95-AC-2

BUZZARDS BAY WATERSHED

2000 WATER QUALITY ASSESSMENT REPORT

COMMONWEALTH OF MASSACHUSETTS
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2000 WATER QUALITY ASSESSMENT REPORT

Prepared by:

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Department of Environmental Protection
Division of Watershed Management

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  - Estuaries Project
- Massachusetts Department of Public Health (MDPH)
- Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE)
  NOTE: As of July 2003 the agency name has changed to the Massachusetts Department of Fish and Game.
  - Division of Fisheries and Wildlife (MassWildlife)
  - Riverways Program
  - Division of Marine Fisheries (DMF)
  - Public Access Board
- Massachusetts Department of Environmental Management (MA DEM)
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- Massachusetts Office of Coastal Zone Management (CZM)

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- Coalition for Buzzards Bay (CBB)
- Westport River Watershed Alliance (WRWA)
- Weweantic River Stream Team
- Six Ponds Association
- The Nature Conservancy
- Mass Water Watch Acushnet River Stream Team
- Applied Science Associates
- Camp Dresser & McKee (CDM)
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LIST OF ACRONYMS

7Q10	Seven day, ten year low flow
AAW	Adopt-A-Watershed Project
ACEC	Area of Critical Environmental Concern
ACOE	US Army Corps of Engineers
AFCEE	Air Force Center for Environmental Excellence
ASA	Applied Science Associates
BBP	Buzzards Bay Project, National Estuary Program
BMP	Best Management Practice
BDL	Below Detection Limit
BOD	Biochemical Oxygen Demand
BPJ	Best professional judgment
BRP	Bureau of Resource Protection
CAFO	Concentrated Animal Feeding Operations, a type of NPDES permit
CBB	Coalition for Buzzards Bay
CCCG	Cape Cod Cranberry Growers
CCMP	Comprehensive Conservation and Management Plan
CDE	Cornell Dubilier Electronics, Inc.
CDM	Camp Dresser & McKee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMR	Code of Massachusetts Regulations
C-NOEC	Chronic no observed effect concentration
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CWF	Cold Water Fishery
CZM	Office of Coastal Zone Management
DDT	Dichlordiphenyltrichloroethane
DFWELE	Department of Fisheries, Wildlife, and Environmental Law Enforcement
DMF	Division of Marine Fisheries
DO	Dissolved oxygen
DWM	Division of Watershed Management
DWP	Drinking Water Program
EMPACT	Environmental Monitoring for Public Access and Community Tracking
EMAP	Environmenatl Monitoring and Assessment Program
ENF	Environmental Notification Form
EOEA	Executive Office of Environmental Affairs
EPA	United States Environmental Protection Agency
EPT	Ephmeroptera, Plecoptera, Trichoptera

LIST OF ACRONYMS (CONTINUED)

ESS	Environmental Science Services, Inc.
FERC	Federal Energy Regulatory Commission
GIS	Geographic information system
LC_{50}	Lethal concentration to 50% of the test organisms
MS4	Medium and large municipal separate storm sewer systems
MA DEM	Massachusetts Department of Environmental Management
MA DEP	Massachusetts Department of Environmental Protection
MassGIS	Massachusetts Geographic Information System
MassWildlife	Division of Fisheries and Wildlife
MCWW	Massachusett Community Water Watch
MDI	Method Detection Limit
MDPH	Massachusetts Department of Public Health
MPN	Most probable number
MMR	Massachusetts Military Reservation
NAS/NAE	National Academy of Sciences/National Academy of Engineering
NBH-LTR	New Bedford Harbor Long Term Monitoring Program
NCCW	Non-Contact Cooling Water
NDA	No Discharge Area
NEP	National Estuary Program
NH_3-N	Ammonia-nitrogen
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	Non-point source pollution
ORW	Outstanding Resource Waters
PAB	Public Access Board
PAH	Polyaromatic Hydrocarbon
PALIS	Pond and Lake Information System
PCB	Polychlorinated biphenol
PCE	perchloroethene
POTW	Publicly Owned Treatment Works
PWS	Public water supply
QAPP	Quality assurance project plan
QA/QC	Quality assurance/ quality control
RBP	Rapid bioassessment protocol
ROD	Record of Decision
SARIS	Stream and River Inventory System
SDWA	Safe Drinking Water Act
SMAST	School of Marine Science and Technology at UMass Dartmouth
SOP	Standard operating procedure
STP	Sewage Treatment Plant
SWAP	Source Water Assessment Program
SWQS	Surface Water Quality Standards
TCE	Trichloroethene
TIE/TRE	Toxicity identification and toxic reduction evaluation
TMDL	Total maximum daily loads
TOC	Total organic carbon
TOXTD	MA DEP DWM Toxicity Testing Database
TRC	Total residual chlorine
TSS	Total Suspended Solids
UMass	University of Massachusetts
USGS	United States Geological Survey
UV	Ultraviolet
VOC	Volatile Organic Compound
WBID	Waterbody Identification Code
WBS	Waterbody System Database
WES	Wall Experiment Station
WMA	Water Management Act
WPCF	Water Pollution Control Facility
WRWA	Westport River Watershed Alliance
WWF	Warm Water Fishery
WWTP	Waste water treatment plant

LIST OF UNITS

cfs	Cubic feet per second
cfu	Colony forming unit
Cm	Centimeter
ft^3	Cubic feet
GPD	Gallons per day
g/L	Gram/liter
KW	Kilowatt
m	meter
m^3	Cubic meter
mg/kg	Milligram/kilogram
mg/L	Milligram/liter
MG	Million gallons
MGD	Million gallons per day
MGY	Million gallons per year
mL/L	Milliliter per liter
µg/g	Microgram per gram
µg/kg	Microgram per kilogram
µg/L	Microgram per liter
µM	Micromoles
µS/cm	Microsiemens per centimeter
ng	Nanogram
NTU	Nephelometric turbidity units
ppb	Parts per billion
ppm	Parts per million
ppt	Parts per thousand
SU	Standard units
TEQ/kg	Toxic equivalents per kilogram

EXECUTIVE SUMMARY
BUZZARDS BAY WATERSHED
WATER QUALITY ASSESSMENT REPORT

The Massachusetts Surface Water Quality Standards (SWQS) designate the most sensitive uses for which surface waters in the Commonwealth shall be protected. The Massachusetts Department of Environmental Protection (MA DEP) is responsible for the assessment of current water quality conditions, which is a key step in the successful implementation of the watershed approach. This critical phase provides an assessment of the support status of the designated uses (support, impaired, or not assessed), as well as basic information needed to focus resource protection and remediation activities later in the watershed management planning process.

This assessment report presents a summary of current water quality data/information used to assess the status of these designated uses as defined in the Massachusetts Surface Water Quality Standards: *Aquatic Life, Fish Consumption, Drinking Water, Shellfish Harvesting* (where applicable)*, Primary* and *Secondary Contact Recreation* and *Aesthetics*. Each use, within a given segment, is individually assessed as ***support*** or ***impaired***. When too little current data/information exists or no reliable data are available the use is ***not assessed***. However, if there is some indication of water quality impairment, which is not "naturally occurring", the use is identified with an "Alert Status". It is important to note that not all waters are described in this assessment report. Many small and/or unnamed rivers and ponds are currently ***unassessed***; the status of their designated uses has never been reported to EPA in the Commonwealth's 305(b) Report nor is information on these waters maintained in the Water Body System (WBS) database.

The Buzzards Bay Watershed, a coastal river drainage area, has land areas on both the mainland and on Cape Cod. It contains freshwater streams that flow into Buzzards Bay. There are a total of 16 river, stream, brook, or creek segments (the term "rivers" will hereafter be used to include all) and 47 estuary/coastal embayment segments assessed in this report in the Buzzards Bay Watershed.

The river segments include the freshwater portions of the Agawam, Wankinco, Weweantic, Sippican, Mattapoisett, Acushnet and East Branch Westport rivers and Snell Creek. Additionally, Buttonwood Brook, Paskamanset River, Copciut River, Shingle Island River, an unnamed tributary to the Shingle Island River, and Bread and Cheese Brook are also assessed in this report. These assessments represent 85% of the 71 named streams and approximately 40% (66.55 miles) of the estimated total of 167 "named" river miles in the basin. The one unnamed tributary to the Shingle Island River adds another 1.01 miles to the total river length assessed in this report. The remaining rivers are small and/or unnamed and currently unassessed.

Coastal embayments/estuaries assessed in this report total 40.60 mi^2 and include the saltwater/estuarine portions of the Agawam, Wankinco, Weweantic, Sippican, Mattapoisett, Acushnet and East Branch Westport rivers and Snell Creek; Buttermilk, Onset, and Apponagansett bays; Hammett, Aucoot, Hiller, and Clarks coves; Sippican, Mattapoisett, New Bedford Inner, Outer New Bedford, Phinneys, Pocasset, Red Brook, Squeteague, Megansett, Wild, West Falmouth, and Quissett harbors; Eel Pond in Mattapoisett; Eel Pond in Bourne; the Cape Cod Canal; Harbor Head; and the open coastal water outside of New Bedford Harbor/Apponagansett Bay.

This report also includes information on 69 of the 173 lakes, ponds or impoundments (the term "lakes" will hereafter be used to include all) in the Buzzards Bay Watershed. The 69 lakes assessed in this report represent 4,488 acres of the 7,106 total lake acres (or 63% of the lake acreage) in the watershed.

Bouchard Barge 120, a 25 –year-old single hulled barge, owned by Bouchard Transportation Co. Inc., carrying 865,200 gallons of Number 6 ("Bunker C") fuel oil started leaking oil into Buzzards Bay on Sunday, 27 April 2003. It was estimated that up to 98,000 gallons of oil spilled into the area. Immediate impacts to shellfish resources (all beds closed), flora/fauna/aquatic life (number of dead birds/fish), and bathing beaches (closures) are not assessed in this report. Long-term affects will be assessed in the next Buzzards Bay Watershed Water Quality Assessment Report. Updated information is available on the Buzzards Bay Project website (http://www.buzzardsbay.org/oilspill-4-28-03.htm#updates).

AQUATIC LIFE USE

The *Aquatic Life Use* is supported when suitable habitat and water quality is available for sustaining a native, naturally diverse, community of aquatic flora and fauna. Impairment of the *Aquatic Life Use* may result from anthropogenic stressors that include point and/or non-point source(s) of pollution and hydrologic modification. Due to the lack of current quality-assured chemical and biological data, none of the rivers in the Buzzards Bay Watershed have been assessed for the *Aquatic Life Use* (Figure 1). However, issues identified in this report that could potentially impact the *Aquatic Life Use* include flow manipulation and its effects on fish passage in the Agawam, Wankinco, Weweantic, and Sippican rivers and water withdrawals from the subwatersheds of the Mattapoisett, Paskamanset, Copicut, Shingle Island rivers and the unnamed tributary. Additionally, the *Aquatic Life Use* for the Acushnet River is identified with an "Alert Status" due to the potential negative effects of elevated nutrients and oxygen depletion as evidenced in the Coalition for Buzzards Bay's poor health index score.

RIVERS
67.56 miles NOT ASSESSED

Only two of the estuaries in the Buzzards Bay Watershed, Aucoot Cove and Mattapoisett Harbor, are assessed as support for the *Aquatic Life Use* (Figure 1). The Agawam River (MA95-29) has been assessed as impaired due to elevated nutrients (unionized ammonia) and whole effluent toxicity. The Acushnet River and Inner New Bedford Harbor have been assessed as impaired for the *Aquatic Life Use* due to PCB contamination (New Bedford Harbor Superfund site). Additionally, thirteen other estuaries/coastal embayments (Buttermilk Bay, Onset Bay, Slocums River, East Branch Westport River, West Branch Westport River, Westport River, Pocasset Harbor, West Falmouth Harbor, Wareham River, Weweantic River, Beaverdam Creek, Outer New Bedford Harbor, and Hammet Cove), totaling 15.14 square miles, have been assessed as impaired for the *Aquatic Life Use* due to the decline/loss of eelgrass bed habitat, which may be associated with elevated nutrients (total nitrogen). The remaining 22.14 square miles are currently not assessed. The Massachusetts Estuaries Project will evaluate the nitrogen sensitivity of 89 coastal embayments in southeastern Massachusetts through comprehensive water quality testing, develop a standard guidance for assessing nutrient impairment, develop Total Maximum Daily Loads (TMDLs) for impaired embayments, and develop management recommendations for communities to consider how implementation of nitrogen management scenarios within watersheds will influence water quality in embayments.

ESTUARIES
1.60 square miles (4%) SUPPORT
16.86 square miles (42%) IMPAIRED
22.14 square miles (54%) NOT ASSESSED

A relatively small number of lakes in the Buzzards Bay Watershed have recently been surveyed for variables used to assess the status of the *Aquatic Life Use* (e.g., dissolved oxygen, pH, nutrients, macrophytes, and plankton/chlorophyll *a*). Baseline lake surveys were conducted on eight lakes (TMDL sampling) in the summer of 2000 (Appendix A, Tables A2 and A3). Synoptic surveys conducted by DWM at 64 lakes in 1995 provided less extensive and older information on more lakes (Appendix A, Table A1). Only two lakes in the Buzzards Bay Watershed, New Long Pond, Plymouth and Turner Pond in New Bedford/Dartmouth, are assessed as supporting the *Aquatic Life Use*. The majority (33%) of the lake acreage assessed is impaired for the *Aquatic Life Use* (Figure 4). The *Aquatic Life Use* is assessed as impaired in 13 lake segments primarily due to the presence of non-native aquatic plants, but other factos may include phosphates, organic enrichment/ low dissolved oxygen, and/or algal blooms. All 13 lakes - Crane Brook, Federal, Fresh Meadow, Tremont, Mill, Parker Mills, Sampson Ponds, New Bedford Reservoir, the two basins of White Island Pond and the three basins of Noquochoke Pond - are infested with non-native aquatic vegetation; *Myriophyllum heterophyllum* (variable milfoil) and/or *Cabomba caroliniana* (fanwort). These two non-native aquatic plant species reproduce vegetatively and are particularly invasive. Therefore, they may spread readily downstream on currents or by mechanical transport. Fifty-four lakes, representing 64% of the lake acreage in the Buzzards Bay Watershed, are currently not assessed for the *Aquatic Life Use*.

LAKES
109 acres (3%) SUPPORT
1,489 acres (33%) IMPAIRED
2,890 acres (64%) NOT ASSESSED

FISH CONSUMPTION USE

The *Fish Consumption Use* is supported when there are no pollutants present that result in unacceptable concentrations in edible portions of marketable fish or for the recreational use of fish, other aquatic life or wildlife for human consumption. The assessment of the *Fish Consumption Use* is made using the most recent list of Fish Consumption Advisories issued by the Massachusetts Executive Office of Health and Human Services, Department of Public Health (MDPH), Bureau of Environmental Health Assessment (MDPH 2001a). The MDPH list identifies waterbodies where elevated levels of a specified contaminant in edible portions of freshwater species poses a health risk for human consumption; hence the *Fish Consumption Use* is assessed as non-support in such waters. In July 2001, MDPH issued new (updated from 1994) consumer advisories on fish consumption and mercury contamination (MDPH 2001b). Because of these statewide advisories, no waters can be assessed as support for the *Fish Consumption Use*; these waters default to "not assessed". The statewide advisories read as follows:

> The MDPH "is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MDPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MDPH 2001b)." Additionally, MDPH "is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to 2 cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MDPH 2001b)." MDPH's statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially.

MDPH issued site-specific advisories for five lakes in the Buzzards Bay Watershed because of elevated mercury concentrations in fishes. They are Cornell Pond in Dartmouth, Long Pond and Snipatuit Pond in Rochester, Turner Pond in Dartmouth/New Bedford and the three basins of Noquochoke Lake in Dartmouth (Figure 5). In addition, there are elevated PCB concentrations in fish tissue from Cornell Pond and the three basins of Noquochoke Lake (MDPH 2002c). The *Fish Consumption Use* is also assessed as impaired due to mercury and PCB contamination for a total of 1.34 miles of the Copicut River (Figure 2). Sources of mercury in this area are currently unknown, although atmospheric deposition is suspected. Sources of PCBs in Cornell Pond, the three basins of Noquochoke Lake and the Copicut River are linked to the Resolve Superfund site. No other lakes or rivers were assessed for the *Fish Consumption Use* in the Buzzards Bay Watershed. Additionally, the estuarine segments of New Bedford Inner Harbor and Outer New Bedford Harbor, Clarks Cove, Apponagansett Bay and Open Coastal Water outside of New Bedford Harbor have fish consumption advisories due to PCB contamination associated with the New Bedford Harbor Superfund site and, therefore, are impaired for this use.

RIVERS
1.34 miles (2%) IMPAIRED
66.22 (98%) miles NOT ASSESSED

ESTUARIES
17.94 sq. miles (44%) IMPAIRED
22.66 sq. miles (56%) NOT ASSESSED

LAKES
925 acres (21%) IMPAIRED
3,563 acres (79%) NOT ASSESSED

DRINKING WATER USE

The term *Drinking Water Use* has been used to indicate sources of public drinking water. While this use is not assessed in this report, the state provides general guidance on drinking water source protection of both surface water and groundwater sources (available at http://www.state.ma.us/dep/brp/dws/dwshome.htm). These waters are subject to stringent regulation in accordance with the Massachusetts Drinking Water Regulations. MA DEP's Drinking Water Program (DWP) has primacy for implementing the provisions of the federal Safe Drinking Water Act. DWP has also initiated work on its Source Water Assessment Program (SWAP), which requires that the Commonwealth delineate protection areas for all public ground and surface water sources, inventory land uses in these

areas that may present potential threats to drinking water quality, determine the susceptibility of water supplies to contamination from these sources, and publicize the results.

Public water suppliers monitor their finished water (tap water) for major categories of both naturally occurring and man-made contaminants such as: microbiological, inorganic, organic, pesticides, herbicides and radioactive contaminants. Specific information on community drinking water sources including SWAP activities and drinking water quality information are updated and distributed annually by the public water system to its customers in a "Consumer Confidence Report". These reports are available from the public water system, the local boards of health, MDPH, and MA DEP.

SHELLFISH HARVESTING USE

The *Shellfish Harvesting Use* is supported when shellfish harvested from approved Open Shellfish Areas (Class SA) are suitable for consumption without depuration and shellfish harvested from approved Restricted Shellfish Areas (Class SB) are suitable for consumption with depuration. The Division of Marine Fisheries (DMF) classifies shellfishing areas in the Buzzards Bay Watershed. The *Shellfish Harvesting Use* for this report was assessed using the DMF shellfishing closure list dated July 2000. Designated shellfish growing areas (as of July 2000) may be viewed using the MassGIS datalayer available from MassGIS at http://www.state.ma.us/mgis/dsga.htm.

On Monday April 28, 2003, in response to the Bouchard 120 oil spill, the Massachusetts Division of Marine Fisheries closed the lower two thirds of Buzzards Bay, southward to the Rhode Island border. The entire bay was closed April 30. The initial closures were precautionary and the Massachusetts Division of Fisheries reopened about 90,000 acres, or half the Bay, on May 22 after tests showed shellfish were safe in these areas. More heavily oiled areas remain closed. Theses closures are not reflective in the assessments of the *Shellfish Harvesting Use*. Additional information is available on the Buzzards Bay Project's website: http://www.buzzardsbay.org/oilspill-4-28-03.htm.

The status (as of July 2000) of the 261,901.301 acres of shellfishing beds in the entire Buzzards Bay Watershed (including areas that extend into open-water and areas not specifically included in this assessment report) is as follows:

DMF Classification Type	MA DEP Use Support Status	DMF Area (Acres)	% of total DMF acreage
Approved	Support	232559.5	89%
Conditionally Approved	SB Waters- Support	13187.88	5%
	SA Waters-Impaired		
Restricted	SB Waters- Support	6200.129	2%
	SA Waters-Impaired		
Prohibited	Impaired	9722.802	4%
Management Closure	Not assessed	230.99	0.09%

Individual DMF management area classifications are provided in Appendix E of this report. It should be noted that DMF's areas are defined in acres of shellfish habitat. Most of the acreage periodically closed to shellfishing is located in heavily used areas close to shore. Whereas, most of the approved acreage is in the deeper waters that are more difficult to harvest (Janik 2003).

PRIMARY & SECONDARY CONTACT RECREATIONAL* AND *AESTHETIC USES

The *Primary Contact Recreational Use* is supported when conditions are suitable (fecal coliform bacteria densities, pH, temperature, turbidity and aesthetics meet the Massachusetts Surface Water Quality Standards) for any recreational or other water related activity during which there is prolonged and intimate contact with the water and there exists a significant risk of ingestion. Activities include, but are not limited to, wading, swimming, diving, surfing, water skiing, and windsurfing. The *Secondary Contact Recreational Use* is supported when conditions are suitable for any recreational or other water use during which contact with the water is either incidental or accidental. These include, but are not limited to, fishing, boating, and limited contact incident to shoreline activities. For lakes, macrophyte cover and/or transparency (Secchi disk depth) data are assessed to evaluate the status of the recreational uses. The

Aesthetics Use is supported when surface waters are free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.

Rivers		
PRIMARY **9.95 miles (15%) IMPAIRED** **57.61 miles (85%) NOT ASSESSED**	***SECONDARY*** **8.96 miles (13%) SUPPORT** **0.99 miles (1%) IMPAIRED** **57.61 miles (86%) NOT ASSESSED**	***AESTHETICS*** **11.46 miles (17%) SUPPORT** **56.10 miles (83%) NOT ASSESSED**

Estuaries		
PRIMARY **21.61 mi^2 (53%) SUPPORT** **1.79 mi^2 (4%) IMPAIRED** **17.20 mi^2 (42%) NOT ASSESSED**	***SECONDARY*** **21.61 mi^2 (53%) SUPPORT** **1.79 mi^2 (4%) IMPAIRED** **17.20 mi^2 (42%) NOT ASSESSED**	***AESTHETICS*** **1.56 mi^2 (4%) IMPAIRED** **39.04 mi^2 (96%) NOT ASSESSED**

The East Branch Westport River (MA95-40), Bread and Cheese Brook, and Snell Creek (MA95-44 and MA95-45) are all assessed as impaired for the *Primary Contact Recreational Use* as the result of elevated fecal coliform bacteria levels. Suspected sources of contamination include municipal separate storm sewer systems, highway/road runoff, on-site septic systems, poor manure management and grazing in the riparian zone. All other rivers in the Buzzards Bay Watershed are currently not assessed for the *Primary Contact Recreational Use* due to the lack of current quality assured bacteria data. However, 2.53 miles of the East Branch Westport River (MA95-40), Bread and Cheese Brook, and one segment of Snell Creek (MA95-44) are assessed as support for the *Secondary Contact Recreational Use*. Snell Creek (MA95-45) and 0.32 miles of the East Branch Westport River (MA95-40), downstream from the Gifford Road storm drain, are assessed as impaired for the *Secondary Contact Recreational Use* due to elevated bacteria counts (Figure 3).

The *Primary* and *Secondary Contact Recreational Uses* are assessed as support the entire Westport River, Squeteague Harbor, Megansett Harbor and Sippican Harbor segments.

A portion of the following segments are assessed as supporting the recreational uses: Buttermilk Bay, Onset Bay, the Wareham River, Weweantic River, Hammet Cove, Aucoot Cove, Hiller Cove, Mattapoisett Harbor, Nasketucket Bay, Apponagansett Bay, open water near New Bedford Harbor/Apponagansett Bay, Slocums River, East Branch Westport River, West Branch Westport River, Cape Cod Canal, Phinneys Harbor, Pocasset Harbor, Red Brook Harbor, West Falmouth Harbor, and Quissett Harbor. With the exception of the East Branch Westport River (see below) the remaining acreage of these segments is currently not assessed.

Snell Creek (MA95-59), the Acushnet River (MA95-33) and New Bedford Inner Harbor are impaired for the *Primary and Secondary Contact Recreational Uses*. Additionally, a portion of the East Branch Westport River (MA95-41) is also impaired for both of these uses. Source of impairment for Snell Creek and the East Branch Westport River include operations related to dairy farming (animal feeding operation, grazing in the riparian zone, dairy outside milk parlor area). Suspected sources of impairment for these segments include municipal separate storm sewer systems, on-site septic systems, highway/road runoff. Sources contributing to the impairment of New Bedford Inner Harbor include CSOs and the urbanized high density areas; waterfowl are also suspected. The Massachusetts Estuaries Project, while primarily evaluating the nitrogen sensitivity of 89 coastal embayments in southeastern Massachusetts, will develop bacteria Total Maximum Daily Loads (TMDLs) for a limited number of impaired embayments.

The *Primary* and *Secondary Contact Recreational Uses* have not been assessed at all for 20 segments (Figure 3).

Only the Weweantic River is assessed as support for the *Aesthetics Use*. The *Aesthetics Use* is assessed as impaired for the Acushnet River and New Bedford Inner Harbor as a result of oil & grease, odor, color, and trash and debris resulting from urban runoff/high density areas and CSO discharges (Figure 3). The remaining segments (both fresh and estuarine) are currently not assessed for the *Aesthetics Use*.

Ten lakes in the Buzzards Bay Watershed (Figure 6) are assessed as supporting both the *Primary* and *Secondary Contact Recreational Uses.* These lakes – Barrett, Charge, College, Curlew, Fearing, Glen Charlie, Queen Sewell, Sampson, Snipatuit, and Vaughn ponds – represent 18.9% (1338 acres) of the total lake acreage (7,106 acres) in the Buzzards Bay Watershed. Five lakes in the Buzzards Bay Watershed are assessed as impaired for both the *Primary* and *Secondary Contact Recreational Uses* and the *Aesthetics Use.* Crane Brook Bog Pond is impaired due to excess algal growth; Federal Pond is impaired due to non-native plants; New Bedford Reservoir is impaired due to non-native plants and phosphate; Parker Mills Pond is impaired due to non-native plants and phosphate; and the east basin of White Island Pond is impaired due to excess algal growth, Secchi disk transparency, and phosphate. Although sources are currently unknown, nutrient enrichment from storm water runoff; failing, substandard, or inappropriately sited sewage disposal systems; or drainage from agricultural lands is likely to contribute to increased macrophyte productivity, resulting in impairments to this use. Additionally, one basin of Noquochoke Lake (MA95170) is assessed as impaired for the *Primary Contact Recreation Use* due to elevated *Enterococci* bacteria concentrations. The majority of the lake acreage in the Buzzards Bay Watershed is not assessed for the *Recreational* and *Aesthetics uses* (roughly 55% and 83%, respectively).

Lakes		
PRIMARY	***SECONDARY***	***AESTHETICS***
1338 acres (30%) SUPPORT	**1,338 acres (30%) SUPPORT**	**109 acres (2%) SUPPORT**
759 acres (17%) IMPAIRED	**649 acres (14%) IMPAIRED**	**649 acres (15%) IMPAIRED**
2,391 acres (53%) NOT ASSESSED	**2,501 acres (56%) NOT ASSESSED**	**3,730 acres (83%) NOT ASSESSED**

RECOMMENDATIONS

In addition to specific issues for the individual segments, the evaluation of current water quality conditions in the Buzzards Bay Watershed has revealed the need for the following actions.

- Implement the recommendations developed by the Massachusetts Estuaries Project to minimize nitrogen enrichment and bacterial contamination to the coastal waters of Buzzards Bay.

- Determine the cause of low flows in the Mattapoisett and Paskamansett rivers and work to restore substantial flow for aquatic life.

- Work with interested stakeholders, including the Coalition for Buzzards Bay, Westport River Watershed Alliance, and Falmouth Pond Watchers, to collect quality-assured biological, physical, chemical, and bacteriological data to fully assess the designated uses of segments in the Buzzards Bay Watershed. Follow the strategy presented in the United States Geological Survey Statewide Water-Quality Network Report for examples of the monitoring necessary to completely assess all uses (DeSimone *et al* 2001).

- The flow manipulations associated with cranberry bog operations should be examined to determine their impacts to anadromous fish migrations throughout the watershed. Additionally, cranberry bog and water supply dam operators in the watershed should be encouraged to develop and implement flow management guidelines that protect and/or restore habitat needs.

- Continue to support efforts to map the distribution of eelgrass beds throughout the Buzzards Bay Watershed and continue to examine the health and biovolume of the plants as indicators of water quality.

- As a result of historical urbanization and the evolution from an agrarian society to an important port for whaling and commercial fishing, salt marshes and coastlines in the Buzzards Bay Watershed have been altered (soil erosion and silting from grazing and farming, construction of wharfs, piers, bridges) and tidal flushing has been reduced. Implement the salt marsh restoration projects identified and prioritized in the *2002 Atlas of Tidally Restricted Salt Marshes – Buzzards Bay Watershed, Massachusetts* (BBP 2002b).

- Continue to monitor bacteria levels to document effectiveness of bacteria source reduction activities including treatment of storm water discharges, the Phase II community storm water management programs, and implementation of BMPs.

- All of the municipalities in the Buzzards Bay Watershed are Phase II communities and, as such, must apply for permit coverage for their municipal drainage system. This includes developing, implementing, and enforcing a storm water management program to reduce the discharge of pollutants from their system over the five-year permit term.

- Track the progress of CSO abatement activities and the facilities plan update for the City of New Bedford.

- Coordinate with the Massachusetts Department of Environmental Management, Six Ponds Association, and other groups conducting surveys of lakes and associated watersheds to generate quality-assured data (dissolved oxygen and temperature profiles, total phosphorus and chlorophyll *a*, fecal coliform bacteria, Secchi disk depth) to assess the designated uses. As part of any lake water quality evaluation include identification of non-native species and mapping of macrophyte cover in order to evaluate the status of the *Aquatic Life*, *Recreational,* and *Aesthetic uses.*

- Monitor and control the spread of non-native vegetation in aquatic and wetland habitats.

- When completed, implement recommendations identified in the *Cranberry Bog Phosphorus Dynamics TMDL Project* (DeMoranville 2001).

- Implement recommendations from diagnostic/feasibility studies including the D/F study for New Bedford Reservoir (ENSR 2002).

- Monitor the remediation activities and the water quality downgradient of the Tier 1A hazardous waste sites, including the following five EPA designated superfund sites: New Bedford Harbor, Massachusetts Military Reservation, Atlas Tack in Fairhaven, Re-Solve, Inc. in Dartmouth, and Sullivan's Ledge in New Bedford.

- Review the 2003 Buzzards Bay Stormwater Atlas when it becomes available from the Buzzards Bay National Estuary Project and implement recommended upgrades at the high priority storm water discharge sites.

- In April of 2003 Bouchard Barge 120 spilled oil in Buzzards Bay, affecting an estimated 94 miles of shoreline. If penalty money is assessed from Bouchard, potential recipients could include the Coalition for Buzzards Bay water quality monitoring program, which samples more than 30 waterbodies throughout the watershed, and the Turn the Tide Initiative, which will work to address nutrient enrichment and nonpoint source pollution in the Apponagansett Bay/Slocums River estuary.

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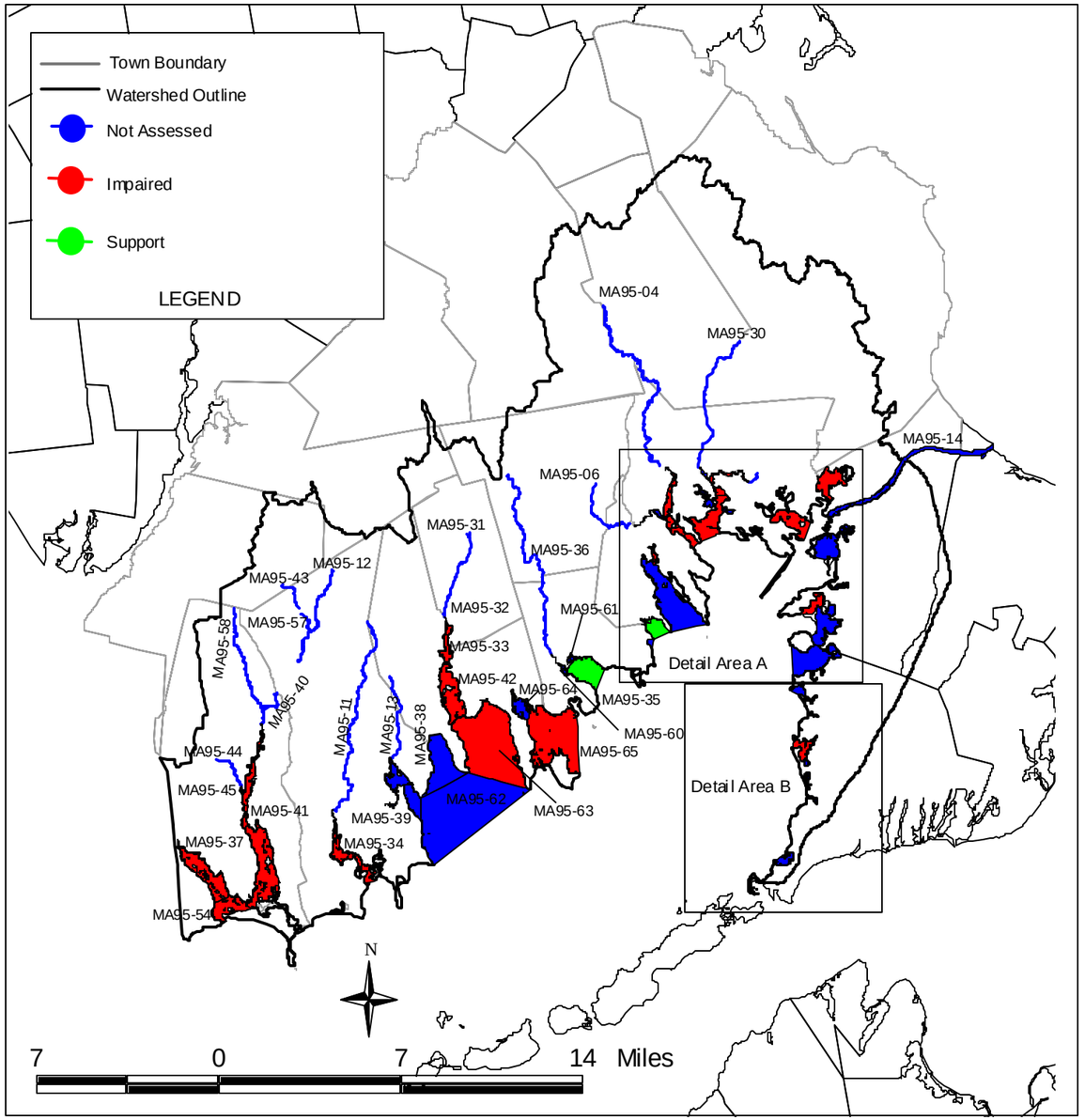
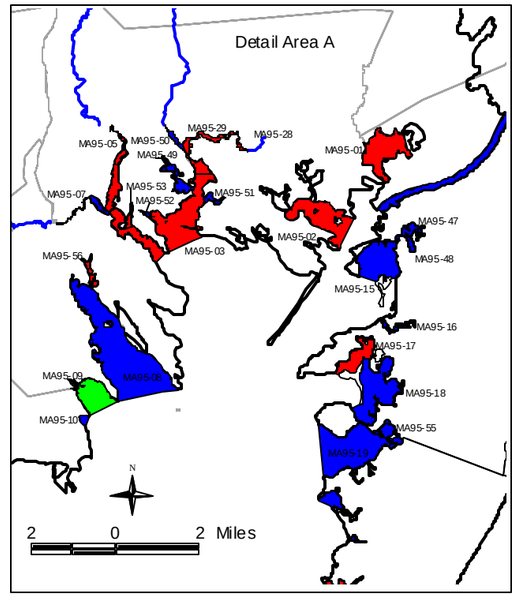
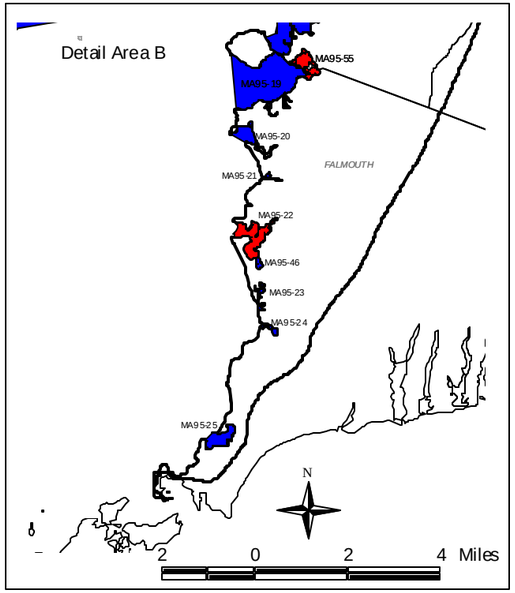
Details of *Aquatic Life Use* impairments of river and estuary/coastal embayment segments in the Buzzards Bay Watershed.

Waterbody (WBID)	Causes	Sources
Buttermilk Bay MA95-01	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Other anthropogenic substrate alterations, total nitrogen	Suspected: Recreational activities (boat traffic), highway/road runoff, urbanized high density area, municipal separate storm sewer systems
Onset Bay MA95-02	Estuarine bioassessment (Loss/decline of eelgrass bed habitat) Suspected: Other anthropogenic substrate alterations, total nitrogen	Suspected: Recreational activities (boat traffic), highway/road runoff, urbanized high density area, municipal separate storm sewer systems
Wareham River MA95-03	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen	Municipal point source discharge Suspected: On-site treatment systems (septic systems), specialty crop production related to cranberry bogs
Weweantic River MA95-05	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen	Suspected: On-site treatment systems (septic systems), specialty crop production related to cranberry bogs, recreational activities (boat traffic)
Pocasset Harbor MA95-17	Estuarine bioassessment (loss/decline of eelgrass bed habitat) Suspected: Other anthropogenic substrate alterations (resuspension of sediments), total nitrogen	Suspected: Recreational activities (boat traffic), highway/ road runoff
West Falmouth Harbor MA95-22	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen	On-site treatment systems (septic systems), septage disposal (landfill lagoon), municipal point source discharge (groundwater)
Agawam River MA95-29	Ammonia (unionized), whole effluent toxicity	Municipal point source discharge Suspected: Irrigated, specialty crop production related to cranberry bogs and on-site treatment systems (septic systems)
Acushnet River MA95-33	PCBs	Contaminated sediments, CERCLA NPL (Superfund site)
Slocums River MA95-34	Estuarine bioassessment (loss of eelgrass bed habitat) Suspected: Total nitrogen	Suspected: On-site treatment systems (septic systems), urbanized high density area, municipal separate storm sewer systems, landfills
West Branch Westport River MA95-37	Estuarine bioassessment (Loss/decline of eelgrass bed habitat) Suspected: Total nitrogen	Suspected: Animal feeding operation, municipal separate storm sewer systems, on- site septic systems
East Branch Westport River MA95-41	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen	Animal feeding operation, municipal separate storm sewer systems Suspected: On-site septic systems, changes in tidal circulation/flushing
New Bedford Inner Harbor MA95-42	PCBs Suspected: Reduced tidal flushing, total nitrogen	Contaminated sediments, CERCLA NPL (Superfund site) Suspected: Changes in tidal circulation/flushing, CSO, urbanized high-density area, municipal point source discharge
Beaverdam Creek MA95-53	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen	Suspected: On-site treatment systems (septic systems), specialty crop production related to cranberry bogs
Westport River MA95-54	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen, other anthropogenic substrate alterations	Suspected: Animal feeding operation, municipal separate storm sewer systems, on-site septic systems
Hammett Cove MA95-56	Estuarine bioassessment (Decline of eelgrass bed habitat) Suspected: Total nitrogen	Suspected: On-site treatment systems (septic systems), residential districts/lawns
Outer New Bedford Harbor MA95-63	Estuarine bioassessment (loss of eelgrass bed habitat) Suspected: Total nitrogen, other anthropogenic substrate alterations	Suspected: CSO, urbanized high density area, municipal separate storm sewer systems

Figure 1. BUZZARDS BAY WATERSHED
***AQUATIC LIFE USE* ASSESSMENT SUMMARY**
RIVERS AND ESTUARIES/COASTAL EMBAYMENTS







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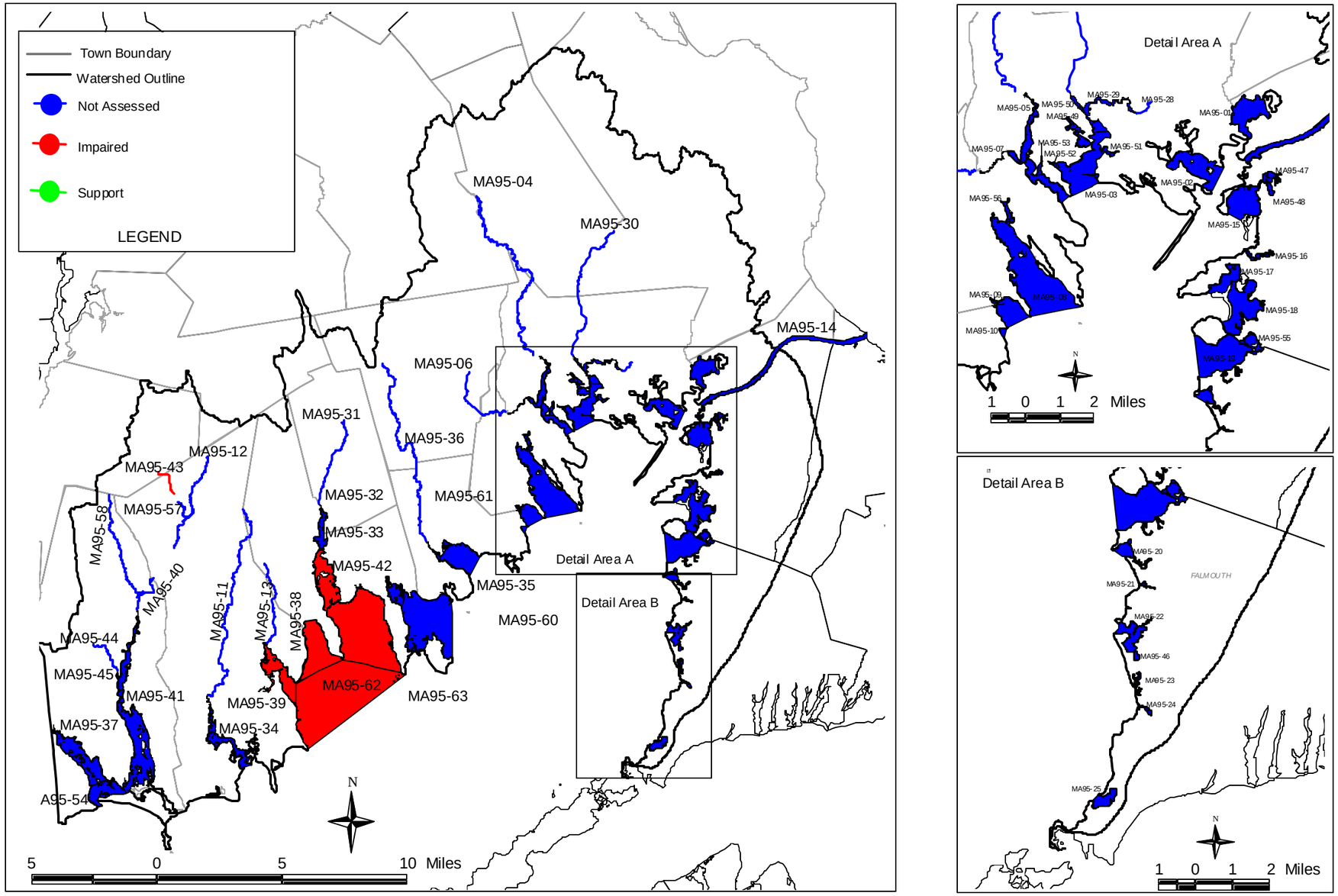
In July 2001, the Massachusetts Department of Public Health issued new consumer advisories on fish consumption and mercury contamination. The MDPH "is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MDPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MDPH 2001b)." Additionally, MDPH "is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to 2 cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MDPH 2001b)." MDPH's statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially. Due to the statewide advisory, no waterbody in Massachusetts can be assessed as Support for the *Fish Consumption Use.*

In the Buzzards Bay Watershed, MDPH issued site specific fish consumption advisories for the Copicut River (MA95-11) due to elevated levels of mercury and PCBs in edible fillets of fish and for Clarks Cove (MA95-38), Apponagansett Bay (MA95-39), New Bedford Inner Harbor (MA95-42), Open Water (MA95-62), and Outer New Bedford Harbor (MA95-63) due to PCBs. Therefore, the *Fish Consumption Use* is Impaired. Sources of PCB impairment include contaminated sediments and Superfund Sites. Atmospheric deposition is a suspected source of mercury.

Figure 2. BUZZARDS BAY WATERSHED
***FISH CONSUMPTION USE* ASSESSMENT SUMMARY**
RIVERS AND ESTUARIES/COASTAL EMBAYMENTS



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Details of Impairment of the *Primary* and *Secondary Contact Recreational uses* and the *Aesthetics Use* for river and estuary/coastal embayment segments in the Buzzards Bay Watershed.

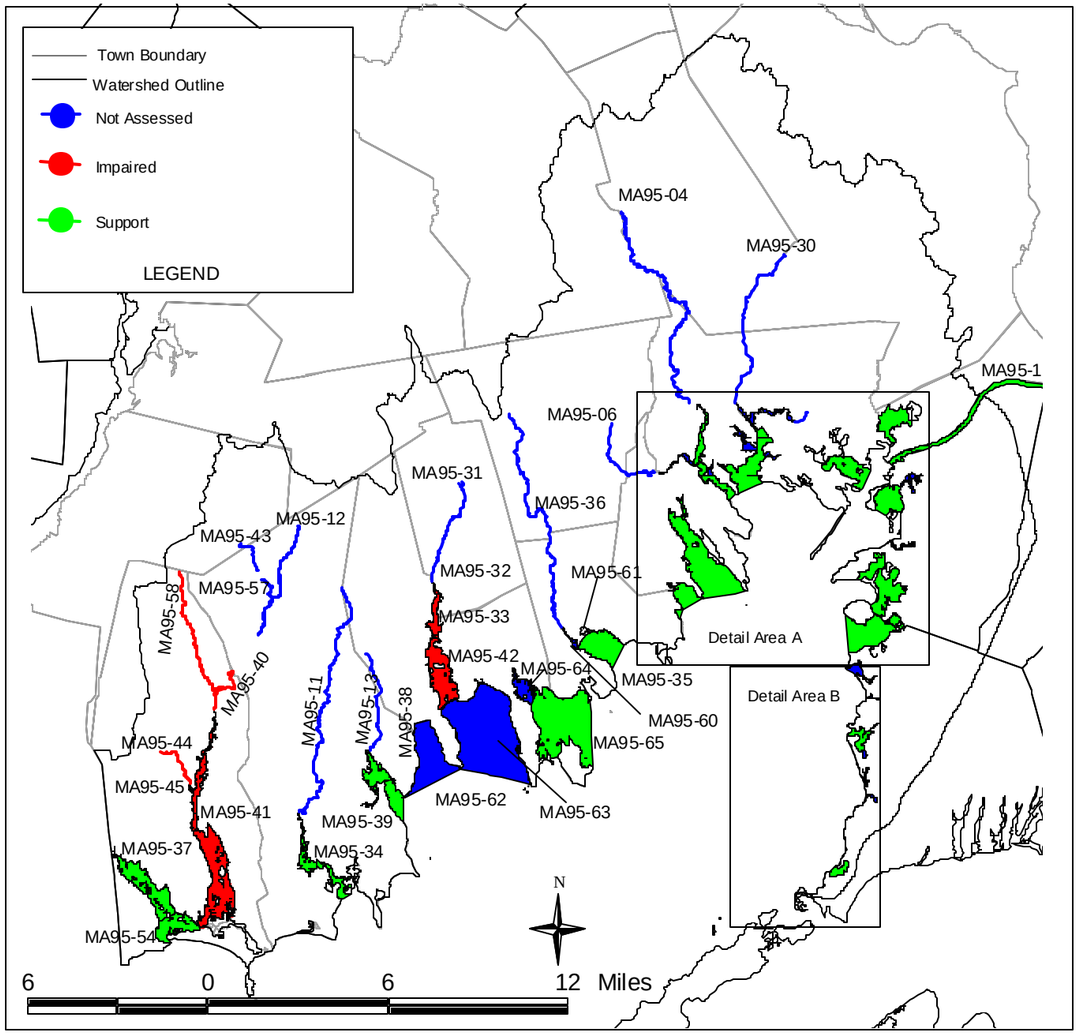
NOTES: 1º = Primary Contact; 2º = Secondary Contact. *The Aesthetics Use is assessed as Support in one segment, MA95-04, and as IMPAIRED in two segments, MA95-33 and MA95-42 due to oil & grease, odor, color, trash and debris. Because the *Aesthetics Use* is impaired, the *Primary and Secondary Contact uses* are also impaired. Sources include CSO and urbanized high-density areas. Suspected sources in MA95-42 include shipbuilding, repairs, dry-docking, and ballast water releases.

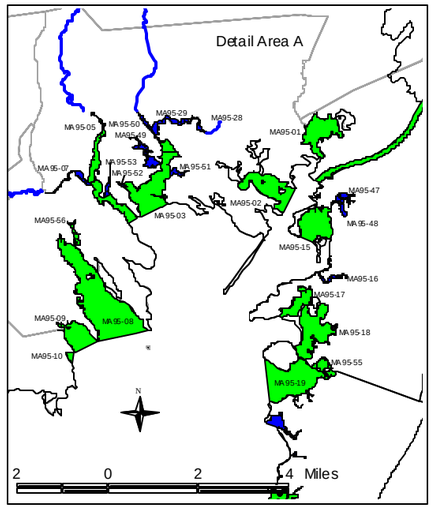
Waterbody (WBID)	Use Assessment	Causes	Source
Acushnet River (MA95-33)*	1º, 2º- IMPAIRED	Oil & grease, odor, color, trash and debris	CSO, urbanized high density area
East Branch Westport River (MA95-40)	1º -IMPAIRED 2º- 2.53 miles SUPPORT 0.32 miles IMPAIRED	Fecal coliform bacteria	Suspected: Municipal separate storm sewer systems, highway/road runoff
East Branch Westport River (MA95-41)	1º, 2º- 2.43 mi^2 SUPPORT 1º, 2º- 0.22 mi^2 IMPAIRED	Fecal Coliform Bacteria	Animal feeding operation, dairy outside milk parlor area, grazing in riparian zone, municipal separate storm sewer systems Suspected: On-site septic systems highway/road runoff
New Bedford Inner Harbor (MA95-42)*	1º, 2º- IMPAIRED	Oil & grease, odor, trash and debris	CSO, urbanized high density area Suspected: Waterfowl
Snell Creek (MA95-44)	1º, 2º- IMPAIRED	Fecal coliform bacteria	Suspected: Municipal separate storm sewer systems, on-site septic systems, highway/road \runoff
Bread and Cheese Brook (MA95-58)	1º, 2º- IMPAIRED	Fecal coliform bacteria	Suspected: Municipal separate storm sewer systems, grazing in riparian z one, highway/road runoff
Snell Creek (MA95-59)	1º, 2º- IMPAIRED	Fecal Coliform Bacteria	Animal feeding operation, grazing in riparian zone, dairy outside milk parlor area Suspected: Municipal separate storm sewer systems, on-site septic systems, highway/road runoff

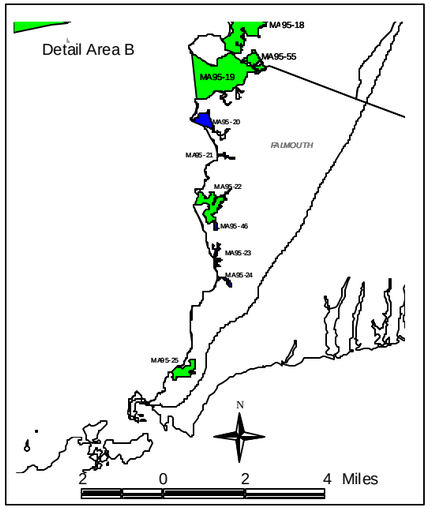
The following estuaries/coastal embayments in the Buzzards Bay Watershed have been assessed as SUPPORT for a portion of their area:

Buttermilk Bay	1º, 2º- 0.51 mi^2 SUPPORT	Onset Bay	1º, 2º- 0.63 mi^2 SUPPORT
MA95-01	1º, 2º- 0.16 mi^2 NOT ASSESSED	MA95-02	1º, 2º- 0.15 mi^2 NOT ASSESSED
Wareham River	1º, 2º- 0.93 mi^2 SUPPORT	Weweantic River	1º, 2º- 0.17 mi^2 SUPPORT
MA95-03	1º, 2º- 0.25 mi^2 NOT ASSESSED	MA95-05	1º, 2º- 0.45 mi^2 NOT ASSESSED
Aucoot Cove	1º, 2º- 0.46 mi^2 SUPPORT	Hiller Cove	1º, 2º- 0.03 mi^2 SUPPORT
MA95-09	1º, 2º- 0.04 mi^2 NOT ASSESSED	MA95-10	1º, 2º- 0.01 mi^2 NOT ASSESSED
Cape Cod Canal	1º, 2º- 0.58 mi^2 SUPPORT	Pocasset Harbor	1º, 2º- 0.2 mi^2 SUPPORT
MA95-14	1º, 2º- 0.15 mi^2 NOT ASSESSED	MA95-17	1º, 2º- 0.13 mi^2 NOT ASSESSED
Red Brook Harbor	1º, 2º- 0.8 mi^2 SUPPORT	West Falmouth Harbor	1º, 2º- 0.09 mi^2 SUPPORT
MA95-18	1º, 2º- 0.11 mi^2 NOT ASSESSED	MA95-22	1º, 2º- 0.2 mi^2 NOT ASSESSED
Quissett Harbor	1º, 2º- 0.11 mi^2 SUPPORT	Slocums River	1º, 2º- 0.01 mi^2 SUPPORT
MA95-25	1º, 2º- 0.06 mi^2 NOT ASSESSED	MA95-34	1º, 2º- 0.66 mi^2 NOT ASSESSED
Mattapoisett Harbor	1º, 2º- 1.00 mi^2 SUPPORT	West Branch Westport River	1º, 2º- 0.5 mi^2 SUPPORT
MA95-35	1º, 2º- 0.01 mi^2 NOT ASSESSED	MA95-37	1º, 2º- 0.78 mi^2 NOT ASSESSED
Apponagansett Bay	1º, 2º- 0.27 mi^2 SUPPORT	Hammet Cove	1º, 2º- 0.05 mi^2 SUPPORT
MA95-39	1º, 2º- 0.68 mi^2 NOT ASSESSED	MA95-56	1º, 2º- 0.02 mi^2 NOT ASSESSED
Open Water	1º, 2º- 4.82 mi^2 SUPPORT	Nasketucket Bay	1º, 2º- 3.2 mi^2 SUPPORT
MA95-62	1º, 2º- 3.2 mi^2 NOT ASSESSED	MA95-65	1º, 2º- 0.5 mi^2 NOT ASSESSED

Figure 3. BUZZARDS BAY WATERSHED
PRIMARY* AND *SECONDARY CONTACT RECREATIONAL USES
ASSESSMENT SUMMARY
RIVERS AND ESTUARIES/COASTAL EMBAYMENTS







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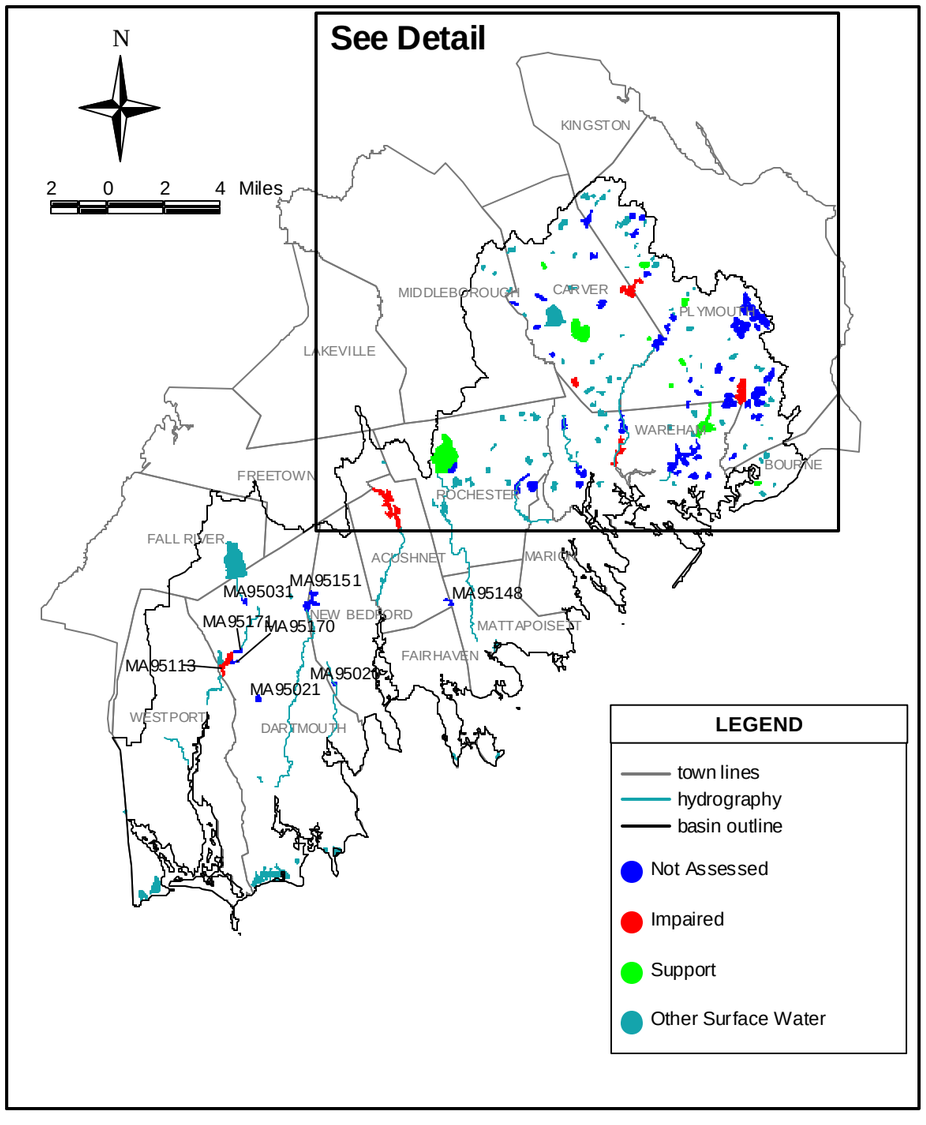
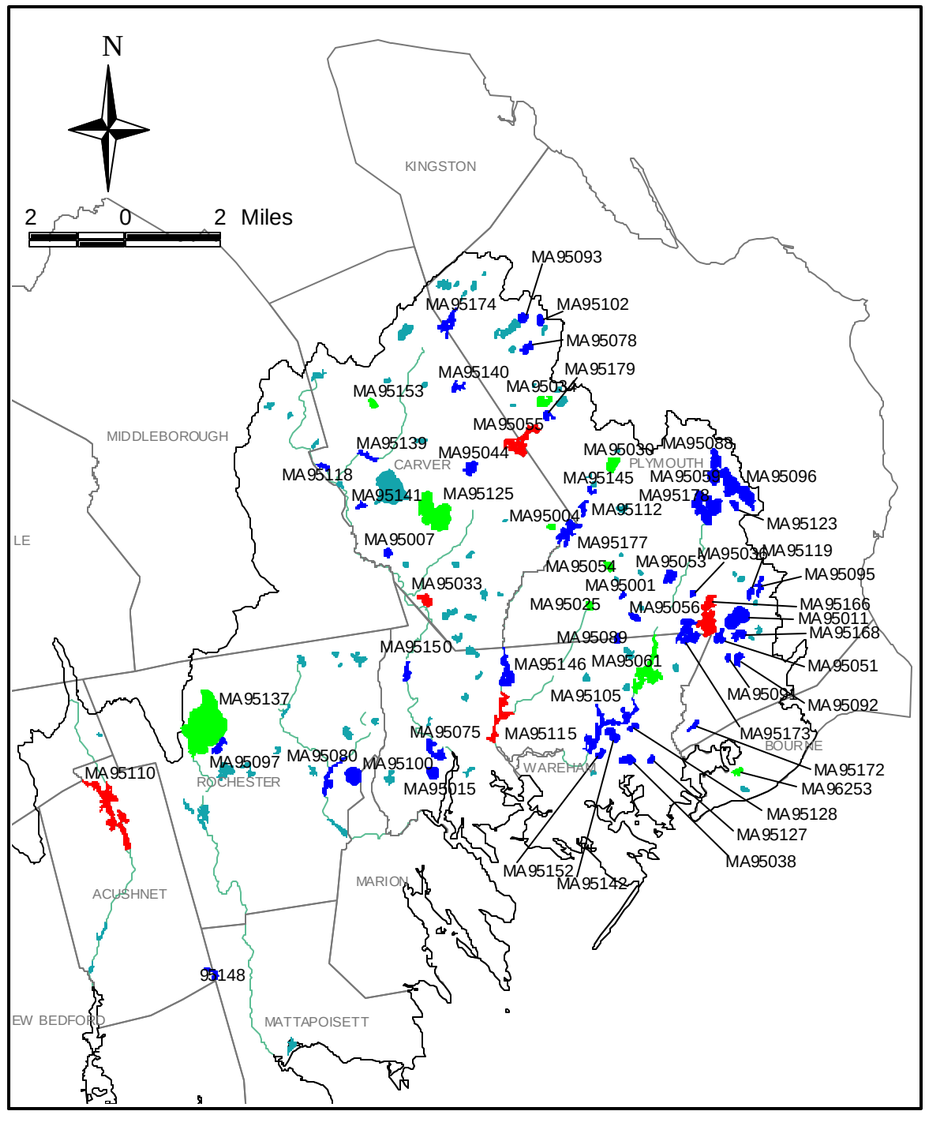
Details of *Aquatic Life Use* impairments of lake segments in the Buzzards Bay Watershed.

Waterbody (WBID)	Causes
Carver Brook Bog Pond (MA95033)	Non-native plants, phosphate, excess algal growth
Federal Pond (MA95055)	Non-native plants
Fresh Meadow Pond (MA95174)	Non-native plants
Mill Pond (MA95105)	Non-native plants
New Bedford Reservoir (MA95110)	Non-native plants, DO, DO saturation, phosphate
Noquochoke Lake (MA95113)	Non-native plants
Noquochoke Lake (MA95170)	Non-native plants
Noquochoke Lake (MA95171)	Non-native plants
Parker Mills Pond (MA95115)	Non-native plants, phosphate
Sampson Pond (MA95125)	Non-native plants
Tremont Mill Pond (MA95150)	Non-native plants
White Island Pond (East) (MA95166)	Non-native plants, phosphate, excess algal growth, chlorophyll a
White Island Pond (West) (MA95173)	Non-native plants

Figure 4. BUZZARDS BAY WATERSHED
***AQUATIC LIFE USE* ASSESSMENT SUMMARY**
LAKES





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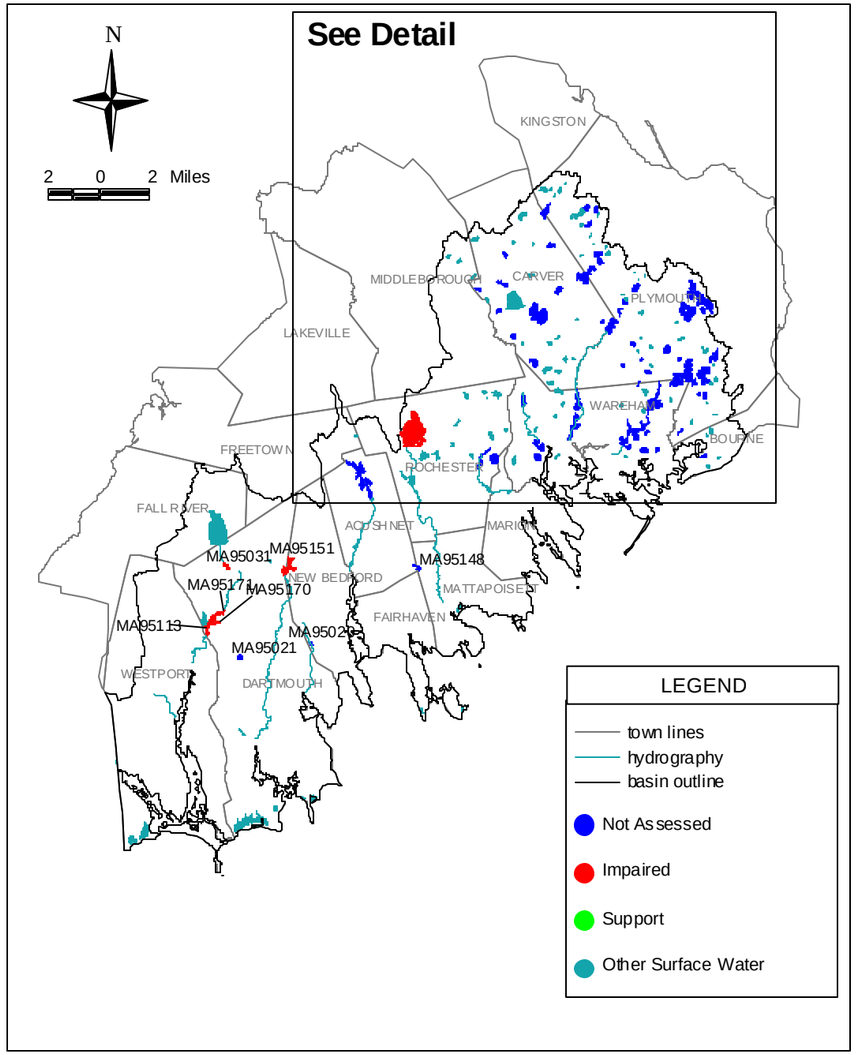
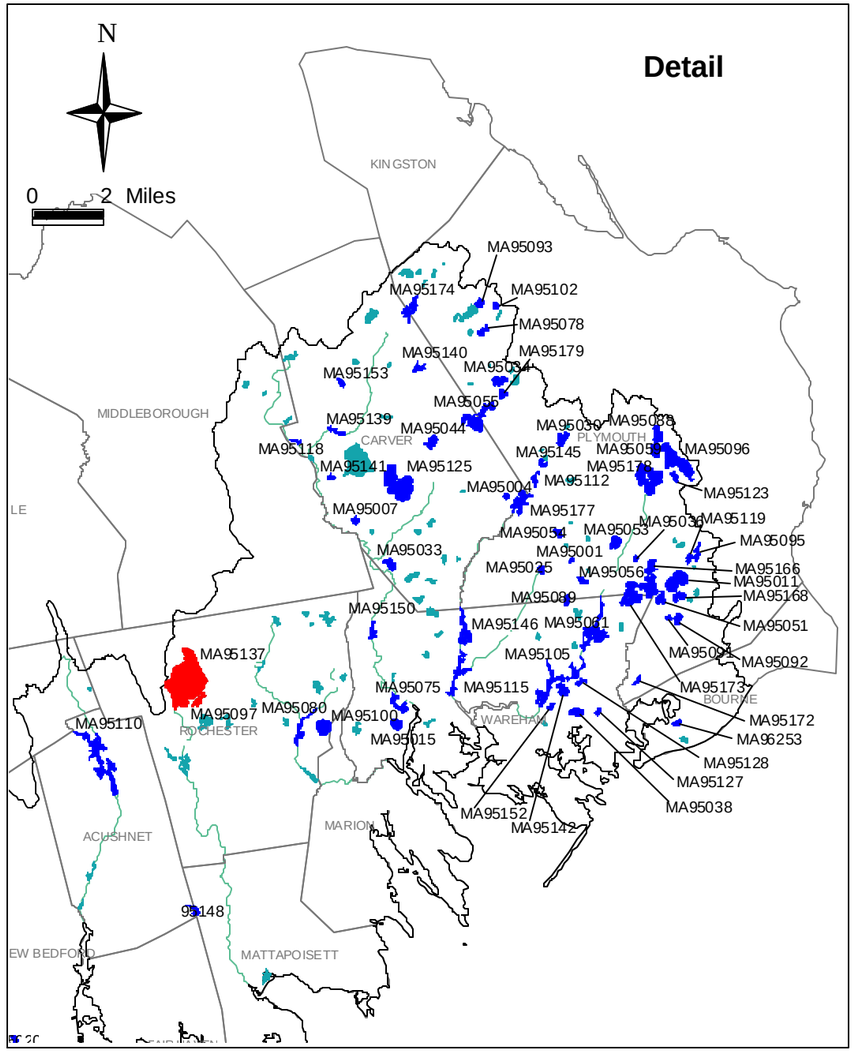
In July 2001, the Massachusetts Department of Public Health issued new consumer advisories on fish consumption and mercury contamination. The MDPH "is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MDPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MDPH 2001b)." Additionally, MDPH "is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to 2 cans per week. Very small children, including toddlers, should eat less. Consumers may wish to choose to eat light tuna rather than white or chunk white tuna, the latter of which may have higher levels of mercury (MDPH 2001b)." MDPH's statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially. Due to the statewide advisory, no waterbody in Massachusetts can be assessed as Support for the *Fish Consumption Use.* Atmospheric deposition is suspected as a source of mercury. PCBs contamination is associated with the ReSolve Superfund Site.

Waterbody	WBID	Cause
Cornell Pond	MA95031	Mercury, PCBs
Long Pond	MA95097	Mercury
Noquochoke Lake	MA95113	Mercury, PCBs
Noquochoke Lake	MA95170	Mercury, PCBs
Noquochoke Lake	MA95171	Mercury, PCBs
Snipatuit Pond	MA95137	Mercury
Turner Pond	MA95151	Mercury

Figure 5. BUZZARDS BAY WATERSHED
***FISH CONSUMPTION USE* ASSESSMENT SUMMARY**
LAKES





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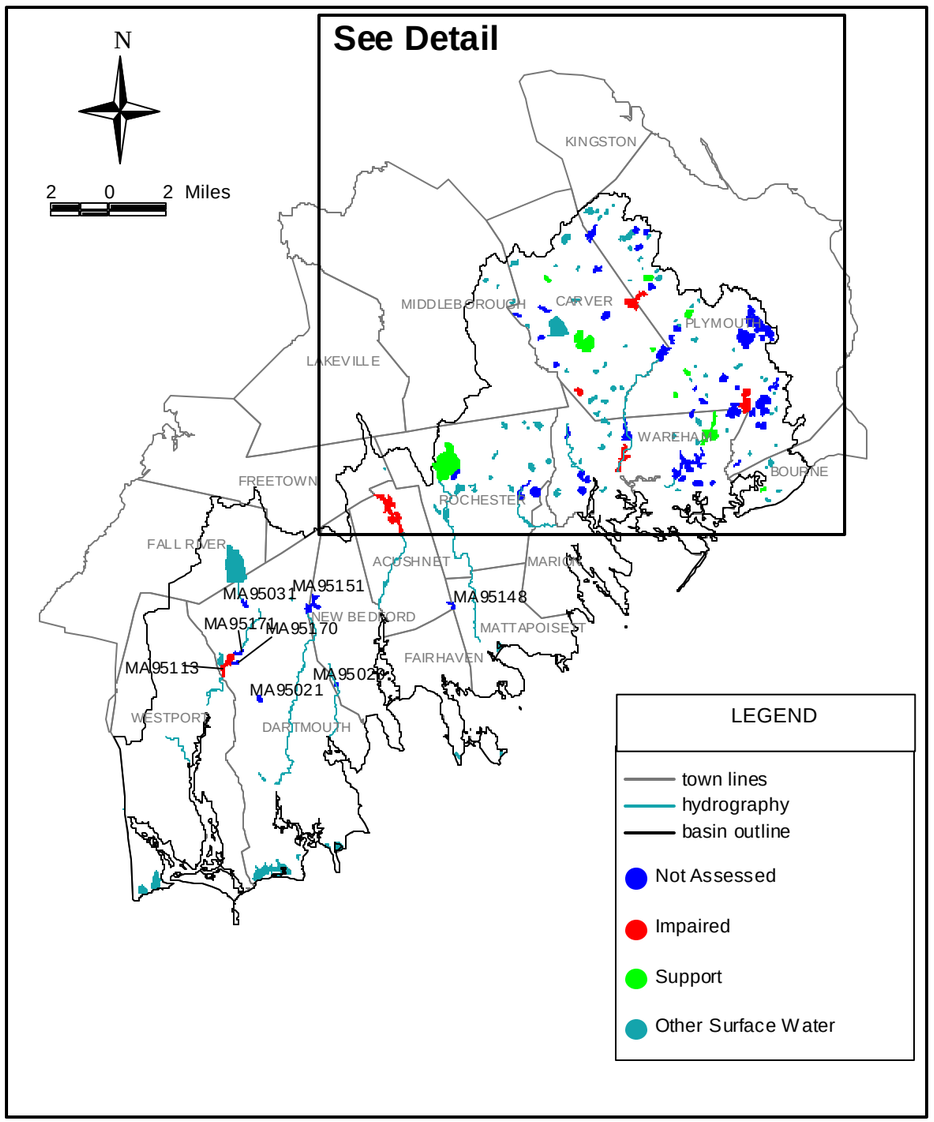
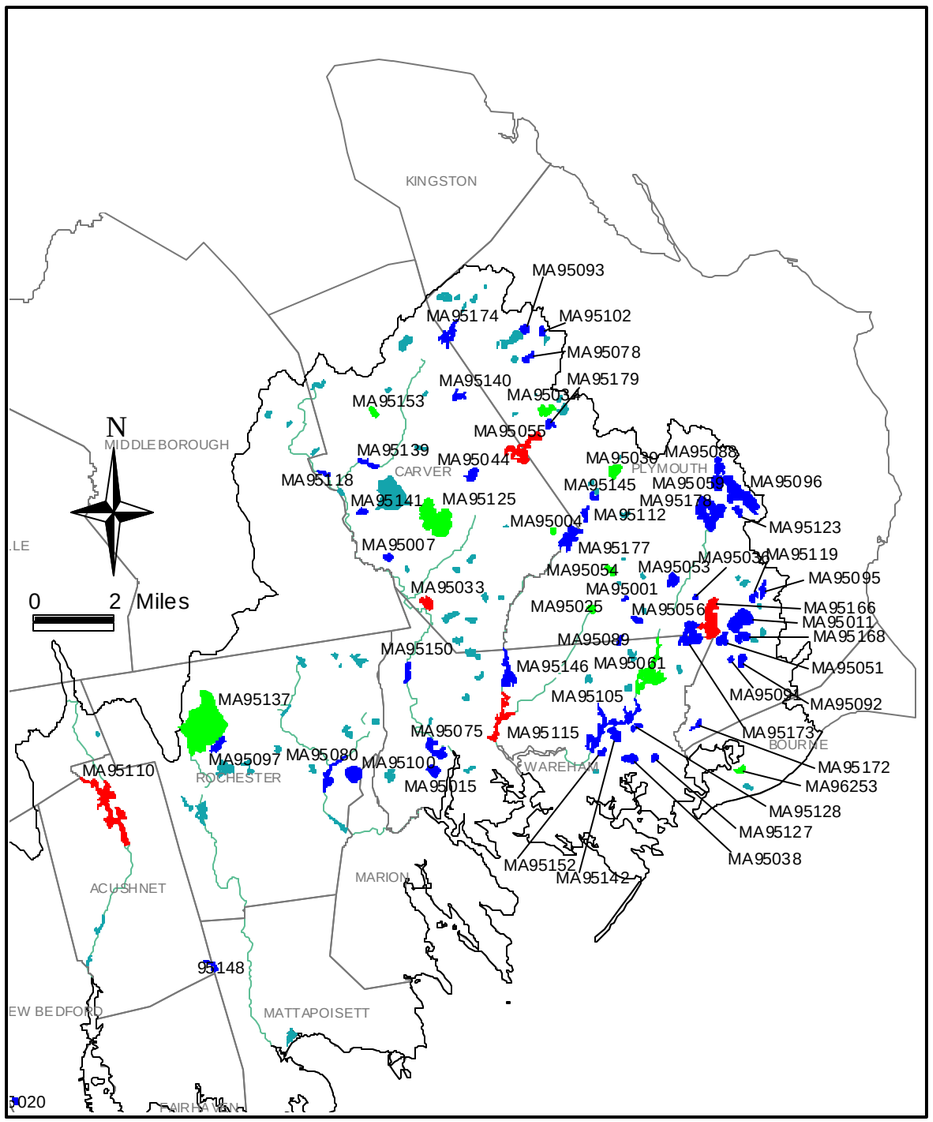
Details of impairment of the *Primary* and *Secondary Contact Recreational uses* and the *Aesthetics Use* for lake segments in the Buzzards Bay Watershed.

NOTES: 1º = Primary Contact; 2º = Secondary Contact. Turner Pond, New Bedford/Dartmouth (MA95112) is the only pond assessed as SUPPORT for the Aesthetics Use.

Waterbody	WBID	Use Assessment	Causes
Crane Brook Bog Pond	MA95033	1º, 2º, Aesthetics- IMPAIRED	Excess algal growth
Federal Pond	MA95055	1º, 2º, Aesthetics- IMPAIRED	Non-native plants
New Bedford Reservoir	MA95110	1º, 2º - IMPAIRED Aesthetics- IMPAIRED	Non-native plants, phosphate Phosphate
Parker Mills Pond	MA95115	1º, 2º, Aesthetics- IMPAIRED	Non-native plants, phosphate
White Island Pond (East)	MA95166	1º, 2º, Aesthetics- IMPAIRED	Excess algal growth, Secchi disk transparency, phosphate

Figure 6. BUZZARDS BAY WATERSHED
***PRIMARY* AND *SECONDARY CONTACT RECREATIONAL USES* ASSESSMENT SUMMARY**
LAKES





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