounts of the various shellfish species within the Northern Barnegat Bay, the most densely populated and economically productive species is *Mercenaria mercenaria* (hard clam). According to the last clam census in the 1980's done by Fish, Game, & Wildlife, there is an 'occurrence' of hard clams and very few soft clam beds in the Northern Barnegat Bay (see Figure 12, Figure 13, & Figure 14).

This Northern Barnegat Bay growing area includes about 10,935 acres of marine water. Collected samples are analyzed and determinations are made on how the shellfish waters should be classified (see Figure 6).

FIGURE 6: CURRENT CLASSIFICATION OF NORTHERN BARNEGAT BAY



HISTORY OF GROWING AREA

A provincial law, enacted in 1719, forbade gathering shellfish from May 10 to September 1 in the Barnegat Bay (Welcome to the Beautiful Barnegat Bay, 2006). In the 1780's, oysters became a chief export from Barnegat Bay. Until 1812, the Barnegat Bay had connection with the Atlantic Ocean through the Cranberry Inlet, directly opposite Toms River. (Welcome to the Beautiful Barnegat Bay, 2006). Since then, the nearest inlet has been at Barnegat Light.

Shellfish were still productive; in 1879, the bay produced 150,000 bushels of quahogs (MacKenzie, 2003). For nearly two centuries, shellfish harvesting supported a large part of the Barnegat Bay communities. It was not until the 1960's and 1970's that a sharp decline in shellfish occurred. Potential reasons for the decline in shellfish numbers include: the decline in water quality due to brown tides, the increase of predators like blue crabs, changing levels of salinity, and an over-harvest of resource (MacKenzie, 2003).

Even though there is now modest harvesting from the Northern Barnegat Bay, monitoring of the shellfish waters has continued. Over the last twenty years there have been many classification changes in the Barnegat Bay, but the most recent change to the Northern Barnegat Bay was in 2005. In the 2005 Reappraisal, a change in the shellfish water classification occurred in the vicinity of Havens Cove, where 82-acres of *Approved* waters were downgraded to a *Seasonal (Nov-Apr)* waters classification (NJDEP).

METHODS

Almost 2,400 water samples were collected between May 1, 2006 to April 30, 2010 and analyzed by the three-tube, three-dilution (at some stations four-dilutions are used, see below) standard total coliform fermentation method according to the American Public Health Association (1970, 1995). Figure 7 shows the Shellfish Growing Water Quality monitoring stations in the Northern Barnegat Bay. Seventy-three stations are monitored each year for coliform levels in the Northern Barnegat Bay.

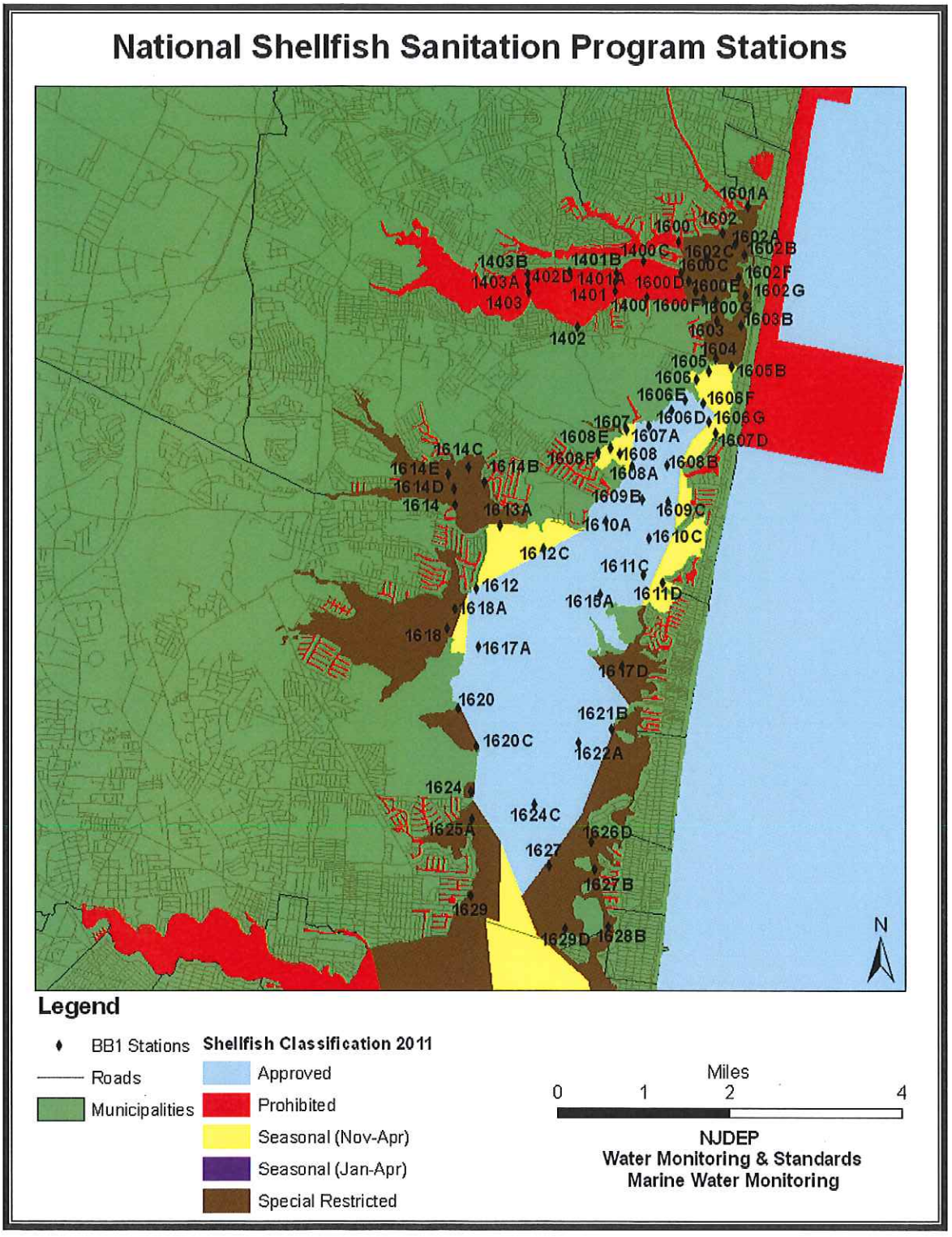
The Northern Barnegat Bay area is divided into three assignment runs, one in Metedeconk River and the remaining three in the Barnegat Bay section. An assignment run is a set grouping of sampling stations that are retrieved by an allocated boat captain in a day's time. Presently, all three assignment runs are sampled under the Systematic Random Sampling Strategy (see **Sampling Strategy** below for further information).

The upper limit of the three-dilution total coliform test is 2,400 MPN in comparison to the 24,000 MPN limit of the four-dilution test. The four-dilution captures those occurrences when the total coliform levels reach the 2,400 MPN limit on the three-dilution test, but has the potential of reaching a higher

MPN number on the four-dilution test. The Bureau of Marine Water Monitoring is doing the four-dilution test on stations located in *Special Restricted*, *Seasonally Approved*, or *Approved* waters that regularly exceed the 2,400 MPN on the three-dilution test. Four-dilution testing should also be done before upgrading *Prohibited* water to assure adequate classification.

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 1992). Water quality sampling, shoreline, and watershed surveys were conducted in accordance with the NSSP *Guide for the Control of Molluscan Shellfish* (2007 Revision). Data management and analysis were accomplished using database applications developed for the Bureau of Marine Water Monitoring. The mapping of data was performed with the Geographic Information System (ArcGIS®).

FIGURE 7: STATIONS IN THE NORTHERN BARNEGAT BAY



BACTERIOLOGICAL INVESTIGATION AND DATA ANALYSIS

The water quality of each growing area must be evaluated before an area can be classified as *Approved, Seasonal, Special Restricted,* or *Prohibited. Approved* waters can be harvested for shellfish all year round. *Seasonal* waters can be harvested for all, or part, of the winter; there is a *Seasonal (Nov-Apr)* classification and a *Seasonal (Jan-Apr)* classification. *Special Restricted* waters are approved for harvest, followed by depuration or relay, which help to cleanse bacteria from the shellfish. No harvest is allowed in *Prohibited* waters. Criteria for the bacterial acceptability of shellfish growing waters are provided in the NSSP *Guide for the Control of Molluscan Shellfish,* 2007 Revision.

Sampling Strategy

The State Shellfish Control Authority has the option of choosing one of two water monitoring sampling strategies for each growing area, a Systematic Random sampling strategy or Adverse Pollution Condition sampling strategy. For additional information on the types of sampling strategies see the *Shellfish Growing Area Report Guidance Document, 2007.*

This shellfish growing area was sampled using the Systematic Random Sampling strategy (Assignment/s 077, 087, & 108).

NSSP Criteria

Each shellfish-producing state is directed to adopt either the total coliform criterion, or the fecal coliform criterion. While New Jersey bases its growing water classifications on the total coliform criterion, the laboratory does have the ability to make corresponding fecal coliform determinations for each sampling station. These data are viewed as adjunct information and are not directly used for classification.

The total coliform criterion was developed to ensure that shellfish harvested from the designated waters would be free of pathogenic (disease-producing) bacteria. Each classification criterion is composed of a measure of the statistical 'central tendency' (geometric mean) and the relative variability of the data set. For the Systematic Random Sampling Strategy, variability is expressed as the Estimated 90th percentile (see Table 3).

TABLE 1: CRITERIA FOR SYSTEMATIC RANDOM SAMPLING STRATEGY

	Total Coliform Criteria		Fecal Coliform Criteria	
	Geometric mean (MPN/100 ml)	Estimated 90th percentile (MPN/100 ml)	Geometric mean (MPN/100 ml)	Estimated 90th percentile (MPN/100 ml)
Approved Water Classification	70	330	14	49
Special Restricted Water Classification	700	3300	88	300

SHORELINE SURVEY

CHANGES SINCE LAST SURVEY

Barnegat Bay has been a "No Discharge Zone" since 2003 and there are now four sewage pumpout boats available to recreational boaters. In 1998, the pumpout boat program started with one boat, 'Circle of Life', then added, 'Waste Watcher' and 'Bay Saver'. 'Bay Saver' services the northern Barnegat Bay and tidal portions of the Metedeconk River (OCDOP, 2010). Ocean County has added a fourth boat at the end of the 2008 boating season Ocean County added 'Water Warrior', which operates in the tidal portion of the Toms River. These boats remove sewage from recreational boats with onboard tanks to prevent the emptying of waste directly into the waters of Barnegat Bay. From 1998 to 2008, these four boats serviced 25,470 boats and about 466,000 gallons of waste (OCDOP, 2008). Because of the overwhelming demand and success of the pumpout boat program has now added a fifth boat, named "Bay Sweeper" to service the area between the Causeway Bridge, in Stafford, and the inlet, in Barnegat Light (Asbury Park Press, 2010).

LAND USE

The majority of land use in this area is divided into wetlands, urban, and forested areas (see Figure 8).

Mantoloking Neck and Cattus Island County Park are wetland areas (see Figure 9). Wetlands serve to purify water; organic and inorganic materials are removed for plant growth. Therefore, the wetlands can contribute to maintaining good water quality in this area. The condition of the wetlands is very important to the health of the

shellfish due to their indirect link via the food web.

Urban areas are found on the majority of the shoreline (see Figure 10). Some of these areas experience population fluxes each year, high in summer, lower in winter.

Forested areas are intermittent in the Northern Barnegat Bay growing area. Most of the forested areas are inland and not located near the shoreline.

Agricultural land use is even less frequent than forested areas. The agricultural areas also tend to be situated inland.

The back-bay waters make the Northern Barnegat Bay area a suitable locale for lagoon communities. A lagoon is essentially a manmade canal, surrounded by bulkheaded properties, with access to the bay (see Figure 11). Lagoon communities gradually became regulated under the Wetlands Act of 1970 (N.J.S.A. 13:9A). In 1978, construction of lagoon communities was greatly restricted. Lagoon areas are laden with stormwater outfalls that often drain directly into the canal water. Additionally, many homeowners have docks, which are used to store their own boats. For these reasons, all lagoons are classified as *Prohibited.*

FIGURE 8: 1995 LAND USE PATTERNS

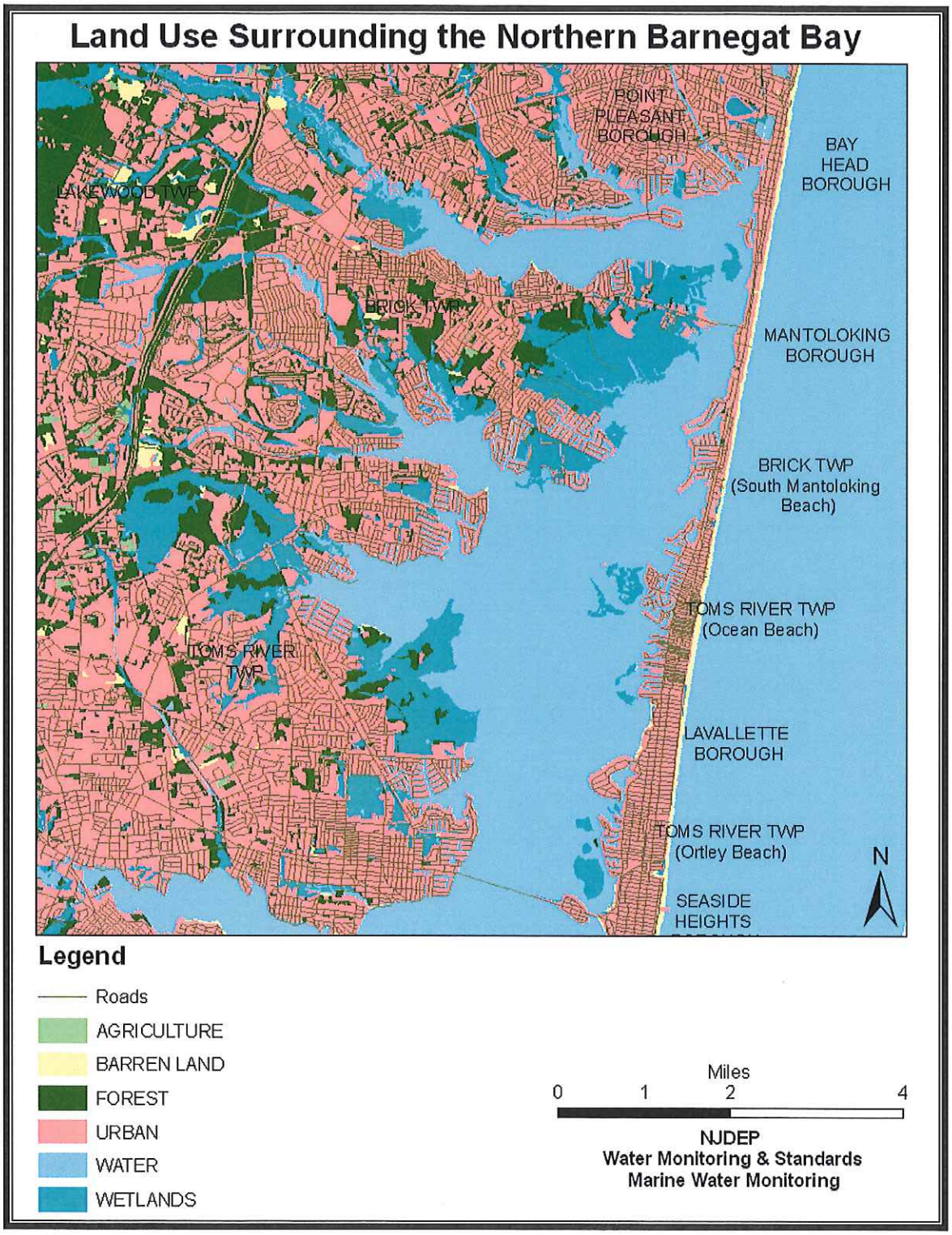


FIGURE 9: WETLANDS

FIGURE 10: URBAN LAND USE

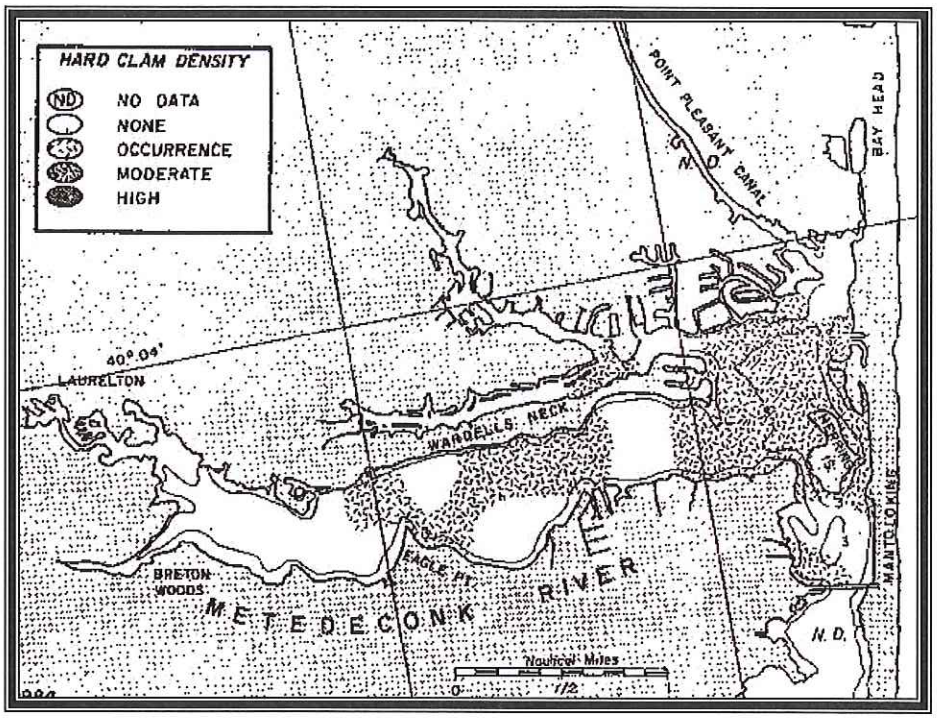
FIGURE 11: LAGOON IN THE NORTHERN BARNEGAT BAY

EVALUATION OF BIOLOGICAL RESOURCES

The Northern Barnegat Bay area is not especially productive at this time (see Figure 12, Figure 13, & Figure 14). An occurrence of hard clam and soft clams were documented in this area in the 1980's by NJDEP Fish, Game, & Wildlife. There are higher densities of hard clams in the southern portion of Barnegat Bay due to the open water and sandflat areas. However, this does not mean that viable shellfish resources are not present or may not be present in the Northern Barnegat Bay in the future. Factors that contribute to having a viable resource include: salinity, dissolved oxygen levels, bottom conditions, and predator activity. Barnegat Bay has been experiencing moderately heavy silting because of low tidal flow, which can cause suffocation in clams (Bates and Moore, 2003).

Until the 2006 suspension in the relay program, portions of the Barnegat Bay were used for relaying clams. In the relay program clams from *Special Restricted* areas are brought to *Approved* waters to purge themselves for at least 30 days.

FIGURE 12: HARD CLAM DENSITY OF THE METEDECONK RIVER (1980'S)



- *1986 was the last time a density study was done in this area.*

FIGURE 13: SOFT CLAM DENSITY OF THE METEDECONK RIVER (1980'S)

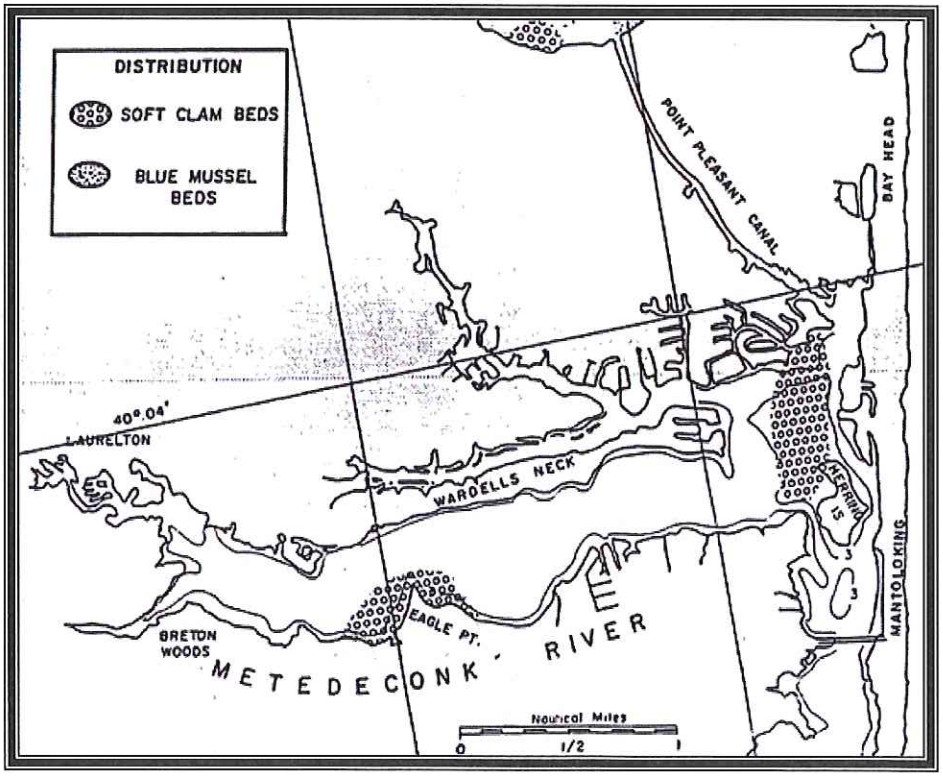
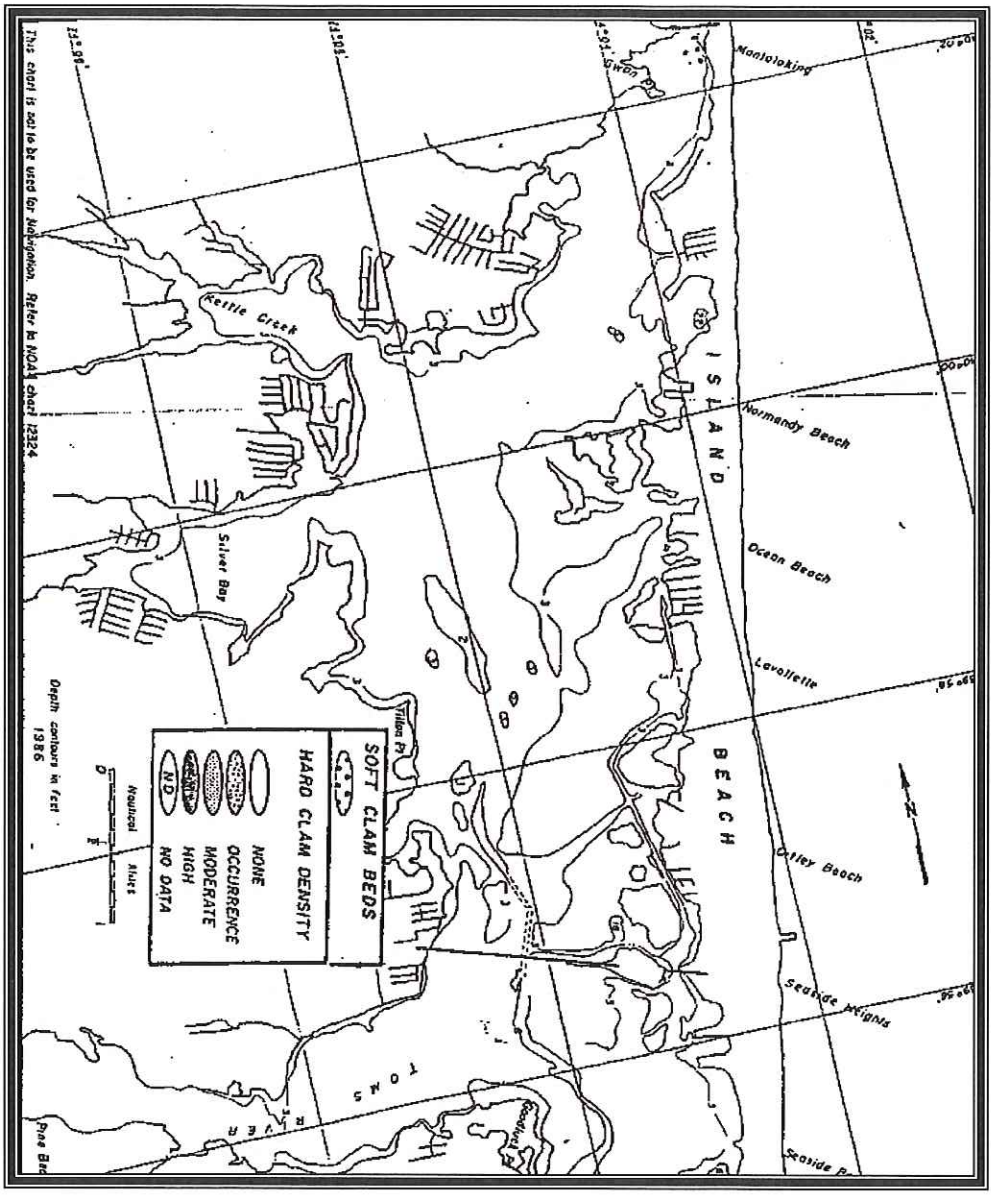


FIGURE 14: SOFT CLAM DENSITY OF THE UPPER BARNEGAT BAY (1980'S)



IDENTIFICATION AND EVALUATION OF POLLUTION SOURCES

Effluent Discharges

There are no known effluent discharges directly into the Northern Barnegat Bay waters. The Ocean County Utilities Authority's Northern Water Pollution Control Facility (NWPCF) treats the domestic wastes and handles the sanitary wastewater to most of the surrounding municipalities. This plant is located in Brick Township. The capacity of the plant is 32 million gallons per day (OCUA, 2010). The NWPCF provides

wastewater treatment service to Bay Head, Brick, Mantoloking, Point Pleasant Beach, Point Pleasant Borough, Lakewood & Jackson Township. Sewage from the Manasquan River Regional Sewage Authority is also treated by the facility. The facility sends the treated effluent one mile into the Atlantic Ocean at a location east of Mantoloking Borough. As a precautionary measure, the NSSP requires a closed safety zone, so ocean waters adjacent to the outfall line are classified as *Prohibited* for the harvesting of shellfish for a distance of approximately one mile offshore. Although the ocean outfall line is not within the confines of the Northern Barnegat Bay area; the pipeline runs through this growing area. Therefore, there is the potential for leaks and breaks in the line, which would affect the surrounding waters.

The remaining communities (Toms River Township, Lavallette, and Seaside Heights), as well as many municipalities located in the Central Barnegat Bay are served by the Ocean County Utilities Authority's Central Water Pollution Control Facility (CWPCF) in Bayville. The capacity of the plant is 28 million gallons per day and the OCUA is currently seeking rerating to 32 million gallons per day (OCUA, 2010). This facility also discharges to the Atlantic Ocean approximately a mile offshore of Island Beach State Park.

Indirect Discharges

Any indirect or direct source contamination can be reported to the NJDEP toll free hotline at 1-877-WARNDEP.

Most of the Northern Barnegat Bay area has sewage connections; although some still have septic tanks or other means. The quality of a sewer system depends heavily on the municipal planning and upkeep of the sewer lines. New residential developments joining into a sewer system must be adequately planned for in order to handle the increased volume. The age of the pipes and facilities also factor in when assessing the potential for sewer problems.

Septic systems are harder to regulate since they are not the responsibility of the municipality, but the property owner. A faulty septic system can add bacteria into runoff, which can then enter waterbodies, causing high bacteria counts.

Stormwater Inputs

Runoff is a term for the surface water that moves from land to the ocean. Storm drains along roads collect runoff and transmit it to stormwater outfalls. The outfalls deposit the runoff directly into the bay, or indirectly via other waterbodies. Therefore, pollutants in the runoff gradually make their way to the bay/ocean waters. During this transition the water picks up both nutrients and pollutants. While some nutrients in the

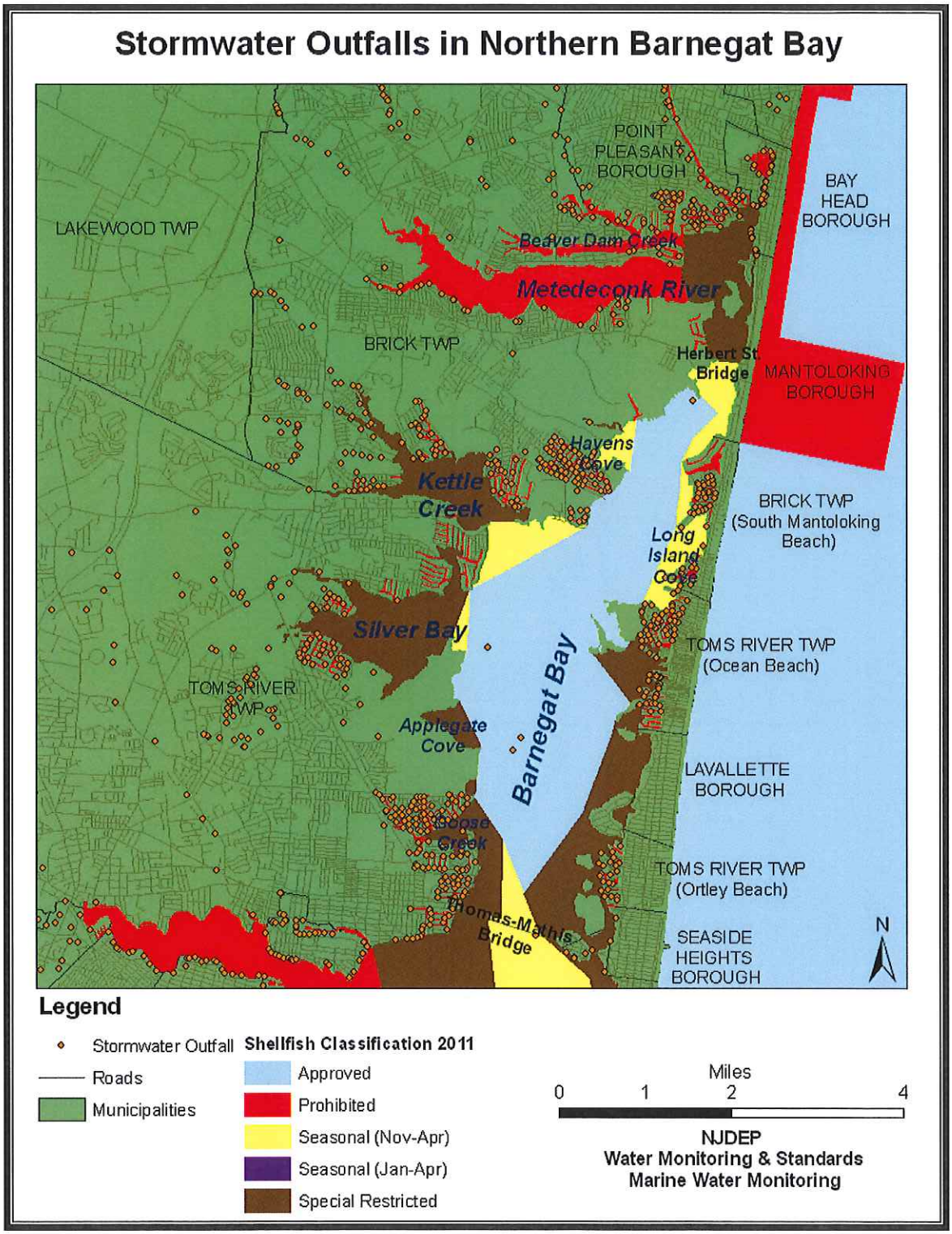
runoff provide food for plants and animals, excessive nutrient loads can lead to eutrophic conditions, where algae and other organisms proliferate and cause low levels of dissolved oxygen. In this region, runoff from the urban areas is the most likely cause of pollutants. Pollutants, like bird wastes, agricultural pesticides, animal waste, and remnants from faulty septic systems enter the water through runoff. Fecal waste carries a great deal of bacteria, and runoff can easily bring the bacteria to swimming beaches and other waterbodies. Among other things, this can cause human sickness through recreational contact or through consumption of contaminated shellfish. Seeing the substantial amount of outfalls in this area, it is crucial their role in coastal pollution.

There are many stormwater outfalls in the Northern Barnegat Bay area (see Figure 15). Stormwater outfalls are one of the most significant non-point sources of pollution. Stormwater outfalls are mostly found in urban areas, and are especially common within lagoon communities. Lagoon stormwater discharges are especially harmful because lagoons see little tidal flushing, heavy boat usage, and high quantities of bulkheading.

WM&S's BMWM has the ability to conduct stormwater projects. Water samples are taken before and during a storm event in order to determine the effect of runoff. Once a possible source of the problem is identified, then the appropriate State and local officials are notified to attempt to remedy the situation.

Over the last several years there was a nonpoint source pollution project done by the WM&S's BMWM in the area of Seaside Heights, see below.

FIGURE 15: STORMWATER OUTFALLS IN NORTHERN BARNEGAT BAY

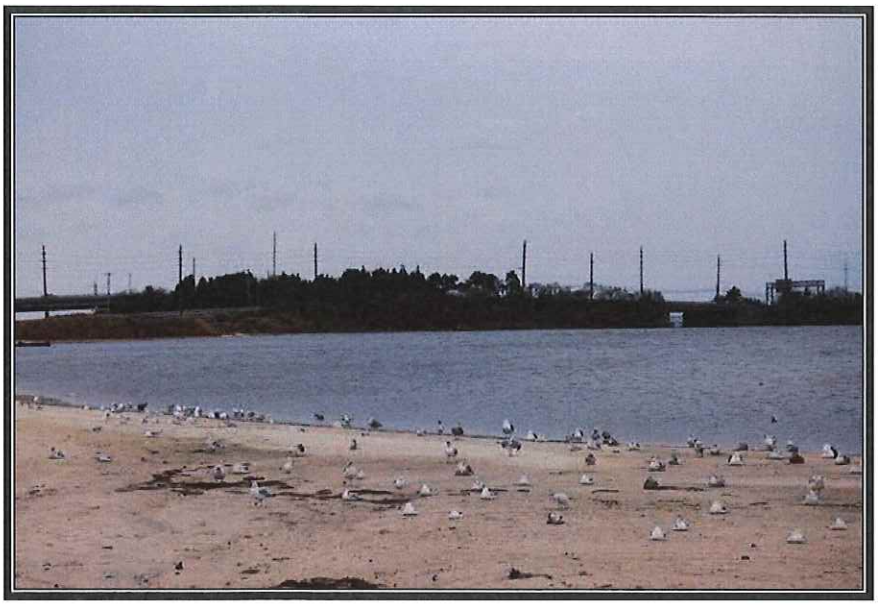


Seaside Heights Storm Study Follow-up

Seaside Heights is located at the southeastern boundary of the Northern Barnegat Bay area. Initial high levels of coliform lead to a nonpoint source pollution project in 2000, where levels of fecal coliform were taken before, during, and after rain events. Once the data were analyzed, the sources of contamination were identified, and the proper authorities were notified to work on resolving the problem (see Figure 16 & Figure 17). According to Seaside Heights, all infrastructure repairs identified in the initial study, were completed in November of 2006. Twelve sanitary sewer lateral lines protruded through the stormwater line. These were corrected along with two fire hydrant protruding water lines, one protruding gas service line, and one protruding water service line. Continual work is being done to repair structural defects and reduce infiltration and inflow into the system; the Borough of Seaside Heights plans for a full rehabilitation of the Borough's sewer system by 2011.

FIGURE 16: OUTFALL AT SEASIDE HEIGHTS

FIGURE 17: SEASIDE HEIGHTS BATHING AREA



Marinas

Marina facilities have the potential to affect the suitability of shellfish growing areas for the harvest of shellfish. The biological and chemical contamination associated with marina facilities may be of public health significance.

Boating is a very popular summertime activity within Barnegat Bay. According to the BMW's latest marina survey, there are a total of 57 marinas in the Northern Barnegat Bay (see Figure 19 & Table 2). There are also many lagoon and waterfront communities with additional boat slips. The waters enclosed by a marina are classified as *Prohibited.* Depending on the size of the marina and its water quality, the water immediately adjacent to each marina may be classified as *Prohibited*, *Special Restricted*, or *Seasonal (Jan-Apr* or *Nov-Apr).* A *Seasonal* classification does not allow harvest during summer months when the marina is active. Although there are marinas throughout this growing area, they are particularly numerous in Metedeconk River, Kettle Creek, and the eastern shoreline of the bay (see Figure 18).

Although good for tourism, the marinas, and the accompanying boats, can discharge many harmful pollutants into the water. Gas fumes, oil, and grease from boats and marinas can contribute to the contamination of the waters. There are some irresponsible boat owners who do not use available pumpout stations or pumpout boats, instead dumping human wastes directly into the local waterbodies. The biological and chemical contamination associated with marina facilities may be of public health significance. The Barnegat Bay was made a "No Discharge Zone" in 2003 (USEPA, 2003).

The 'Clean Marina' program is voluntary and provides guidelines that aim, "to protect water quality and coastal resources by preventing and reducing nonpoint sources of pollution" (NJDEP Clean Marina, 2010). Six marinas in

this growing area have been certified as New Jersey Clean Marinas (NJDEP Clean Marina, 2010). These marinas are Baywood Marina, Brennan Boat Co. and Marina, Inc., Green Cove Marina, Sherman's Boat Basin, Shore Haven Yacht Club, and Jersey Shore Marina and Boat Sales, Inc. Trader's Cove Marina and Park has signed a Clean Marina Pledge Card, which means that, "the marina owners and operators pledge to identify opportunities and implement practices to control pollution associated with activities occurring at marinas, enhance the surrounding environment and encourage responsible boating practices as recommended in the New Jersey Clean Marina Guidebook." (NJDEP Clean Marina, 2010).

For additional information on the marina equations used for buffer generation see the Shellfish Growing Area Report Guidance Document 2007.

FIGURE 18: MARINA ON THE METEDECONK RIVER

FIGURE 19: MARINA FACILITIES LOCATED IN NORTHERN BARNEGAT BAY

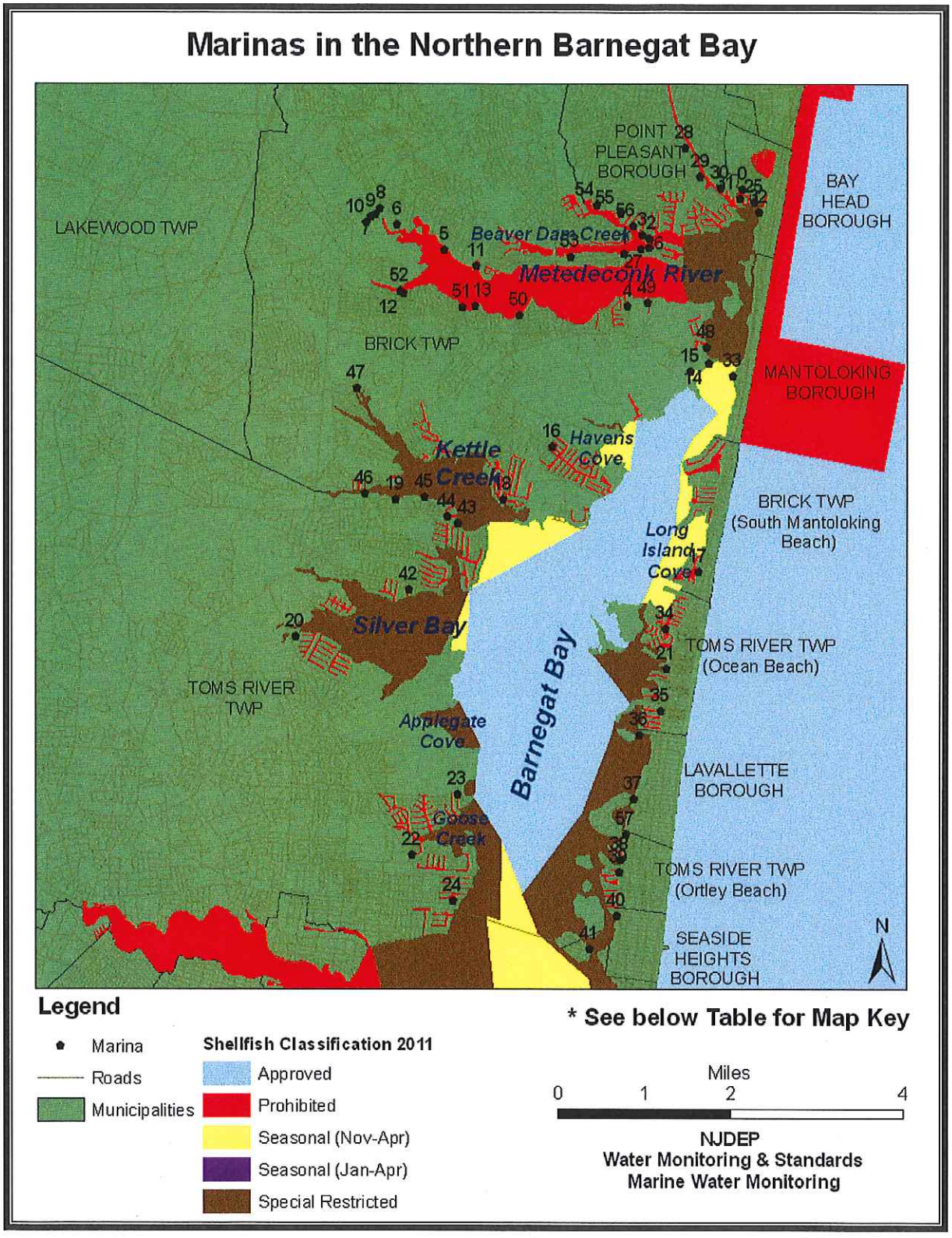


TABLE 2: MARINA FACILITIES LOCATED IN THE NORTHERN BARNEGAT BAY AREA

MAP KEY	MARINA NAME	NUMBER OF SLIPS	EST. BUFFER (RADIUS, IN FT.)
0	Johnson Brothers Boat Works	34	674.5
1	Sherman's Boat Basin	42	728.0
2	Forsberg's Boat Works	52	801.7
3	Arnold's Yacht Basin	220	1847.7
4	Cranberry Cove Marina	30	896.1
5	Wehrlen Bros Marina	300	2833.6
6	Green Cove Marina	220	2257.4
7	Brennan Boat Co. and Marina, Inc.	72	1314.9
8	Jersey Shore Marina	170	1333.1
9	Lightning Jack's Marina	85	1133.4
10	Forge Landing Marina	196	1462.1
11	Riverfront Marina	80	1463.3
12	Mermaid's Cove Marina	20	580.7
13	C. Breton Woods Marina	180	2194.9
14	Hinckley Yachts & Marina	126	1803.7
15	David Beaton & Sons	60	1267.2
16	Baywood Marina	200	2313.6
17	Harbour Yacht Club & Marina	120	1792.1
18	Drum Point Marina	25	818.0
19	Kettle Creek Marina	50	1156.8
20	Silver Bay North Marina	100	1636.0
21	Ocean Beach Marina	200	2313.6
22	East Dover Marina	60	1186.5
23	Hobby Lobby Marine	80	963.4

Map Key	Marina Name	Number of Slips	Est. Buffer (Radius, in Ft.)
24	Pier One Restaurant Hotel & Marina	40	1034.7
25	Bay Head Yacht Club	80	1023.2
26	Comstock Yacht Sales & Marina	220	1847.7
27	Starck's Landing	16	258.5
28	Point Pleasant Yacht Club	25	578.4
29	Unknown	15	448.0
30	Canal Point Marina	20	517.3
31	Bay Point Harbor Condo Marina	50	818.0
32	Dale Yacht Basin East	60	779.1
33	Mantoloking Yacht Club	40	1034.7
34	Chadwick Island Marina	100	1510.1
35	Bay Villa Yacht Club	40	1034.7
36	Lavallette Yacht Club	50	818.0
37	L&R Marine	35	749.7
38	Docksider LLC	80	1463.3
39	8th Ave. Condo	10	517.3
40	Cranberry Inlet Marina	50	1067.8
41	Pelican Cove Condo	40	1034.7
42	Unknown	36	500.5
43	Unknown	>5	186.5
44	Holiday On The Bay Condo	10	517.3
45	Unknown	>5	186.5
46	Typhoon Marine	15	549.9
47	Sailors Quay Yacht Club	70	1215.5
48	Traders' Cove Marina and Park	220	2257.4
49	Metedeconk Yacht Club	60	1267.2

Map Key	Marina Name	Number of Slips	Est. Buffer (Radius, in Ft.)
50	Unknown	10	517.3
51	Unknown	20	731.6
52	American Legend Post 348	10	517.3
53	Blue Lagoon Marina	25	417.1
54	Shore Haven Yacht Club	65	1319.0
55	Sea Point Dr. Condo Marina	40	1034.7
56	Hidden Harbor Dr. Condo Marina	30	896.1
57	Unknown	48	1133.4

Spills or Other Unpermitted Discharges

The tourist population in the summertime inundates the utility usage in the Northern Barnegat Bay area. However, the cold winter months also prove hard on water and sewer lines. Therefore, breaks and/or leaks can happen at any time and the WM&S's BMWM must be ready to respond to spills and assess the probable effects on the shellfish waters.

There were no closures of shellfish beds in this growing area within May 1, 2006 to April 30, 2010. Closures prior to this time period are discussed in the prior reports on this area, see www.nj.us.gov/dep/bmw for more information.

HYDROGRAPHY AND METEOROLOGY

The Metedeconk River drainage basin covers an area of approximately 34.9 square miles. The conditions of the Metedeconk River are often directly related to rainfall. There are also numerous small tidal creeks, like Reedy Creek, but discharge and flow rate information in not available.

Metedeconk River has the potential to be impacted by stormwater runoff, due to the numerous stormwater outfalls in urban developed areas. Therefore, the Metedeconk River is currently classified as *Prohibited.* Kettle Creek, Silver Bay, and other populated coastline areas are also impacted by stormwater runoff, and are appropriately classified as *Special Restricted.*

Ocean waters enter the Barnegat Bay through the inlet at Barnegat Light. The tidal range for Barnegat Bay, as measured at the Barnegat Inlet, is approximately three feet, although this range varies throughout the bay (US Fish and Wildlife Service, 1997). Tidal influx allows dilution of pollutants in bay water with the ocean water that is typically of higher water quality. The

exchange rate at the Barnegat Bay Inlet is about 7% per tide, which means the complete turnover of the bay waters takes approximately 50 days (US Fish and Wildlife Service, 1997). Since the inlet is about twelve miles south of the Tunney-Mathis Bridge, the Northern Barnegat Bay area does not see prime tidal flushing. However, this combination helps to improve the water quality of the sections adjacent to the urban shorelines, which are often contaminated by runoff. Everything considered, coliform levels are still low enough for many of the waters of the Barnegat Bay to remain classified as *Approved.*

PATTERNS OF PRECIPITATION

Precipitation patterns in the coastal areas of New Jersey are typical of the Mid-Atlantic coastal region. Typical summer storms are localized storms associated with thunderstorms. Winter storms are frequently associated with northeasters. Hurricanes can occur during the summer and early fall.

Appendix C shows the climatological data obtained from NOAA/NWS for the May 1, 2006 to April 30, 2010 time period. There have been no significant changes in hydrography since the last reappraisal report.

Seasonal Effects

Many of the factors that contribute to high total coliform levels occur year round; however, some largely occur on a seasonal basis, like recreational boating in the summer. Runoff from urban areas is perhaps the most influential factor on the coliform levels in this growing area. Runoff occurs year round, however, things like pesticides and bug sprays are used more heavily in the summer season.

This area undergoes a population surge in the summer, which increases sewage use as well as other utilities. Therefore, it is probable that the stations with a seasonal component are affected by non-point source pollution from increased summer population and/or increased use of water-related activities (boating, etc.) during the summer.

Seasonal components were observed at eleven stations (see Figure 20). SRS seasonal components were assessed using a t-test to compare log-transformed total coliform values for summer verses winter data. The t-statistic probability must be less than or equal to 0.05 for a station to have a seasonal component (see Table 3). All of the stations with a seasonal component had higher coliform values in the summer.

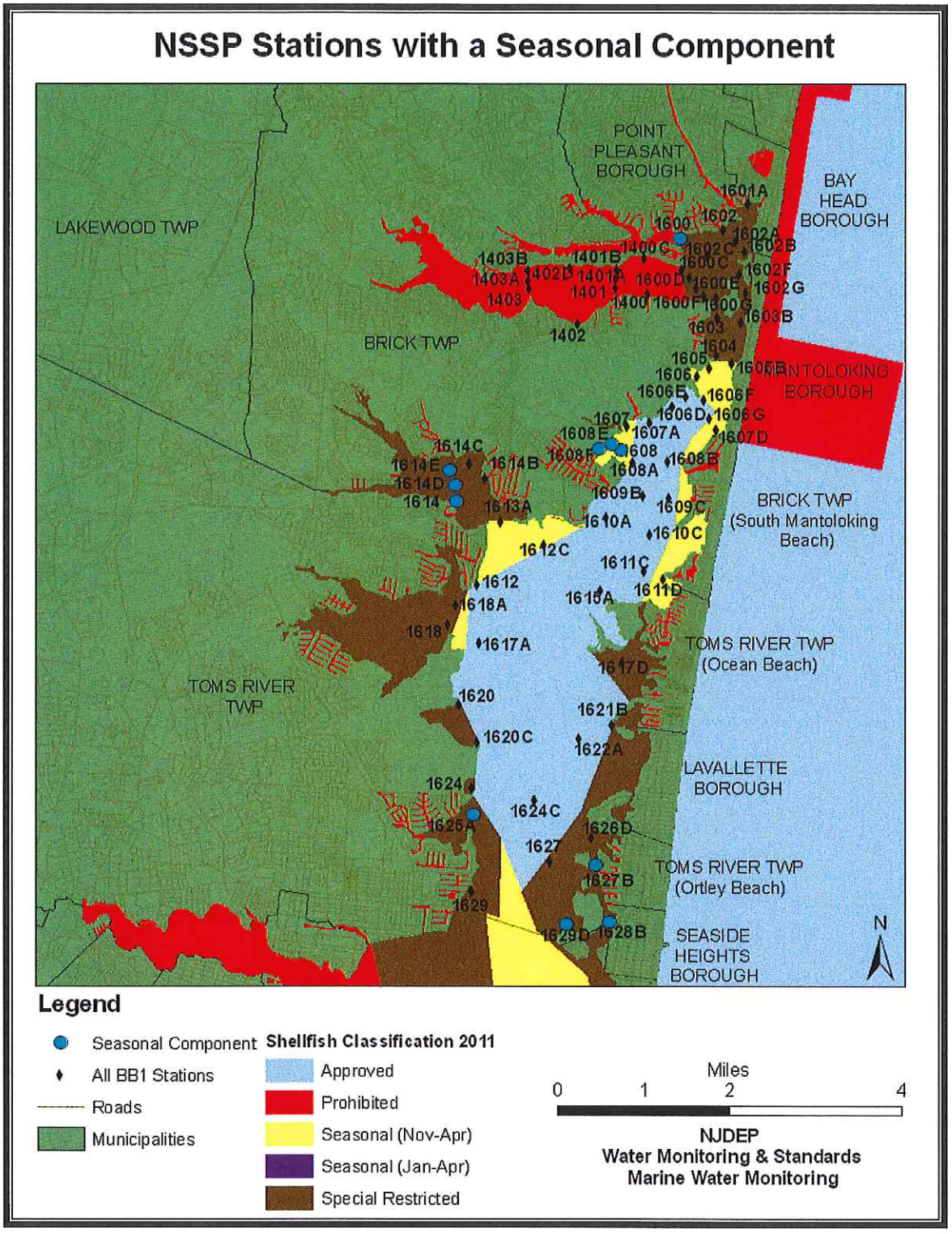
Overall, none of the noted stations had a geometric mean that exceeded the established values for the present classifications. The Est. 90th Percentile values for these stations also fit within criteria. No changes in classification are needed as a result of the seasonal components at these stations.

TABLE 3: SEASONAL EFFECTS

Station	Status*	Seasonal t-Statistic Prob.	Summer Total Coliform Geometric Mean	Winter Total Coliform Geometric Mean
1600	P	**0.026**	104.6	28.9
1608	S	**0.001**	39.6	9.9
1608E	S	**0.001**	50.2	8.4
1608F	S	**0.000**	65.9	8.4
1614	SR	**0.012**	66.9	15.4
1614D	SR	**0.013**	104.0	24.6
1614E	SR	**0.019**	66.1	19.4
1625A	SR	**0.048**	59.6	18.7
1627B	SR	**0.003**	80.0	12.2
1628B	SR	**0.003**	136.4	17.3
1629D	SR	**0.009**	89.2	18.5

***STATUS: A = APPROVED, S = SEASONAL (NOV-APR), SR = SPECIAL RESTRICTED, P=PROHIBITED**

FIGURE 20: SAMPLING STATIONS AFFECTED BY SEASON



Rainfall Effects

Non-point source pressures on shellfish beds in New Jersey originate in materials that enter the water via stormwater outfalls. These materials include bacteria and other wastes that can negatively impact the surrounding water quality.

A t-test is used to compare log-transformed total coliform values for wet verses dry data. The t-statistic probability must be less than or equal to 0.05 for a station to be rainfall impacted. There is also a wet/dry cutoff that dictates what data is considered 'wet' and what data is considered 'dry'. For example, if the wet/dry cutoff is set at 0.1 inches, then days with rainfall amounts below 0.1 inch are considered 'dry' weather and days with rainfall amounts above 0.1 inch are considered 'wet' weather. The wet/dry cutoff is used because waterbodies throughout New Jersey are impacted by different amounts of rainfall.

Rainfall data are based on the closest established NOAA/NWS station; each assignment run is assigned to a weather station to accurately reflect the rainfall at the sampling stations.

The effects of the 'first flush' should be captured by the '24 hours prior to sampling' t-statistics. T-statistics are also determined for the 'cumulative 48 hours prior to sampling' and the 'cumulative 72 hours prior to sampling'. These t-statistics help to determine if there is a delayed impact on the waterbody.

The best scenario that represented this growing area was based on a wet/dry cutoff of 0.15 inch. Once this was determined, the data were analyzed at '24 hours prior to sampling', '48 hours prior to sampling', and '72 hours prior to sampling'.

Rainfall appears to be a significant factor for the stations located in this growing area. The 'first flush' after 0.15 inch of rainfall impacts various spots close to the shoreline, which is expected since this area is urban and is abundant in impervious surfaces. The 'cumulative 48 hours prior to sampling' shows the most impact with 47 stations, again mostly along the shoreline. The 'cumulative 72 hours prior to sampling' shows the impact being spread to the channel areas away from the shoreline (see Figure 21, Figure 22& Figure 23).

FIGURE 21: RAINFALL IMPACTED STATIONS FROM 24 HOURS PRIOR TO SAMPLING

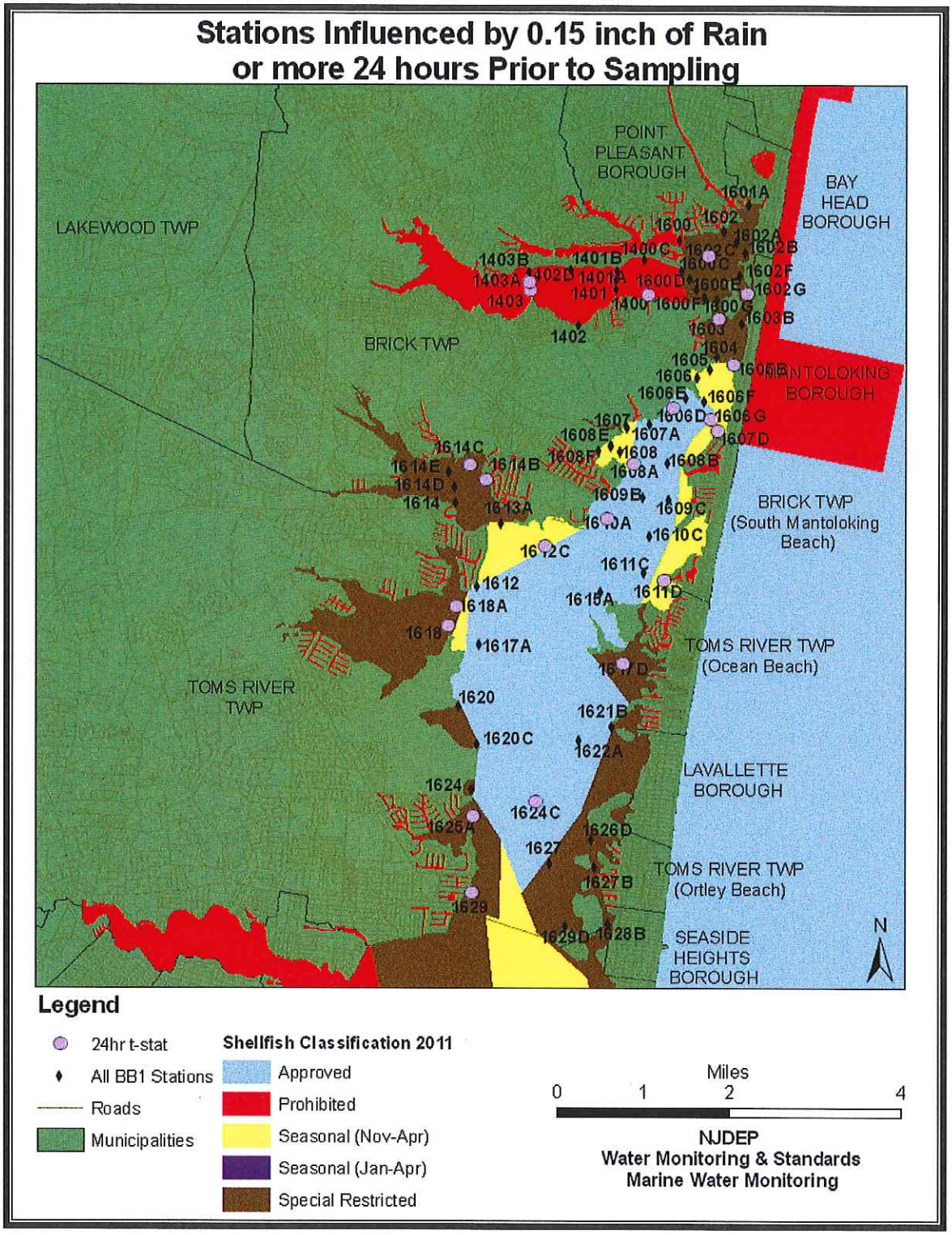


FIGURE 22: RAINFALL IMPACTED STATIONS FROM 48 HOURS PRIOR TO SAMPLING

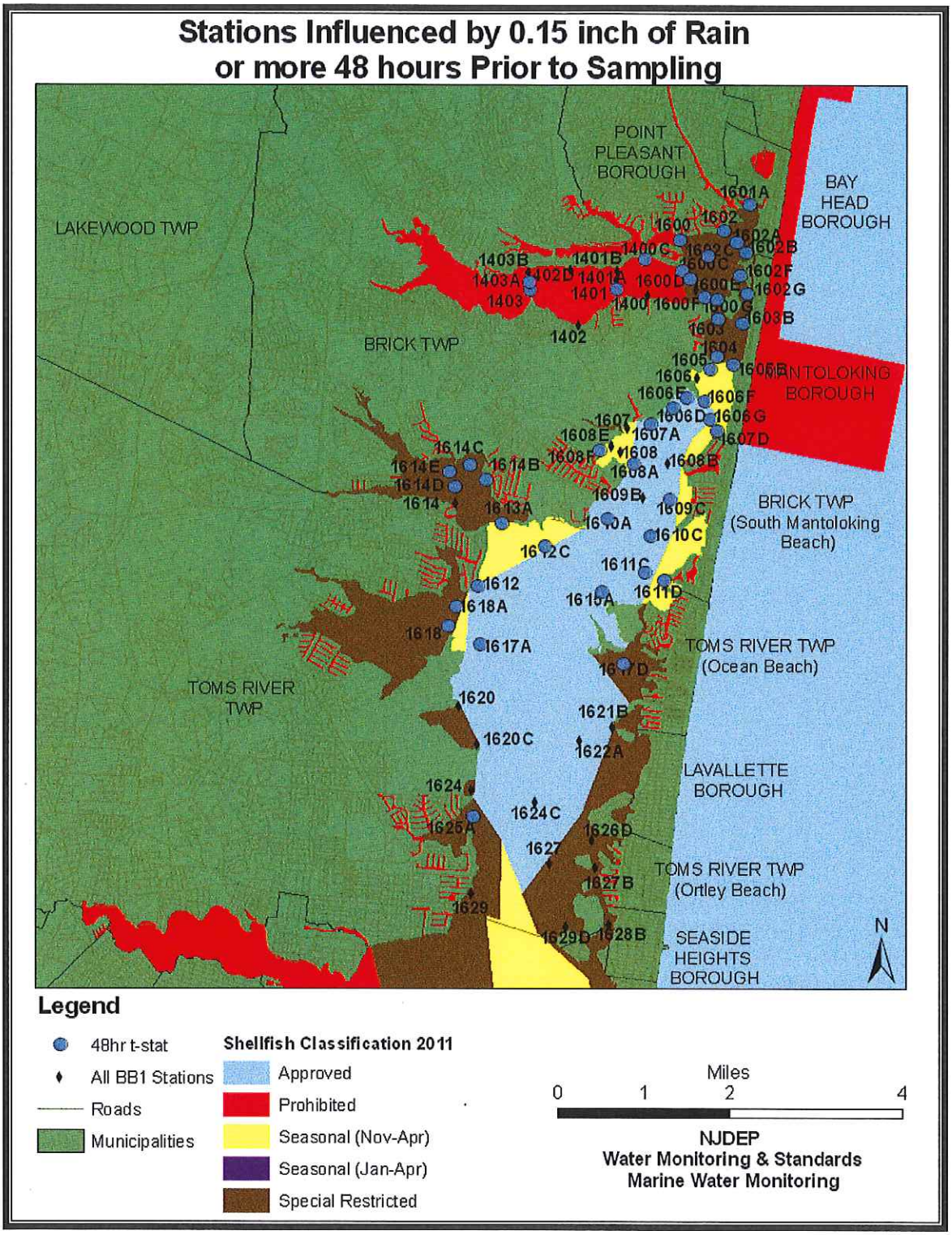
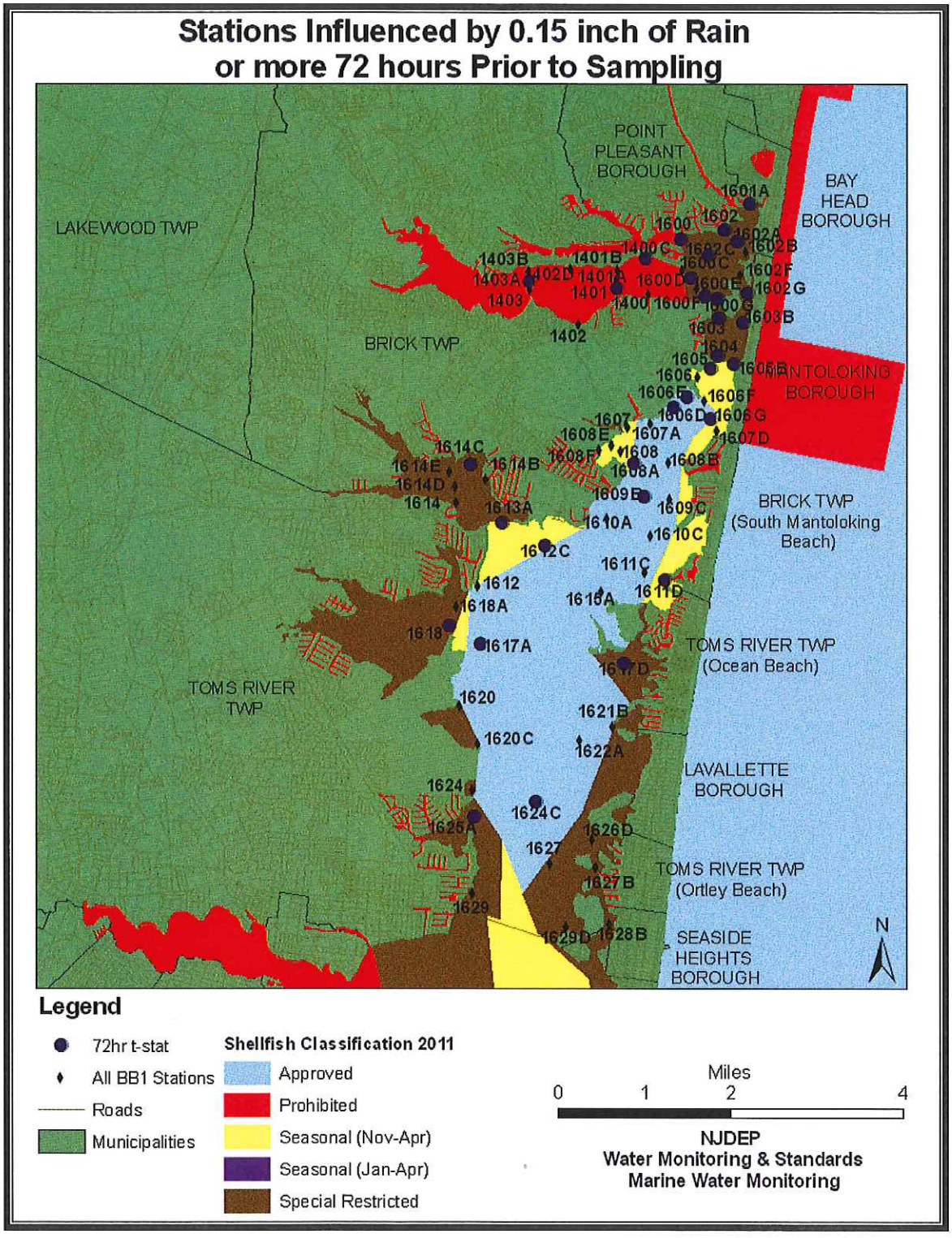


FIGURE 23: RAINFALL IMPACTED STATIONS FROM 72 HOURS PRIOR TO SAMPLING



RELATED STUDIES

NJDEP STUDIES

Water Monitoring and Standard's (WMS) Bureau of Marine Water Monitoring (BMWM) assesses total coliform levels, but there are many other tests that can be run on retrieved water samples. In addition to testing for total coliform, the laboratory is also capable of testing for fecal coliform and enterococcus levels.

WMS's BMWM also monitors all the marine bathing beaches across the state. Other capabilities include testing New Jersey waters for levels of phytoplankton, nutrients (estuarine monitoring), and bathing beach standards.

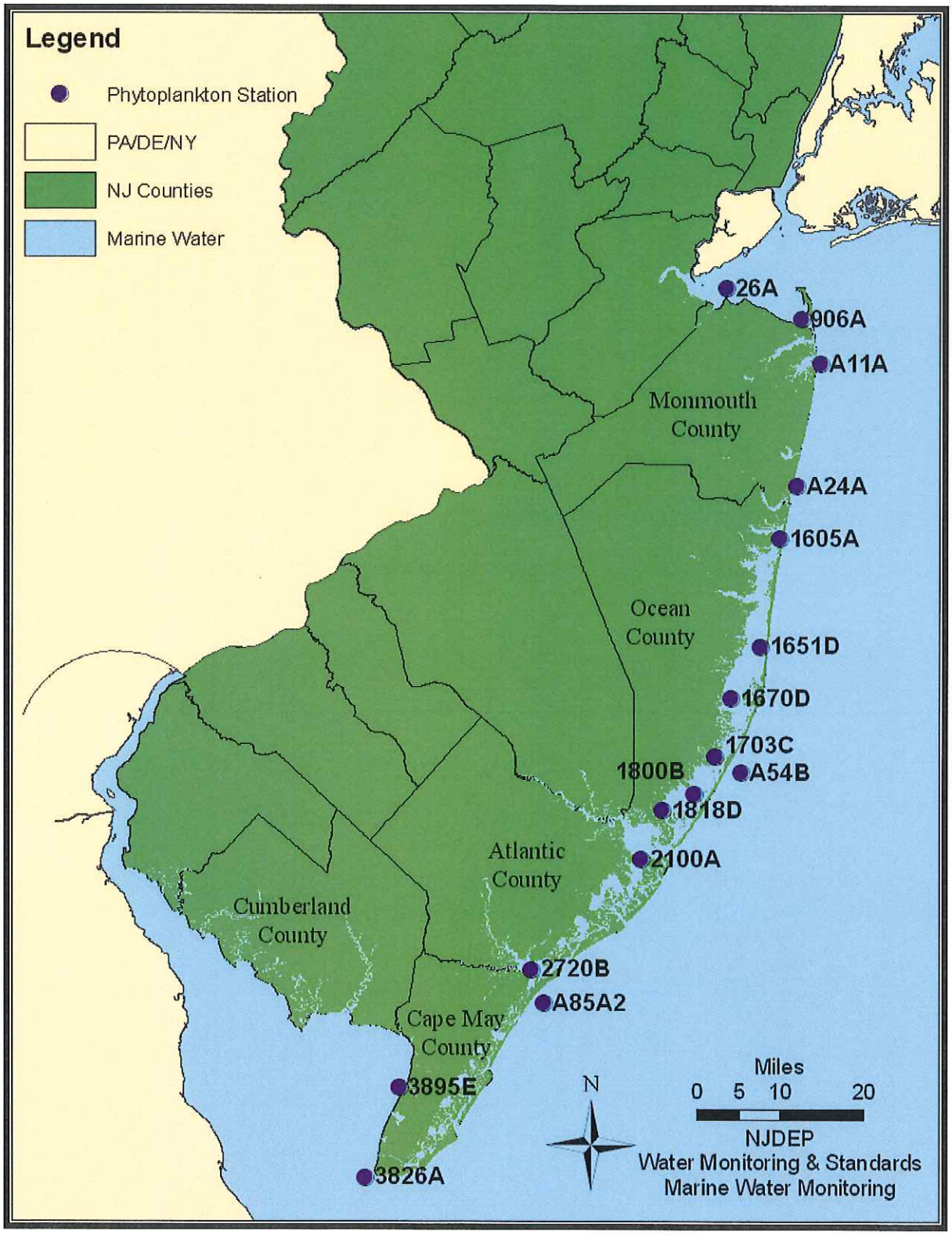
Phytoplankton

Phytoplankton are photosynthetic algae that play a critical role at the base of aquatic food webs. Normally, New Jersey's coastal waters are populated with non-threatening diatoms during the summer months.

Water Monitoring and Standard's BMWM collects samples at regular intervals throughout the summer to determine the occurrence of marine biotoxins. The BMWM, in accordance with the NSSP requirements, also analyzes the data.

The NJDEP and the United States Environmental Protection Agency (USEPA) conduct routine helicopter surveillance looking for color abnormalities in New Jersey waters, indicating an algal bloom (see http://www.nj.gov/dep/bmw/remotesensing.htm). Phytoplankton station 1605A is located in the Northern Barnegat Bay (see Figure 24).

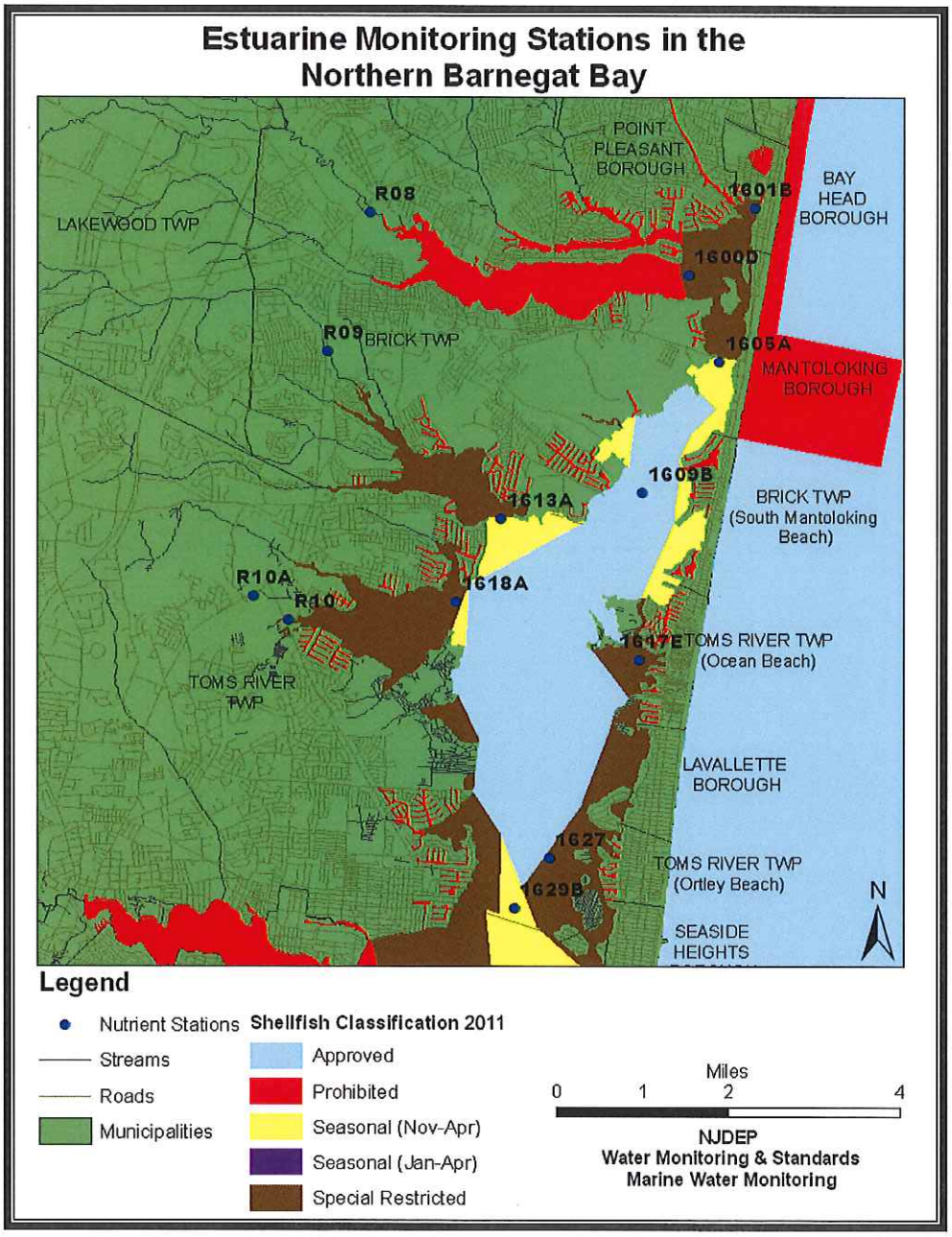
FIGURE 24: PHYTOPLANKTON STATIONS THROUGHOUT NEW JERSEY



Estuarine Monitoring

Nutrient and dissolved oxygen samples are collected at thirteen stations in this growing area four times each year (see Figure 25). The parameters are evaluated, analyzed, and provided in a separate report by the WMS's BMWM, available on the web at: http://www.state.nj.us/dep/wms//bmw/reports.htm.

FIGURE 25: NUTRIENT STATIONS IN NORTHERN BARNEGAT BAY



Bathing Beach Data

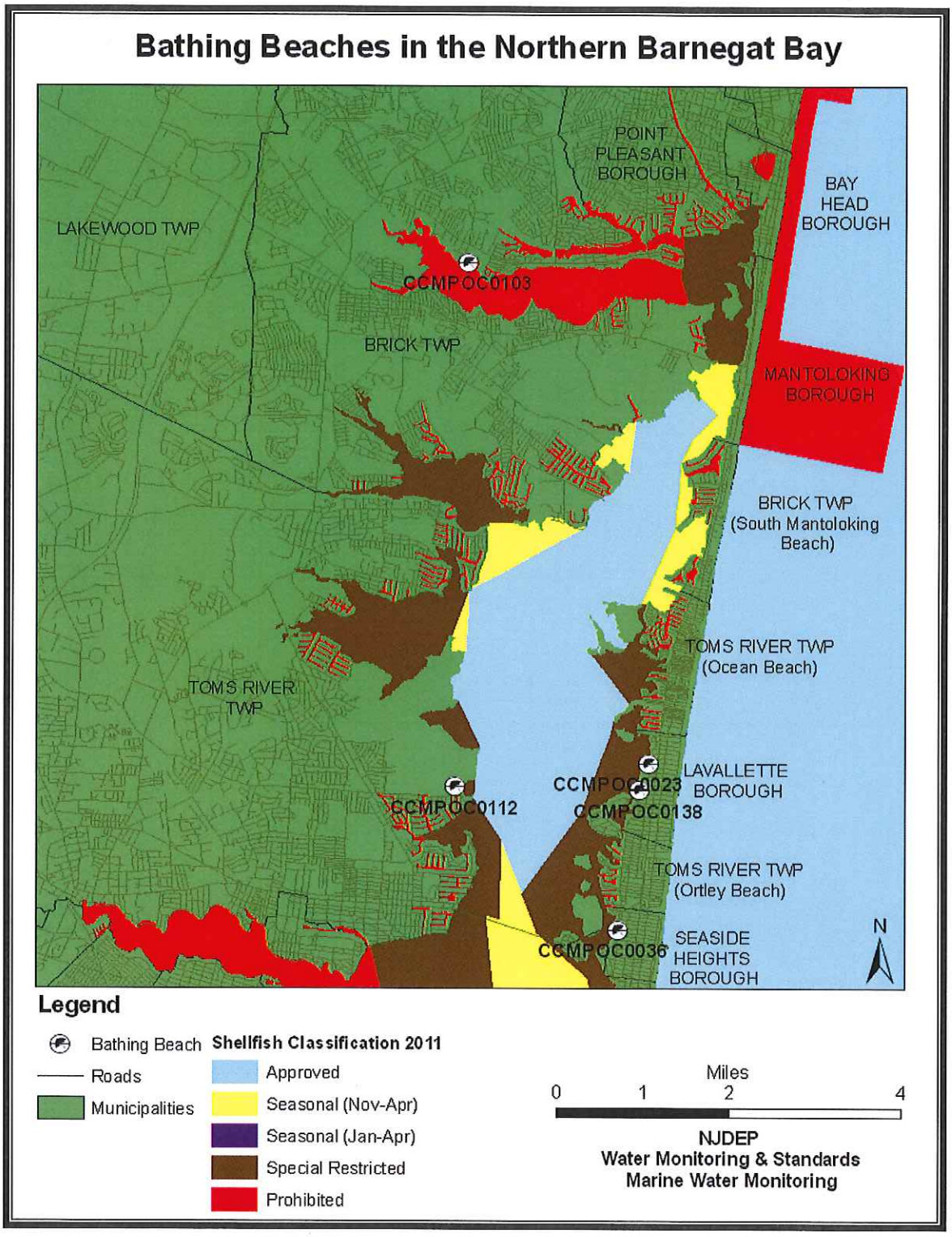
The NJDEP WMS group cooperatively works with the New Jersey Department of Health and Senior Services and local health agencies to monitor the bathing beaches in New Jersey. Together, these agencies implemented the Cooperative Coastal Monitoring Program (2010). With this program, the coastal and estuarine waters that are open to the public for recreational bathing are surveyed and regularly monitored for the concentration of bacteria.

Typically, samples are taken once a week for the entire summer. These samples are tested for Enterococci. Ocean and bay recreational beaches are subject to opening and closing procedures of the State Sanitary Code. Local health agencies and law enforcement may close a bathing beach at any time if the results exceed the State Sanitary Code of 104 Enterococci per 100 mL. Stations must be re-sampled when bacteria concentrations exceed the primary contact standard of 104 Enterococci per 100 mL of sample. Consecutive samples that exceed the standard require the closing of the beach until a sample is obtained that is within the standard. Environmental stations are not bathing beaches and do not require re-samples. WM&S's BMWM utilizes these data as adjunct information; the closure of shellfish waters does not correspond with these results.

There are 5 bathing beach stations located within this shellfish growing area (see Figure 26 & Figure 27). For more information on bathing beach data and closures please see the following websites: www.njbeaches.org or www.earth911.org.

FIGURE 26: WINDWARD BATHING BEACH (CCMPOC0103)

FIGURE 27: BATHING BEACHES IN THE NORTHERN BARNEGAT BAY



OUTSIDE AGENCIES

The National Oceanic and Atmospheric Administration (NOAA) monitors several stations in New Jersey as part of its Mussel Watch Program. Using the mussel tissues, NOAA runs various parameters, including heavy metal concentrations. There is no mussel watch station in the Northern Barnegat Bay area. For further information and data, please visit, http://ccma.nos.noaa.gov/about/coast/nsandt/musselwatch.html.

USEPA's National Coastal Assessment Program (NCA) monitors sediments in New Jersey marine waters. Sediments from are tested for metals, PAH's, PCB's, and pesticides. Currently, no NCA data is available for the Northern Barnegat Bay area for the years 2006-2009. For further information and data, please visit, http://www.epa.gov/emap/nca/html/about.html.

WATER QUALITY STUDIES

BACTERIOLOGICAL QUALITY

Summary of Northern Barnegat Bay Area

The data for this report was collected from 73 stations in the Northern Barnegat Bay area. About 2,400 surface water samples were analyzed from this growing area for total coliform (TC) during the May 1, 2006 to April 30, 2010 time period.

Three separate assignment runs are required for this large growing area. Two of these assignment runs are in Barnegat Bay (87, & 108) and one assignment (77) is in Metedeconk River. This report examined the data from the assignment runs done in-between May 1, 2006 and April 30, 2010. These assignment runs provided sufficient samples for evaluation, bearing in mind the sample size must be at least 30 for each station according to the Systematic Random Sampling strategy.

Compliance with NSSP *Approved* Criteria

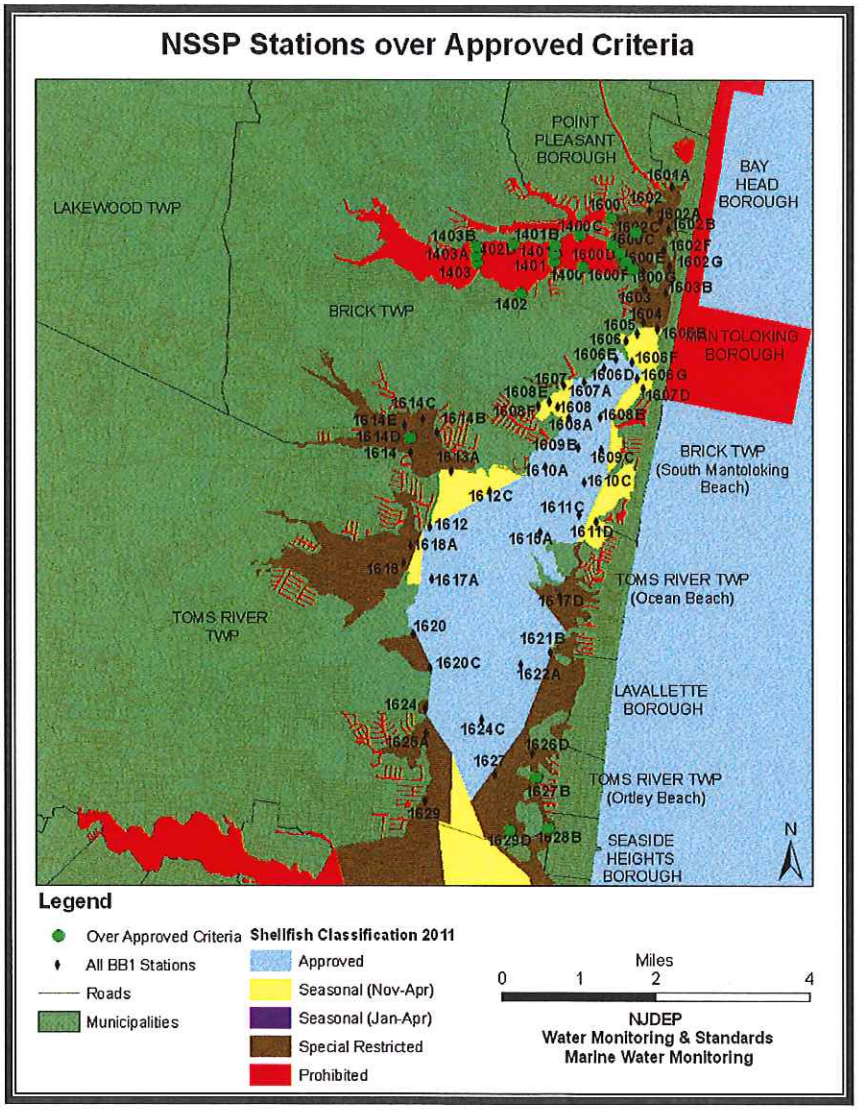
Each sampling station must comply with its respective classification criteria according to the National Shellfish Sanitation Program (NSSP) Model Ordinance (2007 Revision). The classifications are *Approved, Seasonal, Special Restricted,* and *Prohibited.* For the Systematic Random Sampling strategy there is a minimum of 30 data sets for each station. In order for waters to be classified as *Approved,* the total coliform Geometric Mean must be below 70 MPN/100ml and the total coliform Est. 90th Percentile must be below 330 MPN/100ml.

Twenty stations did not meet the SRS *Approved* criteria year round, however, none of these stations are currently located in *Approved* or *Seasonal* waters; therefore, no downgrades in classification are needed (see Figure 28).

Some of the stations in *Seasonal* and *Special Restricted* waters fit the *Approved* criteria, but no changes in classification are recommended at this time. The *Special Restricted* and *Seasonal* areas around the shorelines often serve as a buffer from the lagoon systems, urban areas, and marinas.

All of the stations are currently in the *Prohibited* section of the Metedeconk River exceed the *Approved* criteria, but they do not currently exceed the *Special Restricted* criteria, see the next two sections for further recommendations.

FIGURE 28: SAMPLING STATIONS EXCEEDING APPROVED CRITERIA



Compliance with NSSP Approved Criteria during Seasons

All Data (Summer and Winter)

The year round data are divided between the summer and winter sampling seasons. The summer season runs from May through October, and the winter season runs from November through April.

Winter Data (November – April)

Eleven stations in the Northern Barnegat Bay did not meet the total coliform *Approved* criteria during the winter months. These stations do not exceed the *Special Restricted* criteria and are all located in *Special Restricted* or *Prohibited* waters.

Summer Data (May – October)

Twenty-eight stations in the Northern Barnegat Bay exceeded the criteria for *Approved* waters during the summer months. However, none of these stations exceeded the *Special Restricted* criteria and none of the stations that exceeded the *Approved* criteria are currently classified as *Approved.* Therefore, no changes in classification are needed based on these data.

Compliance with NSSP *Special Restricted* Criteria

All sampled stations complied with the NSSP total coliform criteria for *Special Restricted* waters. For waters to be classified as *Special Restricted,* the Geometric Mean must be below 700 MPN/100ml and the Est. 90^{th} Percentile must be below 3300 MPN/100ml. Since no stations in *Special Restricted* waters had values above the NSSP criteria, no changes in classification are needed.

The current data shows that stations in the Metedeconk River meet the criteria for *Special Restricted* waters. A recommendation for an upgrade is being made to a portion of the *Prohibited* waters of the Metedeconk River. Five-hundred three acres will go from a *Prohibited* classification to a *Special Restricted* classification. The western section of the Metedeconk will remain *Prohibited*, as well as Beaver Dam Creek, all marina basins, and the lagoons. The Metedeconk River is an urban area with some marinas; therefore, it has the potential for contaminants to enter the waterbody, especially after rainfall, and the water quality does not support making the classification *Seasonal* or *Approved*, however water quality supports making the classification *Special Restricted.*

CONCLUSIONS

BACTERIOLOGICAL SUMMARY

The water quality data obtained from the sampling period of May 1, 2006 to April 30, 2010 are listed in Appendix D. Systematic Random Sampling Strategy was used to collect the samples, laboratory tests were run for total coliform, and a thorough analysis of the data was performed for this report. Analysis of the Northern Barnegat Bay shellfish growing area samples indicates that total coliform levels meet the standards of the National Shellfish Sanitation Program (NSSP).

The western portion of the Metedeconk River is and should remain *Prohibited,* even though it did not exceed *Special Restricted* criteria. This is due to the elevated total coliform levels, the abundance of marinas, and high urban land use. The eastern portion of the Metedeconk River will be upgraded to *Special Restricted* due to consistent water quality levels that are below NSSP criteria. The existing section of *Special Restricted* waters fits within its current classification and should remain *Special Restricted* in part due to the surrounding urban land use. Many of the *Seasonal* and *Special Restricted* areas in the Barnegat Bay buffer urban areas, runoff, outfalls, and marinas.

The rest of Barnegat Bay is *Approved* and all of the stations within the *Approved* waters fit within the total coliform *Approved* criteria.

Based on all of the collected data, this growing area is adequately classified. There were eleven stations with a seasonal component, but on analysis it was found that all stations impacted by season remain in compliance with their respective classification criteria. The Metedeconk River and Brick Township areas are particularly impacted by the 'first flush' of rainfall, which then spreads throughout the Barnegat Bay.

RECOMMENDATIONS

RECOMMENDED CLASSIFICATION CHANGES

Five-hundred three acres in the Metedeconk River are being upgraded from a *Prohibited* classification to a *Special Restricted* classification (see Figure 29). The analysis of the water quality data confirms that the sampling stations in the area consistently fit within the *Special Restricted* criteria. A portion will remain *Prohibited* including those waters of the Metedeconk River and its tributaries west of a line beginning at a point of land on Wardells Neck in Brick Township with coordinates latitude 40 degrees 3 minutes 23.04 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West and bearing 180 degrees due south across the Metedeconk

River to a point of land on the southern bank with coordinates latitude 40 degrees 2 minutes 58.27 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West. Waters east of this same line described above will be *Special Restricted*, and they run into the waters of the Metedeconk River that are already classified as *Special Restricted* (see below for official classification changes). Seven NSSP stations fall in this area; they are 1402D, 1402, 1401B, 1401A, 1401, 1400C, & 1400 (see Figure 30). There are no bathing beaches, marinas, or nutrient stations in the upgrade area.

FIGURE 29: UPGRADE TO THE METEDECONK RIVER

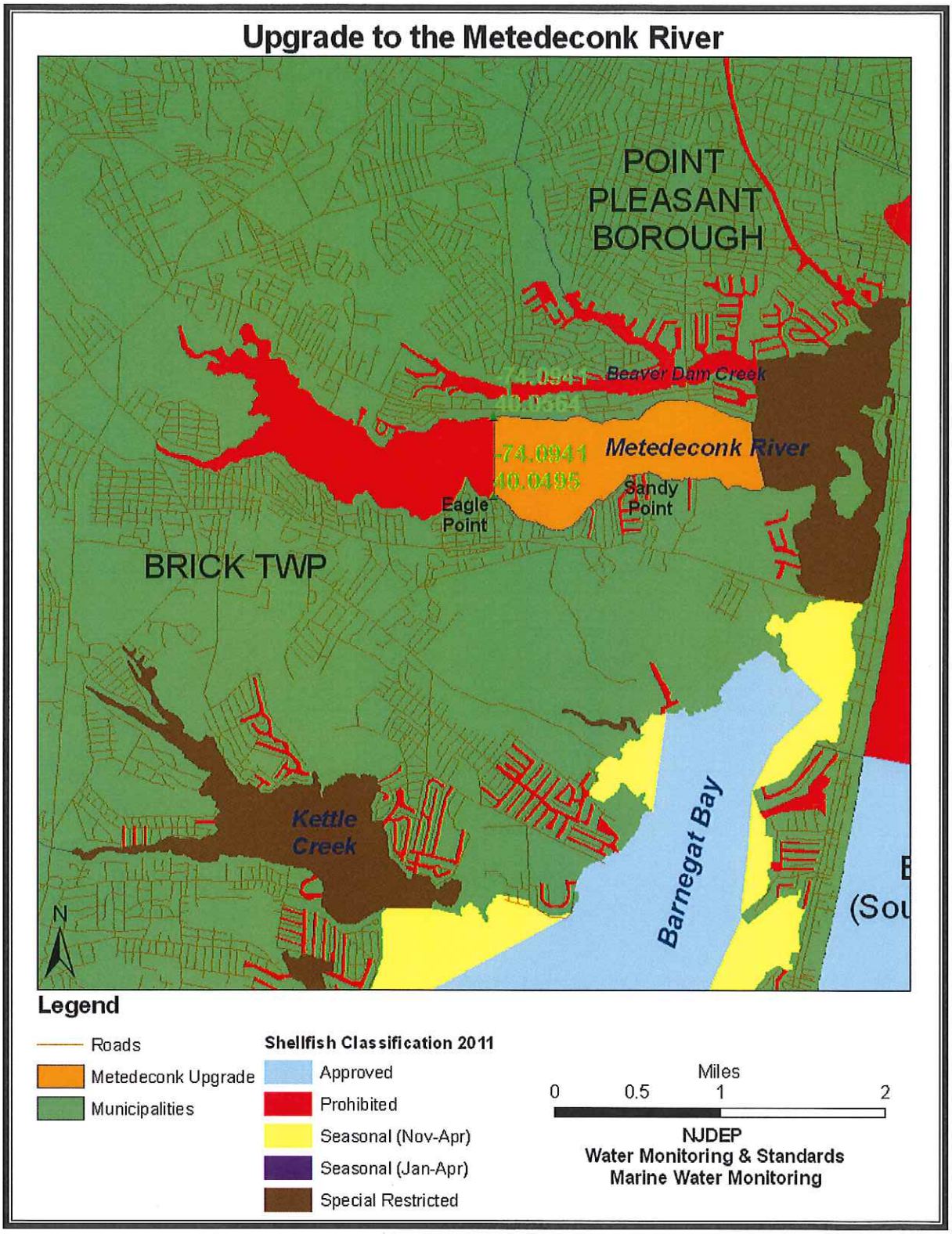
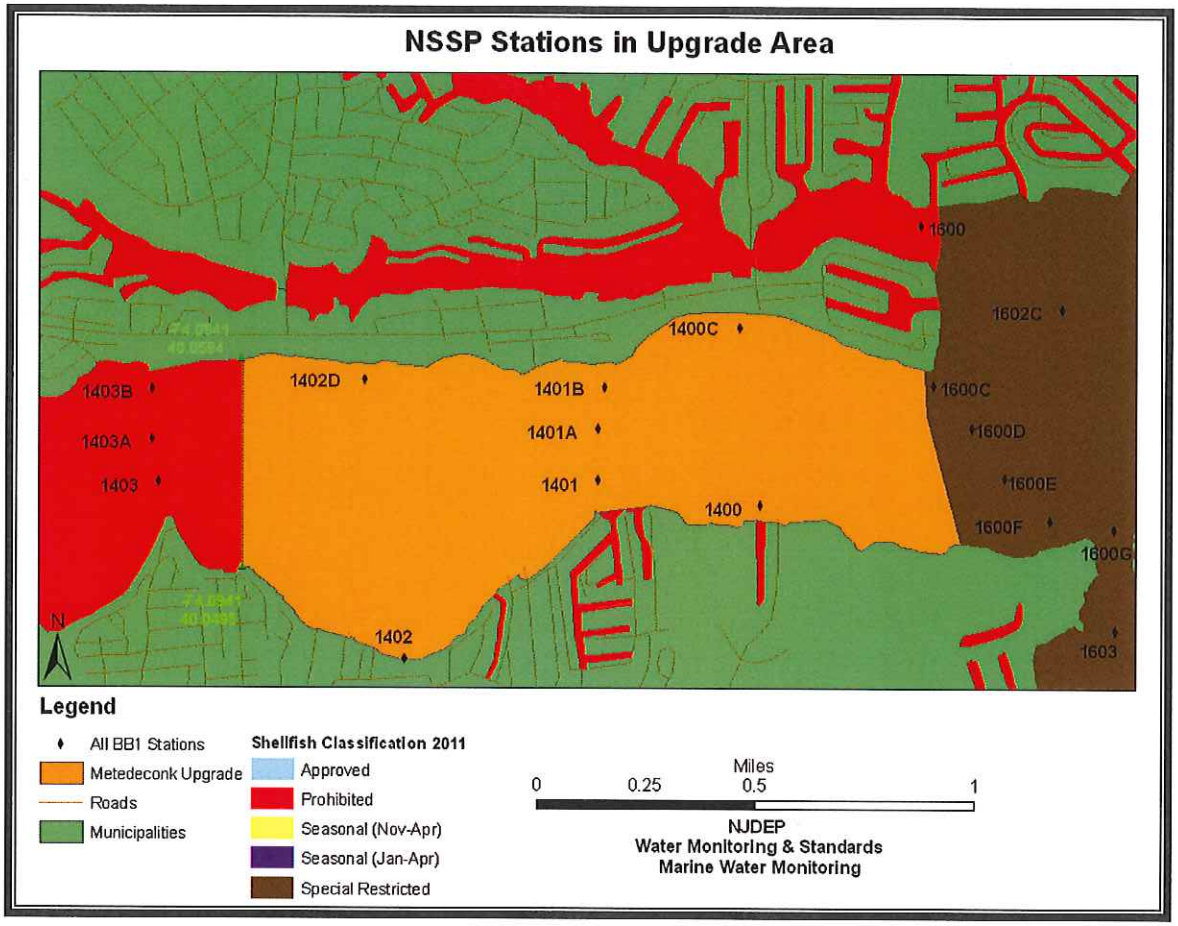


FIGURE 30: NSSP STATIONS IN THE UPGRADE AREA



RECOMMENDED REGULATION CHANGES

Existing Classification

§ 7:12-2.1 Shellfish growing water classification—Prohibited

....

6. Bay Head and Metedeconk River area (Note: A portion is also designated as a Special Restricted area. See N.J.A.C. 7:12-3):

i. All of Twilight Lake and its tributaries including its access channel upstream from where its mouth meets Northern Barnegat Bay or Bay Head Harbor;

ii. All those waters of Beaverdam Creek and its tributaries west of a line beginning on the southwesternmost point of land forming the eastern side of the lagoon located just west of the westernmost extent of Boat Point Drive in Point Pleasant and bearing approximately 174 degrees

T to navigation marker Flashing Green light "3" (FL G "3") and then bearing approximately 210 degrees T to the easternmost point of land on Wardells Neck east of the easternmost extent of North Drive in Brick Township; and

iii. All those waters of the Metedeconk River and its tributaries west of a line beginning on the southeasternmost point of land of Wardells Neck east of the easternmost extent of South Drive in Brick Township and then bearing approximately 180 degrees T to navigation marker Flashing Red light "2" (FL R "2") and then bearing approximately 165 degrees T through navigation marker Flashing Green light "l" (FL G "l") to the shoreline in West Mantoloking where this line terminates.

§ 7:12-3.2 Shellfish growing waters that are classified as Special Restricted

...

6. Bay Head and Mantoloking area: All those waters of Northern Barnegat Bay and tributaries north of a straight line beginning at the southwestern abutment of the Mantoloking Bridge (County Route 528) with coordinates latitude 40 degrees 2 minutes 25.4 seconds North and longitude 74 degrees 3 minutes 23.4 seconds West and continuing along the southern edge of the bridge to the southeastern abutment of the bridge with coordinates of latitude 40 degrees 2 minutes 24.9 seconds North and longitude 74 degrees 3 minutes 17.7 seconds West where this line terminates.

New Classification

§ 7:12-2.1 Shellfish growing water classification—Prohibited

...

6. Bay Head and Metedeconk River area (Note: A portion is also designated as a Special Restricted area. See N.J.A.C. 7:12-3):

i. All of Twilight Lake and its tributaries including its access channel north from where it meets Northern Barnegat Bay at latitude 40 degrees 3 minutes 57.27 seconds North and longitude 74 degrees 2 minutes 49.55 seconds West across the mouth of the access channel to *latitude 40 degrees 3 minutes 58.10 seconds North and longitude 74 degrees 2 minutes 49.47 seconds West*; and

ii. All those waters of Beaverdam Creek and its tributaries west of a line beginning at a point of land near the westernmost extent of Boat Point Drive in Point Pleasant on the northern side of Beaverdam Creek with coordinates latitude 40 degrees 3 minutes 40.32 seconds North and longitude 74 degrees 3 minutes 50.83 seconds West, then crossing Beaverdam Creek with the approximate bearing of 174 degrees T to navigation marker Flashing Green light "3" (FL G

"3"), and then bearing approximately 210 degrees T to the easternmost point of land on Wardells Neck in Brick Township with coordinates latitude 40 degrees 3 minutes 32.66 seconds North and longitude 74 degrees 3 minutes 51.32 seconds West; and

iii. All those waters of the Metedeconk River and its tributaries west of a line beginning at a point of land on Wardells Neck in Brick Township with coordinates latitude 40 degrees 3 minutes 23.04 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West and bearing 180 degrees due south across the Metedeconk River to a point of land on the southern bank with coordinates latitude 40 degrees 2 minutes 58.27 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West; and

iv. All tributaries, lagoons, and marina basins on the southern shoreline of the Metedeconk River from a point of land on the southern bank with coordinates latitude 40 degrees 2 minutes 58.27 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West, then along the shoreline to the most eastern point of land in West Mantoloking with coordinates latitude 40 degrees 3 minutes 0.76 seconds North and longitude 74 degrees 3 minutes 26.97 seconds West.

§ 7:12-3.2 Shellfish growing waters that are classified as Special Restricted

6. Bay Head and Mantoloking area (Note: A portion is also designated as a Prohibited area. See N.J.A.C. 7:12-2.1): Waters inclusive of an area starting at a point of land on Wardells Neck in Brick Township with coordinates latitude 40 degrees 3 minutes 23.04 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West and bearing 180 degrees due south across the Metedeconk River to a point of land on the southern bank with coordinates latitude 40 degrees 2 minutes 58.27 seconds North and longitude 74 degrees 5 minutes 38.70 seconds West, then along the shoreline, crossing all tributaries and lagoons, to the most eastern point of land in West Mantoloking with coordinates latitude 40 degrees 3 minutes 0.76 seconds North and longitude 74 degrees 3 minutes 26.97 seconds West, then continuing along the shoreline in southbound direction, across all tributaries and lagoons and excluding all marina basins, to the southwestern abutment of the Mantoloking Bridge (County Route 528) with coordinates latitude 40 degrees 2 minutes 25.81 seconds North and longitude 74 degrees 3 minutes 22.99 seconds West and continuing east along the southern edge of the bridge to the southeastern abutment of the bridge with coordinates of latitude 40 degrees 2 minutes 24.24 seconds North and longitude 74 degrees 3 minutes 9.11 seconds West, then continuing northbound along the shoreline, crossing all lagoons and excluding all marina basins, to the southeastern corner of the footbridge crossing the access channel to Twilight Lake with coordinated latitude 40 degrees 3 minutes 57.27 seconds North and longitude 74 degrees 2 minutes 49.55 seconds West, then crossing the mouth of the access channel of Twilight Lake to the northeastern corner of the same footbridge with coordinated latitude 40 degrees 3 minutes 58.10 seconds North and longitude 74 degrees 2 minutes 49.47 seconds West, then continuing along the shoreline, across all lagoons and excluding all marina basins, to a point of land off of Bay Ave in Point Pleasant Borough with coordinates latitude 40 degrees 3 minutes 57.69 seconds North and longitude 74 degrees 3 minutes 6.94 seconds West, then crossing the Point Pleasant Canal to a point of land off of Perch Hole Point Place in Point Pleasant Borough with coordinates latitude 40 degrees 3 minutes 55.91 seconds North and longitude 74 degrees 3 minutes 9.06 seconds West, and

continuing along the shoreline, across all lagoons and excluding all marina basins, to a point of land near the westernmost extent of Boat Point Drive in Point Pleasant on the northern side of Beaverdam Creek with coordinates latitude 40 degrees 3 minutes 40.32 seconds North and longitude 74 degrees 3 minutes 50.83 seconds West, then crossing Beaverdam Creek with the approximate bearing of 174 degrees T to navigation marker Flashing Green light "3" (FL G "3"), and then bearing approximately 210 degrees T to the easternmost point of land on Wardells Neck with coordinates latitude 40 degrees 3 minutes 32.66 seconds North and longitude 74 degrees 3 minutes 51.32 seconds West, then continuing along the shoreline, across the lagoon at the end of Wardells Neck, with coordinates latitude 40 degrees 3 minutes 22.15 seconds North and longitude 74 degrees 3 minutes 51.85 seconds West, then following the shoreline in a western direction to the point of origin and terminating.

Recommended Changes in Monitoring Schedule

There are no recommended changes in the monitoring schedule for the Northern Barnegat Bay.

Recommendations for Further Study

Continue sampling under the existing sampling protocol and analyzing the samples for total coliform.

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