

TAUNTON RIVER WATERSHED 2001 WATER QUALITY ASSESSMENT REPORT



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TAUNTON RIVER WATERSHED
WATER QUALITY ASSESSMENT REPORT

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 - Bureau of Waste Site Cleanup (BWSC)
- Massachusetts Department of Public Health (MA DPH)
- Massachusetts Department of Fish and Game (MA DFG)
(Formerly the Department of Fisheries, Wildlife, and Environmental Law Enforcement - DFWELE)
 - Division of Fisheries and Wildlife (MDFW)
 - Division of Marine Fisheries (DMF)
- Massachusetts Department of Conservation and Recreation (MA DCR)
(Formerly the Department of Environmental Management - MA DEM)

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- United States Environmental Protection Agency (EPA)
- United States Geological Survey (USGS)
 - Water Resources Division

Regional

- Taunton River Watershed Alliance (TRWA)
- Stream teams (Forge River in Raynham, Matfield River in West Bridgewater, Nemasket River in Middleborough, Winnetuxet River in Halifax and Town River in Bridgewater, and one on the mainstem Taunton River)

Cover photo: Taunton River in Northern Fall River, MA.

Photo credit: Courtesy of A. Sergeev.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACEC Area of Critical Environmental Concern	NAS/NAE..... National Academy of Sciences/National Academy of Engineers
ADB Assessment Database	NAWQA National Water-Quality Assessment
BPJ Best Professional Judgment	NPDES National Pollutant Discharge Elimination System
BMP Best Management Practices	NPL National Priorities List
BRP Bureau of Resource Protection	NPS Nonpoint Source Pollution
CMR Code of Massachusetts Regulations	ORS Office of Research and Standards
CSO Combined Sewer Overflow	PALIS Pond and Lake Information System
CWA Clean Water Act	PCB Polychlorinated Biphenyls
DMR..... Discharge Monitoring Report	POTW Publicly Owned Treatment Works
DO Dissolved Oxygen	PWS..... Public Water Supply
DWM..... Division of Watershed Management	QAPP Quality Assurance Project Plan
EPA..... United States Environmental Protection Agency	RBP Rapid Bioassessment Protocol
HPC Hatheway and Patterson Company	S-EL..... Severe Effect Level
LC ₅₀ Lethal concentration to 50% of the test organisms	SWQS..... Surface Water Quality Standards
L-EL Low Effect Level	TMDL Total Maximum Daily Load
MA DCR Massachusetts Department of Conservation and Recreation (formerly the Department of Environmental Management)	TOXTD MassDEP DWM Toxicity Testing Database
MassDEP Massachusetts Department of Environmental Protection	TRWA Taunton River Watershed Alliance
MA DFG Department of Fish and Game (formerly the Department of Fisheries, Wildlife and Environmental Law Enforcement)	USGS..... United States Geological Survey
MassGIS Massachusetts Geographic Information System	WAL..... Water Access Laboratory (Bridgewater State College)
MDFW..... Massachusetts Division of Fisheries and Wildlife	WBID..... Waterbody Identification Code
MA DPH..... Massachusetts Department of Public Health	WBS..... Waterbody System Database
MDL Method Detection Limit	WMA Water Management Act
	WPAF..... Water Pollution Abatement Facility
	WPCF Water Pollution Control Facility
	WWTF Wastewater treatment facility
	WWTP..... Wastewater treatment plant

LIST OF UNITS

CFS..... cubic feet per second
CFU colony forming unit
GPD gallons per minute
mg/kg milligram per kilogram
MGD..... million gallons per day
mg/L..... milligram per liter
MPN most probable number
MW megawatt
ng..... nanogram
NTU nephelometric turbidity units
ppb..... parts per billion
ppm..... parts per million
SU..... standard units
TEQ/kg..... toxic equivalents per kilogram
µg/kg microgram per kilogram
µg/l microgram per liter
µmhos/cm..... micromhos per centimeter
µS/cm..... microsiemens per centimeter

TABLE OF FISH SCIENTIFIC NAMES

Common name	Scientific name	Common name	Scientific name
American eel	<i>Anguilla rostrata</i>	Golden shiner	<i>Notemigonus crysoleucas</i>
Banded sunfish	<i>Enneacanthus obesus</i>	Largemouth bass	<i>Micropterus salmoides</i>
Black crappie	<i>Pomoxis nigromaculatus</i>	Pumpkinseed	<i>Lepomis gibbosus</i>
Bluegill	<i>Lepomis macrochirus</i>	Redfin pickerel	<i>Esox americanus americanus</i>
Brook trout	<i>Salvelinus fontinalis</i>	Swamp Darter	<i>Etheostoma fusiforme</i>
Brown bullhead	<i>Ameiurus nebulosus</i>	Tessellated Darter	<i>Etheostoma olmstedi</i>
Chain pickerel	<i>Esox niger</i>	White perch	<i>Morone americana</i>
Creek chubsucker	<i>Erimyzon oblongus</i>	White sucker	<i>Catostomus commersoni</i>
Fallfish	<i>Semotilus corporalis</i>	Yellow perch	<i>Perca flavescens</i>

EXECUTIVE SUMMARY

TAUNTON RIVER WATERSHED 2001

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. This assessment report presents a summary of current water quality data and information used to assess the status of the designated uses as defined in the SWQS for the Taunton River Watershed. The designated uses, where applicable, include: *Aquatic Life, Fish Consumption, Drinking Water, Shellfish Harvesting, Primary and Secondary Contact Recreation and Aesthetics*. The assessment of current water quality conditions provides a determination of whether or not each designated use of a particular water body is **supported** or **impaired**. When too little current data/information exists or no quality-assured data are available, the use is **not assessed**. However, if there is some indication of water quality impairment which is not considered to be naturally occurring, the use is identified with an "Alert Status". It is important to note that not all waters are assessed. Many small and/or unnamed rivers and lakes are currently **unassessed**. The status of the designated uses of these waters has never been reported to the United States Environmental Protection Agency (EPA) in the Commonwealth's Summary of Water Quality Report (305(b) Report) nor is information on these waters maintained by the Massachusetts Department of Environmental Protection in the Water Body System (WBS) or Assessment Database (ADB). This report provides basic information that can be used to focus resource protection and remediation activities later in the watershed management planning process.

There are a total of 35 named and one unnamed freshwater rivers, streams, or brooks (the term "rivers" will hereafter be used to include all) represented by 51 river segments (including estuary segments) that are presented in this report. These include the Taunton River, Winnetuxet River, Sawmill Brook, Cotley River, Forge River, Cobb Brook, Segreganset River, Muddy Cove Brook, Lovett Brook, Salisbury Brook, Trout Brook, Salisbury Plain River, Beaver brooks, Meadow Brook, Shumatuscacant River, Poor Meadow Brook, Satucket River, Matfield River, Queset Brook, Coweset Brook, Hockomock River, Town River, Mulberry Meadow Brook, Canoe River, Snake River, Mill River, Robinson Brook, Rumford River, Wading River, Threemile River, Nemasket River, Cedar Swamp River, Assonet River and Rattlesnake Brook. They account for approximately 63% (222.4 miles of an estimated 350.6 named river miles). The one unnamed tributary is 4.0 river miles. The remaining rivers are small and are currently *unassessed*. This report also includes information on 4.86 square miles of coastal and marine waters and on 98 of the 208 lakes, ponds or impoundments (the term "lakes" will hereafter be used to include all) that have been assigned a Pond and Lake Identification System (PALIS) number in the Taunton River Watershed. The 98 lakes included in this report represent 88% of the total lake acreage (11,059 of 12,517 acres) in the Taunton River Watershed.

AQUATIC LIFE USE

The *Aquatic Life Use* is supported when suitable habitat (including 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 nonpoint source(s) of pollution and hydrologic modification. The status of the *Aquatic Life Use* in the Taunton River Watershed is as follows.

Aquatic Life Use Summary – Rivers and Coastal and Marine Waters (Figure 1)

As illustrated in Figure 1, fifty-two (52)% of the freshwater river segments and sixty (60%) of the coastal and marine waters included in this report are assessed as either support or impaired for the *Aquatic Life Use*. A 20.4 mile portion of the Taunton River is assessed as supporting the *Aquatic Life Use* and all or portions of eleven freshwater segments in the watershed, totaling 65.7 river miles, are also assessed as supporting the *Aquatic Life Use*. These waterbodies include: a 3.6 mile portion of Shumatuscacant River (MA62-33), Satucket River (MA62-10), Canoe River (MA62-27), a 3

Aquatic Life Use Assessment
Rivers
(total length included in report – 226.4 miles)
Support – 86.1 miles
Impaired – 32.3 miles
Not Assessed – 108 miles
Coastal and Marine Waters
(total area included in report – 4.86 square miles)
Support – 0.29 miles
Impaired – 2.65 miles
Not Assessed – 1.92 miles
Lakes
(total area included in report – 11,059 acres)
Impaired – 5,247 acres
Not Assessed – 5,812 acres

mile portion of Rumford River (MA62-39), Wading River (MA62-49), Threemile River (MA62-56), Nemasket River (MA62-25), a 1.2 mile portion of an unnamed tributary (MA62-42), Cedar Swamp River (MA62-44), Assonet River (MA62-19), and Rattlesnake Brook (MA62-45). The *Aquatic Life Use* is impaired for the following freshwater waterbodies: Segreganset River (MA62-53 and MA62-54), a 0.4 mile portion of Salisbury Brook (MA62-08), Salisbury Plain River (MA62-06), a 4.9 mile portion of Shumatuscancant River (MA62-33), Matfield River (MA62-32), Robinson Brook (MA62-14), a 5.0 mile portion of Rumford River (MA62-39), and a 2.80 mile portion of an unnamed tributary (MA62-42). One of the primary known causes of impairment is impacts to the benthic macroinvertebrate communities. Other habitat quality degradation and low dissolved oxygen were also documented causes. Known sources of impairment include municipal point source discharges and streambank modification/destabilization. Additional suspected sources include: municipal separate storm sewers, highway/road/bridge runoff in urbanized areas, loss of riparian habitat, cranberry bog operations, and impacts from hydrostructure flow regulation/modification.

Two estuary segments are impaired for the *Aquatic Life Use*: a 2.65 square mile segment of the Taunton River (MA62-04) and a 0.002 square mile unnamed tributary (MA62-48). Causes of impairment include industrial thermal discharges, anthropogenic substrate and flow regime alterations, and habitat, biota alterations. Where known, sources of impairment include channel erosion/incision from upstream hydromodification, impacts from hydrostructure flow regulation/modification, and industrial thermal discharges. Additional suspected sources include: cooling water intake operations, municipal storm sewer systems, combined sewer overflow (CSOs), municipal point source discharges, highway and bridge runoff, and chlorine.

The remaining 108.0 river miles (48%) and 1.92 square miles of coastal and marine waters (40%) are currently not assessed for the *Aquatic Life Use*.

Aquatic Life Use Summary – Lakes (Figure 1)

Few lakes in the Taunton River Watershed have been surveyed recently for variables used to assess the status of the *Aquatic Life Use* (i.e., dissolved oxygen (DO), pH, nutrients, macrophytes and plankton/chlorophyll *a*). Without these data none of the lakes in the Taunton River Watershed are assessed as supporting the *Aquatic Life Use*. The *Aquatic Life Use* is assessed as impaired for forty-three lakes (5,247 lake acres) based on the presence of non-native macrophytes (Figure 1). Monponsett Pond west basin (MA62119) and Watson Pond (MA62205) are also impaired because of elevated phosphorus levels and Sabbatia Lake (MA62166) is also impaired because of low dissolved oxygen/saturation. The remaining 55 lakes (5,812 lake acres) in the Taunton River Watershed are not assessed for the *Aquatic Life Use*.

FISH CONSUMPTION USE

The *Fish Consumption Use* is supported when there are no pollutants present that result in concentrations unacceptable for human consumption in edible portions (as opposed to whole fish - see *Aquatic Life Use*) of fish, other aquatic life or wildlife. 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 (MA DPH), Bureau of Environmental Health Assessment (MA DPH 2004). The MA DPH 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 impaired in these waters. In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury contamination (MA DPH 2001). Because of the statewide advisory no waters can be assessed as support for the *Fish Consumption Use*. These waters default to “not assessed”. The statewide advisory reads as follows:

The MA DPH “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, MA DPH 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 (MA DPH 2001).” Additionally, MA DPH “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 (MA DPH 2001).” MA DPH’s statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially.

The status of the *Fish Consumption Use* in the Taunton River Watershed is as follows:

Fish Consumption Use Summary - Rivers and Coastal and Marine Waters (Figure 2)

MA DPH issued a site-specific fish consumption advisory for the lower 5.0 mile reach of the Rumford River (MA62-39) due to elevated dioxin and pesticides levels in fish tissue as a result of contamination from the Hatheway & Patterson Company Superfund site. However, the upper 3.0 mile reach of this segment of the Rumford River is not assessed for the *Fish Consumption Use*. There are currently no other site-specific MA DPH-issued fish consumption advisories for any other rivers or coastal and marine segments in the Taunton River Watershed. The remaining rivers and all of the coastal and marine waters in the watershed default to not assessed for the *Fish Consumption Use* because of the statewide advisory.

Fish Consumption Use Summary – Lakes (Figure 2)

Six lakes, representing a total of 983 acres, are assessed as impaired for the *Fish Consumption Use* because of either mercury contamination or dioxin/pesticide contamination. The waterbodies impaired due to dioxin/pesticide contamination include Cabot Pond (MA62029), Fulton Pond (MA62075), Hodges Pond (MA62091), and Norton Reservoir (MA62134). The dioxin/pesticide contamination is associated with the Hatheway & Patterson Company Superfund site. The waterbodies impaired due to mercury contamination are Monponsett Pond – east basin (MA62218), and Somerset Reservoir (MA62174). The source of mercury is unknown although atmospheric deposition is suspected. The remaining 92 lakes representing 10,076 acres are not assessed for the *Fish Consumption Use*.

<p style="text-align: center;"><i>Fish Consumption Use Assessment</i></p> <p style="text-align: center;">Rivers (total length included in report – 226.4 miles) Impaired – 5 miles Not Assessed – 221.4 miles</p> <p style="text-align: center;">Coastal and Marine Waters (total area included in report – 4.86 square miles) Not Assessed – 4.86 square miles</p> <p style="text-align: center;">Lakes (total area included in report – 11,059 acres) Impaired – 983 acres Not Assessed – 10,076 acres</p>
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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.mass.gov/dep/brp/dws/dwshome.htm>). These waters are subject to stringent regulation in accordance with the Massachusetts Drinking Water Regulations. Massachusetts Department of Environmental Protection’s (MA DEP) 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 that may present potential threats to drinking water quality in these areas, 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.

SHELLFISH HARVESTING USE

The *Shellfish Harvesting Use* is assessed as support when shellfish harvested from Approved (Class SA or SB) or Conditionally Approved (Class SB) Shellfish Growing Areas are suitable for consumption without depuration and when shellfish harvested from Restricted (Class SB) Shellfish Growing Areas are suitable for consumption with depuration. The Division of Marine Fisheries (DMF) classifies shellfishing areas in the Taunton River Watershed. The *Shellfish Harvesting Use* for this report was assessed using the DMF shellfishing closure list dated 1 July 2000 and published on Massachusetts Geographic Information System (MassGIS) in October 2000 (<http://www.mass.gov/mgis/dsga.htm>) and updated classification information provided by DMF. All of the coastal and marine waters included in this report are impaired for the *Shellfish Harvesting Use* because of elevated bacteria (Sawyer 2003).

Shellfish Harvesting Use Assessment
Coastal and Marine Waters
(total area included in report – 4.86 square miles)
Impaired – 4.86 square miles

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 and/or the MA DPH Bathing Beaches State Sanitary Code and/or guidance) 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 also 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.

The status of the *Primary & Secondary Contact Recreational and Aesthetics uses* in the Taunton River Watershed is as follows:

Primary & Secondary Contact Recreational and Aesthetics uses Summary – Rivers and Coastal and Marine Waters (Figures 3 and 4)

Twenty-four (24%) of the freshwater river segments included in this report are assessed as either support or impaired for the *Primary and Secondary Contact Recreational uses*. Four freshwater river segments, Satucket River (MA62-10), an unnamed tributary to Cedar Swamp River (MA62-42), Cedar Swamp River (MA62-44), and a segment of the Assonet River (MA62-19), totaling 15.8 river miles, are assessed as supporting the *Primary Contact Recreational Use*. In addition to these four river segments, Meadow Brook (MA62-38) and Shumatuscacant River (MA62-33) are assessed as supporting for the *Secondary Contact Recreational Use* (totaling 30.3 river miles). The *Primary Contact Recreational Use* is impaired for 38.6 river miles (17%) and the *Secondary Contact Recreational Use* is impaired for 24.1 river miles (11%) in the Taunton River Watershed. These freshwater river segments include Salisbury Brook (MA62-08), Trout Brook (MA62-07), Salisbury Plain River (MA62-05 and MA62-06), Beaver Brook (MA62-09), Meadow Brook (MA62-38) – *Primary Contact Recreational Use* only,

Primary Contact Recreational Use Assessment Rivers

(total length included in report – 226.4 miles)
Support – 15.8 miles
Impaired – 38.6 miles
Not Assessed – 172 miles

Secondary Contact Recreational Use Assessment Rivers

(total length included in report – 226.4 miles)
Support – 30.3 miles
Impaired – 24.1 miles
Not Assessed – 172 miles

Aesthetics Use Assessment Rivers

(total length included in report – 226.4 miles)
Support – 124.9 miles
Impaired – 10.3 miles
Not Assessed – 91.2 miles

Shumatuscacant River (MA62-33) – *Primary Contact Recreational Use* only, and the Matfield River (MA62-32). All of these impaired segments are located within the Matfield River subwatershed. The primary cause of impairment is elevated fecal coliform bacteria. Excess algal growth, in-stream turbidity, odor, and trash/debris are also problematic. The only known sources of impairment are municipal point source discharges. Additional suspected sources include: municipal separate storm sewers, highway/road/bridge runoff in urbanized areas, and illicit connections/hookups to storm sewers.

The majority of the river miles fifty-five (55%) are assessed as support for the *Aesthetics Use*. Only 10.3 river miles, three segments, are assessed as impaired. These include a 1.3 mile portion of Trout Brook (MA62-07), Salisbury Plain River (MA62-06), and Matfield River (MA62-32). The primary causes of impairment are odor and turbidity. The only known sources of impairment are municipal point source discharges. Additional suspected sources include: municipal separate storm sewers, highway/road/bridge runoff in urbanized areas and illicit connections/hookups to storm sewers. The remaining 91.2 river miles are not assessed for the *Aesthetics Use*.

All of the coastal and marine water areas in this report are currently not assessed for the *Primary & Secondary Contact Recreational* and *Aesthetics uses* due to the lack of current bacteria data and field observations.

Primary & Secondary Contact Recreational and Aesthetics uses Summary – Lakes (Figures 3 and 4)

The *Primary* and *Secondary Contact Recreational* uses are assessed as support in eight lakes (Clear Pond, Cooper Pond, Island Grove Pond, Johns Pond, Long Pond, Middle Pond, Monponsett Pond – east basin, and Tispaquin Pond), totaling 2,229 acres and representing 21% of the freshwater lake acreage included in this report. The *Recreational* and *Aesthetic* uses are assessed as impaired in six lakes (Ames Long Pond, Monponsett Pond – west basin, Sabbatia Lake, Sassaquin Pond, Watson Pond, and West Meadow Pond), totaling 854 acres (8% of the freshwater lake acreage). Ames Long Pond, Sabbatia Lake, and West Meadow Pond were assessed as impaired because of the high percentage of biovolume occupied by non-native aquatic macrophytes. Monponsett Pond east basin and Watson Pond are assessed as impaired because of low Secchi disk transparency and excessive algal growth. Sassaquin Pond is assessed as impaired due to aesthetically objectionable conditions (filamentous algae, sewage odors) and because of the frequent and prolonged beach closures/postings. The *Recreational* uses for the remaining 84 lakes in the Taunton River Watershed, representing 7,906 acres, are not assessed because of a lack of bacteria, transparency and in-lake survey data. The *Aesthetics Use* for the 92 remaining lakes representing 10,205 acres are also not assessed because of a lack of transparency and in-lake survey data.

<p><i>Primary Contact Recreation Use Assessment</i> Lakes (total area included in report – 11,059 acres) Support – 2,299 acres Impaired – 854 acres Not Assessed – 7,906 acres</p> <p><i>Secondary Contact Recreation Use Assessment</i> Lakes (total area included in report – 11,059 acres) Support – 2,299 acres Impaired – 854 acres Not Assessed – 7,906 acres</p> <p><i>Aesthetics Use Assessment</i> Lakes (total area included in report – 11,059 acres) Support – 0 acres Impaired – 854 acres Not Assessed – 10,205 acres</p>

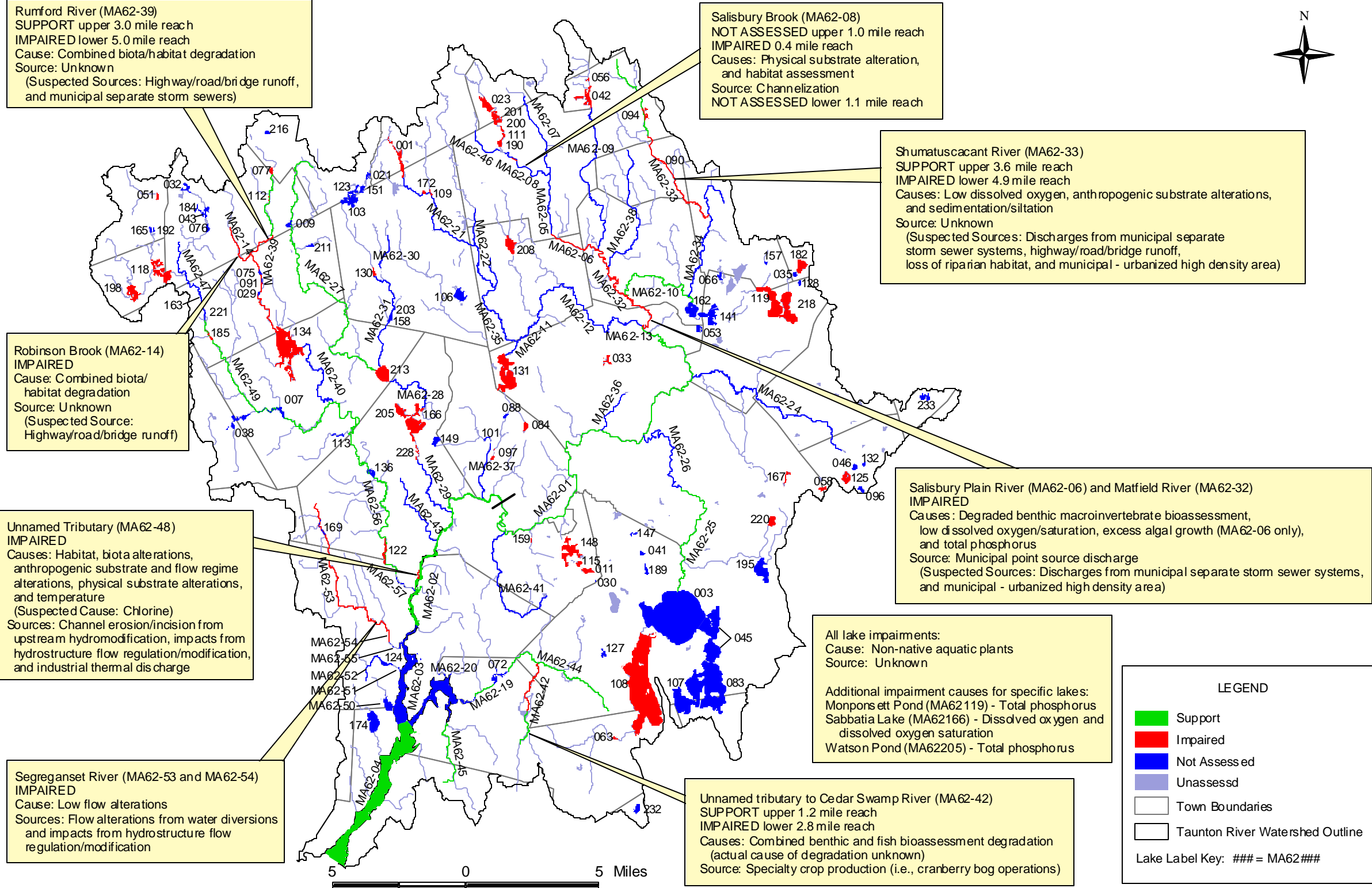
RECOMMENDATIONS

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

- Monitor bacteria levels to document effectiveness of bacteria source reduction activities associated with sewer collection improvements, Title V (septic system) improvements/upgrades, treatment of stormwater discharges, sewerage and/or Phase II community stormwater management programs to assess the status of the *Primary* and *Secondary Contact Recreation* uses.
- Coordinate with MA DCR and/or other groups conducting lake surveys to generate quality-assured lakes data. Conduct more intensive surveys to better determine the lake trophic and use support status and identify causes and sources of impairment. As sources are identified within lake watersheds they should be eliminated or at least minimized through the application of appropriate point or non-point source control techniques.
- Continue to conduct water quality monitoring to better evaluate the status of the *Aquatic Life Use*. At a minimum continuous dissolved oxygen, temperature, pH and total phosphorus data should be collected and biological (benthic macroinvertebrate, habitat assessment, and fish population) sampling should be conducted.
- Conduct shoreline surveys to assess the *Aesthetics Use*.
- Keep all National Pollutant Discharge Elimination System (NPDES) permits current and compliant within the watershed.
- The TRWA and Bridgewater State Water Access Laboratory (WAL) should continue to conduct water quality monitoring at their established sampling stations in the Taunton River Watershed to meet their sampling objectives. For the TRWA and WAL data to be utilized by MassDEP in making water quality assessments, the TRWA and WAL should work with MA DEP to meet the following requirements 1) an approved and appropriate *Quality Assurance Project Plan* including a laboratory Quality Assurance /Quality Control (QA/QC) plan and 2) sample data, QA/QC and other pertinent sample handling information documented in a citable report.

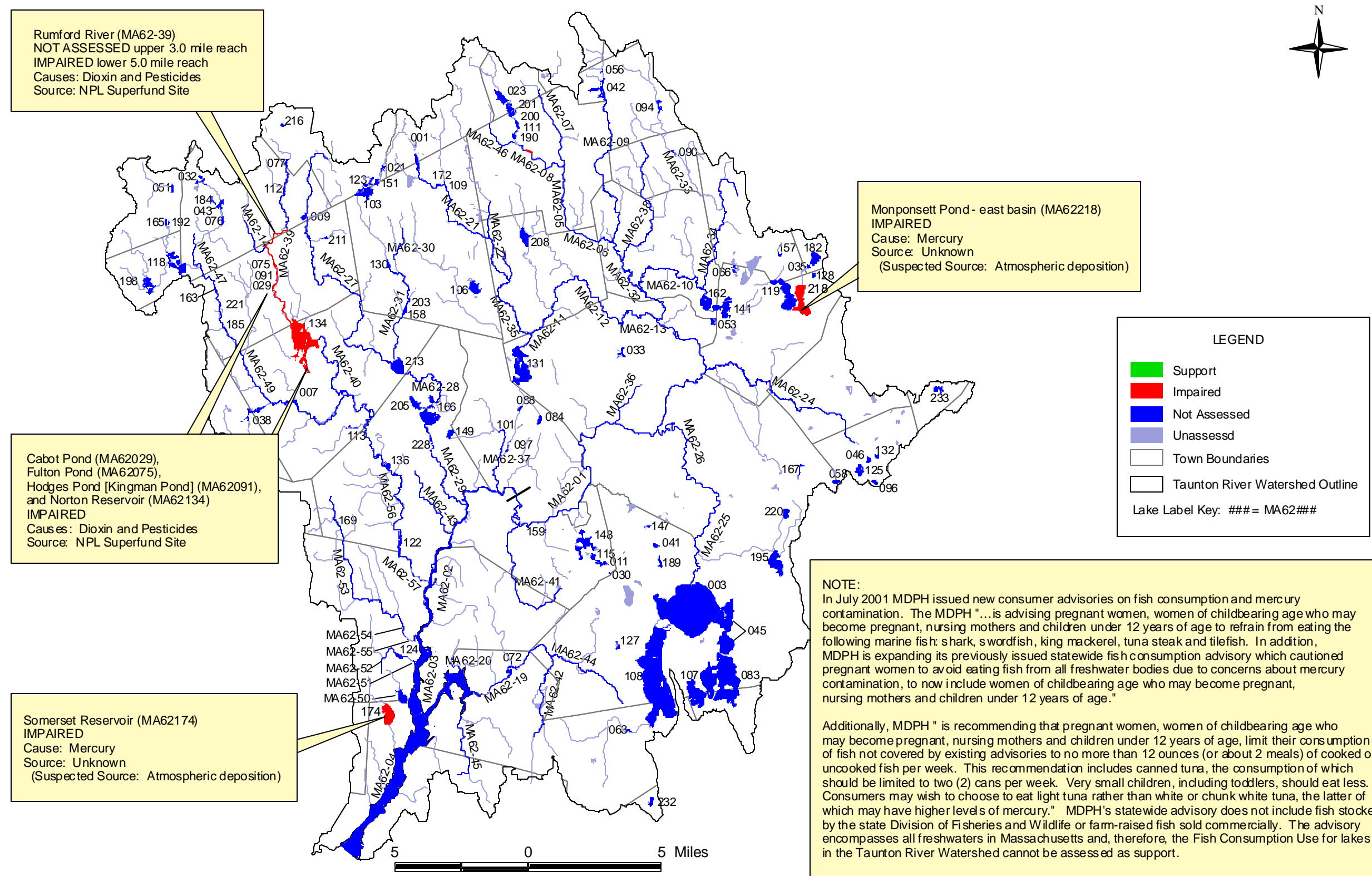
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Figure 1. Aquatic Life Use - Rivers, Estuaries and Lakes



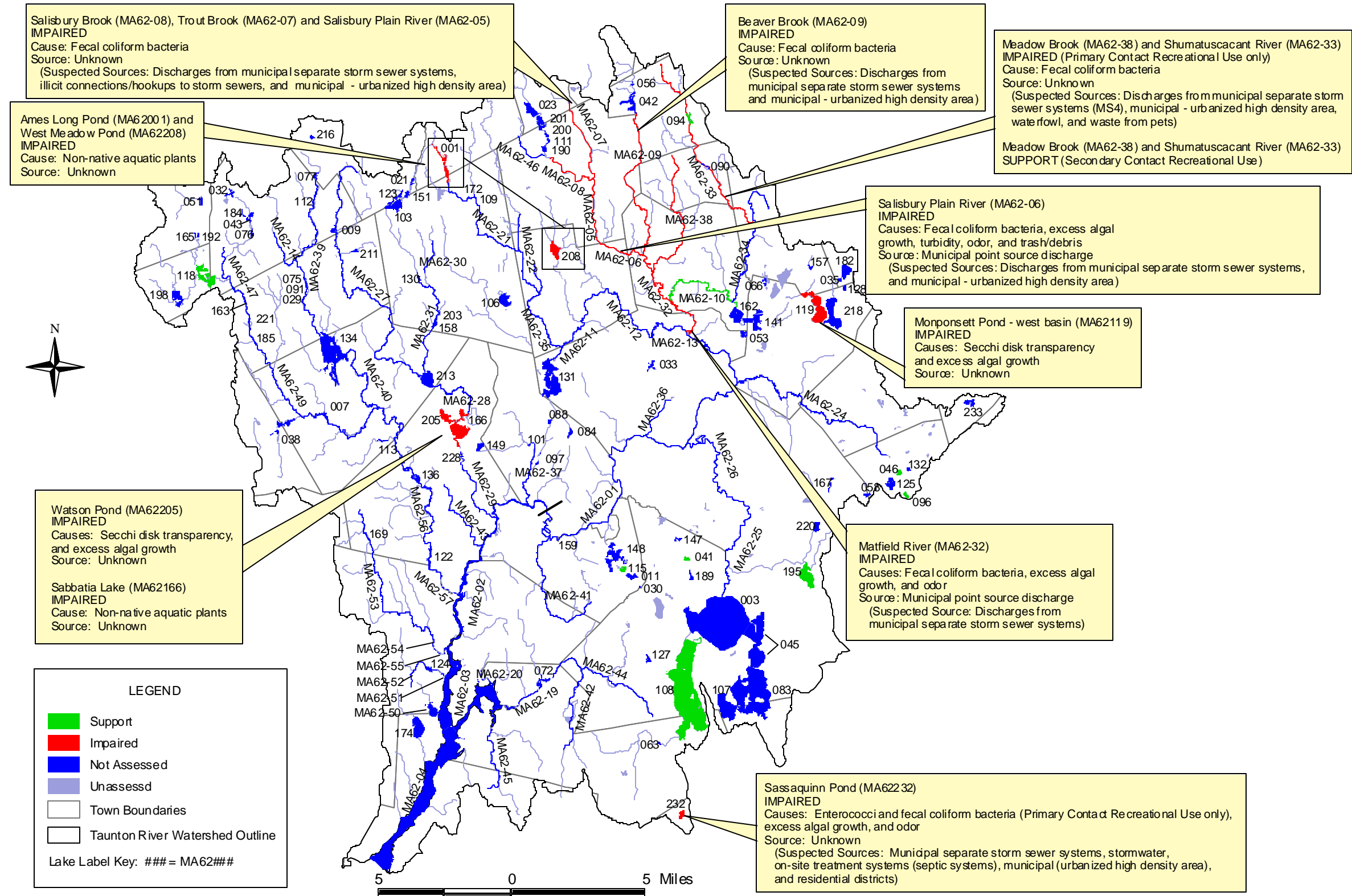
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Figure 2. Fish Consumption Use - Rivers, Estuaries and Lakes



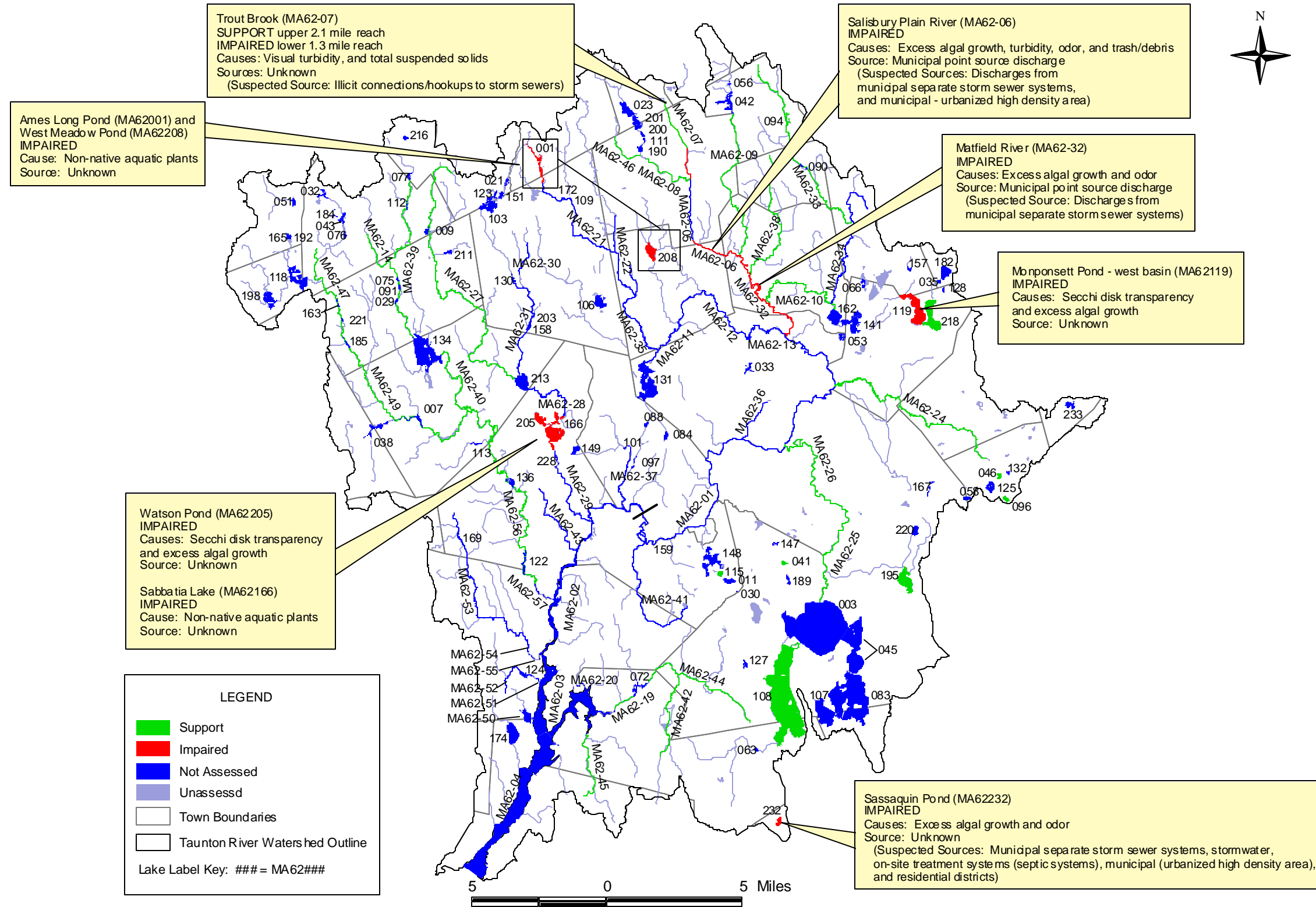
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Figure 3. Primary and Secondary Contact Recreational uses - Rivers, Estuaries and Lakes



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Figure 4. Aesthetics Use- Rivers, Estuaries and Lakes



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INTRODUCTION

The Massachusetts watershed approach is a collaborative effort between state and federal environmental agencies, municipal agencies, citizens, non-profit groups, businesses and industries in the watershed. The mission is to improve water quality conditions and to provide a framework under which the restoration and/or protection of the watershed's natural resources can be achieved. Figure 5 illustrates the management structure to carry out the mission. This report presents the current assessment of water quality conditions in the Taunton River Watershed. The water quality assessments are based on information that has been researched and developed by the Massachusetts Department of Environmental Protection (MA DEP) through the first three years (information gathering, monitoring, and assessment) of the five-year cycle in partial fulfillment of MA DEP's federal mandate to report on the status of the Commonwealth's waters under the Federal Water Pollution Control Act (commonly known as the Clean Water Act).

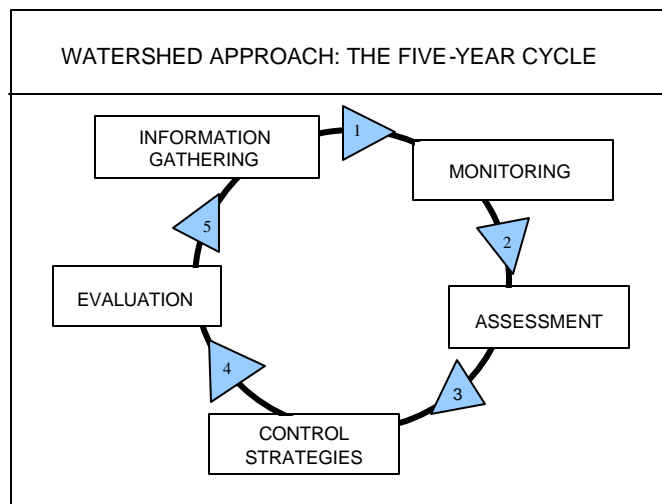


Figure 5. Five-year cycle of the Watershed Approach

The goal of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (Environmental Law Reporter 1988). To meet this objective the CWA requires states to develop information on the quality of the Nation's water resources and report this information to the U.S. Environmental Protection Agency (EPA), the United States Congress, and the public. Together, these agencies are responsible for implementation of the CWA mandates. Under Section 305(b) of the Federal Clean Water Act, every two years MassDEP must submit to the EPA a statewide report, which describes the status of water quality in the Commonwealth. Up until 2002 this was accomplished as a statewide summary of water quality (the 305(b) Report). States are also required to submit, under Section 303(d) of the CWA, a List of Impaired Waters requiring a total maximum daily load (TMDL) calculation. In 2002, however, EPA required the states to combine elements of the statewide 305(b) Report and the Section 303(d) List of Impaired Waters into one "Integrated List of Waters" (Integrated List). This statewide list is based on the compilation of information for the Commonwealth's 27 watersheds. Massachusetts has opted to write individual watershed water quality assessment reports and use them as the supporting documentation for the Integrated List. The assessment reports utilize data compiled from a variety of sources and provide an evaluation of water quality, progress made towards maintaining and restoring water quality, and the extent to which problems remain at the watershed level. Instream biological, habitat, physical/chemical, toxicity data and other information are evaluated to assess the status of water quality conditions. This analysis follows a standardized process described below (Assessment Methodology). Once the use assessments have been completed, the segments are categorized for the Integrated List.

ASSESSMENT METHODOLOGY

WATER QUALITY CLASSIFICATION

The Massachusetts SWQS designate the most sensitive uses for which the surface waters of the Commonwealth shall be enhanced, maintained and protected; prescribe minimum water quality criteria required to sustain the designated uses; and include provisions for the prohibition of discharges (MassDEP 1996a). These regulations should undergo public review every three years. The surface waters are segmented and each segment is assigned to one of the six classes described below. Each class is identified by the most sensitive and, therefore, governing water uses to be achieved and protected. Surface waters may be suitable for other beneficial uses but shall be regulated by the Department of Environmental Protection to protect and enhance the designated uses.

Inland Water Classes

1. **Class A** – *These waters are designated as a source of public water supply. To the extent compatible with this use they shall be an excellent habitat for fish, other aquatic life and wildlife, and suitable for primary and secondary contact recreation. These waters shall have excellent aesthetic value. These waters are designated for protection as Outstanding Resource Waters (ORWs) under 314 Code of Massachusetts Regulations (CMR) 4.04(3).*
2. **Class B** – *These waters are designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
3. **Class C** – *These waters are designated as a habitat for fish, other aquatic life and wildlife, and for secondary contact recreation. These waters shall be suitable for the irrigation of crops used for consumption after cooking and for compatible industrial cooling and process uses. These waters shall have good aesthetic value.*

Coastal and Marine Classes

4. **Class SA** – *These waters are designated as an excellent habitat for fish, other aquatic life and wildlife and for primary and secondary recreation. In approved areas they shall be suitable for shellfish harvesting without depuration (Open Shellfishing Areas). These waters shall have excellent aesthetic value.*
5. **Class SB** – *These waters are designated as a habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. In approved areas they shall be suitable for shellfish harvesting with depuration (Restricted Shellfishing Areas). These waters shall have consistently good aesthetic value.*
6. **Class SC** – *These waters are designated as a habitat for fish, other aquatic life, and wildlife and for secondary contact recreation. They shall also be suitable for certain industrial cooling and process uses. These waters shall have good aesthetic value.*

The CWA Section 305(b) water quality reporting process is an essential aspect of the Nation's water pollution control effort. It is the principal means by which EPA, Congress, and the public evaluate existing water quality, assess progress made in maintaining and restoring water quality, and determine the extent of remaining problems. In so doing, the States report on waterbodies within the context of meeting their designated uses (described above in each class). These uses include: *Aquatic Life, Fish Consumption, Drinking Water, Primary Contact Recreation, Secondary Contact Recreation, Shellfish Harvesting and Aesthetics*. Two subclasses of Aquatic Life are also designated in the standards: Cold Water Fishery (capable of sustaining a year-round population of cold water aquatic life, such as trout) and Warm Water Fishery (waters that are not capable of sustaining a year-round population of cold water aquatic life).

The SWQS, summarized in Table 1, prescribes minimum water quality criteria to sustain the designated uses. Furthermore, these standards describe the hydrological conditions at which water quality criteria must be applied (MA MASSDEP 1996a). In rivers the lowest flow conditions at and above which aquatic life criteria must be applied are the lowest mean flow for seven consecutive days to be expected once in ten years (7Q10). In artificially regulated waters the lowest flow conditions at which aquatic life criteria

must be applied are the flow equal or exceeded 99% of the time on a yearly basis or another equivalent flow that has been agreed upon. In coastal and marine waters and for lakes the most severe hydrological condition for which the aquatic life criteria must be applied shall be determined by MASSDEP on a case-by-case basis.

The availability of appropriate and reliable scientific data and technical information is fundamental to the 305(b) reporting process. It is EPA policy (EPA Order 5360.1 CHG 1) that any organization performing work for or on behalf of EPA establish a quality system to support the development, review, approval, implementation, and assessment of data collection operations. To this end MassDEP describes its Quality System in an EPA-approved Quality Management Plan to ensure that environmental data collected or compiled by MassDEP are of known and documented quality and are suitable for their intended use. For external sources of information, MassDEP requires 1) an approved and appropriate *Quality Assurance Project Plan* including a laboratory Quality Assurance /Quality Control (QA/QC) plan, 2) use of a state certified lab (or as otherwise approved by MASSDEP for a particular analysis), and 3) sample data, QA/QC and other pertinent sample handling information are documented in a citable report.

EPA provides guidelines to the States for making their use support determinations (EPA 1997 and 2002, Grubbs and Wayland III 2000 and Wayland III 2001). The determination of whether or not a waterbody supports each of its designated uses is a function of the type(s), quality, and quantity of available current information. Although data/information older than five years are usually considered "historical" and used only for descriptive purposes, they can be utilized in the use support determination provided they are known to reflect the current conditions. While the Water Quality Standards (Table 1) prescribe minimum water quality criteria to sustain the designated uses, numerical criteria are not available for every indicator of pollution. Best available guidance in the literature may be applied in lieu of actual numerical criteria (e.g., freshwater sediment data may be compared to *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* 1993 by D. Persaud, R. Jaagumagi and A. Hayton). Excursions from criteria due solely to "naturally occurring" conditions (e.g., low pH in some areas) do not constitute violations of the standards.

Each designated 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**. In this report, however, if there is some indication that water quality impairment may exist, which is not "naturally occurring", the use is identified with an "Alert Status". Detailed guidance for assessing the status of each use follows in the Designated Uses Section of this report. It is important to note that not all waters are assessed. Many small and/or unnamed ponds, rivers, and estuaries are currently **unassessed**; the status of their designated uses has never been reported to EPA in the Commonwealth's 305(b) Report or the Integrated List of Waters nor is information on these waters maintained in the WBS or the new ADB.

Table 1. Summary of Massachusetts Surface Water Quality Standards (MassDEP 1996a and MA DPH 2002a).

Dissolved Oxygen	<p><u>Class A, Class B Cold Water Fishery (BCWF), and Class SA:</u> ≥ 6.0 mg/L and $\geq 75\%$ saturation unless background conditions are lower</p> <p><u>Class B Warm Water Fishery (BWFW) and Class SB:</u> ≥ 5.0 mg/L and $\geq 60\%$ saturation unless background conditions are lower</p> <p><u>Class C:</u> Not ≤ 5.0 mg/L for more than 16 of any 24-hour period and not ≤ 3.0 mg/L anytime unless background conditions are lower; levels cannot be lowered below 50% saturation due to a discharge</p> <p><u>Class SC:</u> Not ≤ 5.0 mg/L for more than 16 of any 24-hour period and not ≤ 4.0 mg/L anytime unless background conditions are lower; and 50% saturation; levels cannot be lowered below 50% saturation due to a discharge</p>
Temperature	<p><u>Class A:</u> $\leq 68^\circ\text{F}$ (20°C) and $\Delta 1.5^\circ\text{F}$ (0.8°C) for Cold Water and $\leq 83^\circ\text{F}$ (28.3°C) and $\Delta 1.5^\circ\text{F}$ (0.8°C) for Warm Water.</p> <p><u>Class BCWF:</u> $\leq 68^\circ\text{F}$ (20°C) and $\Delta 3^\circ\text{F}$ (1.7°C) due to a discharge</p> <p><u>Class BWFW:</u> $\leq 83^\circ\text{F}$ (28.3°C) and $\Delta 3^\circ\text{F}$ (1.7°C) in lakes, $\Delta 5^\circ\text{F}$ (2.8°C) in rivers</p> <p><u>Class C and Class SC:</u> $\leq 85^\circ\text{F}$ (29.4°C) nor $\Delta 5^\circ\text{F}$ (2.8°C) due to a discharge</p> <p><u>Class SA:</u> $\leq 85^\circ\text{F}$ (29.4°C) nor a maximum daily mean of 80°F (26.7°C) and $\Delta 1.5^\circ\text{F}$ (0.8°C)</p> <p><u>Class SB:</u> $\leq 85^\circ\text{F}$ (29.4°C) nor a maximum daily mean of 80°F (26.7°C) and $\Delta 1.5^\circ\text{F}$ (0.8°C) between July through September and $\Delta 4.0^\circ\text{F}$ (2.2°C) between October through June</p>
pH	<p><u>Class A, Class BCWF and Class BWFW:</u> 6.5 - 8.3 SU and $\Delta 0.5$ outside the background range.</p> <p><u>Class C:</u> 6.5 - 9.0 SU and $\Delta 1.0$ outside the naturally occurring range.</p> <p><u>Class SA and Class SB:</u> 6.5 - 8.5 SU and $\Delta 0.2$ outside the normally occurring range.</p> <p><u>Class SC:</u> 6.5 - 9.0 SU and $\Delta 0.5$ outside the naturally occurring range.</p>
Solids	<p><u>All Classes:</u> <i>These waters shall be free from floating, suspended, and settleable solids in concentrations or combinations that would impair any use assigned to each class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.</i></p>
Color and Turbidity	<p><u>All Classes:</u> <i>These waters shall be free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use.</i></p>
Oil and Grease	<p><u>Class A and Class SA:</u> <i>Waters shall be free from oil and grease, petrochemicals and other volatile or synthetic organic pollutants.</i></p> <p><u>Class SA:</u> <i>Waters shall be free from oil and grease and petrochemicals.</i></p> <p><u>Class B, Class C, Class SB and Class SC:</u> <i>Waters shall be free from oil and grease, petrochemicals that produce a visible film on the surface of the water, impart an oily taste to the water or an oily or other undesirable taste to the edible portions of aquatic life, coat the banks or bottom of the water course or are deleterious or become toxic to aquatic life.</i></p>
Taste and Odor	<p><u>Class A and Class SA:</u> <i>None other than of natural origin.</i></p> <p><u>Class B, Class C, Class SB and Class SC:</u> <i>None in such concentrations or combinations that are aesthetically objectionable, that would impair any use assigned to each class, or that would cause tainting or undesirable flavors in the edible portions of aquatic life.</i></p>
Aesthetics	<p><u>All Classes:</u> <i>All surface waters shall be 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.</i></p>
Toxic Pollutants	<p><u>All Classes:</u> <i>All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife... The division shall use the recommended limit published by EPA pursuant to 33 USC 1251, 304(a) as the allowable receiving water concentrations for the affected waters unless a site-specific limit is established.</i></p>
Nutrients	<p><i>Shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication.</i></p>

Note: Italics are direct quotations.

Δ criterion (referring to a change from natural background conditions) is applied to the effects of a permitted discharge.

Table 1 (Continued). Summary of Massachusetts Surface Water Quality Standards (MassDEP 1996a and MA DPH 2002a)

<p>Bacteria (MassDEP 1996 and MA DPH 2002)</p> <p>Class A criteria apply to the <i>Drinking Water Use</i>.</p> <p>Class B and SB criteria apply to <i>Primary Contact Recreation Use</i> while Class C and SC criteria apply to <i>Secondary Contact Recreation Use</i>.</p>	<p><u>Class A:</u></p> <ul style="list-style-type: none"> Fecal coliform bacteria: An arithmetic mean of <20 cfu/100 mls in any representative set of samples and <10% of the samples >100 cfu/100 mls. <p><u>Class B:</u></p> <ul style="list-style-type: none"> At public bathing beaches, as defined by MA DPH, where <i>E.coli</i> is the chosen indicator: No single <i>E.coli</i> sample shall exceed 235 <i>E.coli</i> /100 mls and the geometric mean of the most recent five <i>E.coli</i> samples within the same bathing season shall not exceed 126 <i>E.coli</i> / 100 mls . At public bathing beaches, as defined by MA DPH, where <i>Enterococci</i> are the chosen indicator: No single <i>Enterococci</i> sample shall exceed 61 <i>Enterococci</i> /100 mls and the geometric mean of the most recent five <i>Enterococci</i> samples within same bathing season shall not exceed 33 <i>Enterococci</i> /100 mls. Current standards for other waters (not designated as bathing beaches), where fecal coliform bacteria are the chosen indicator: Waters shall not exceed a geometric mean of 200 cfu/100 mls in any representative set of samples, nor shall more than 10% of the samples exceed 400 cfu/100 mls. (This criterion may be applied on a seasonal basis at the discretion of the MassDEP.) <p><u>Class C:</u></p> <ul style="list-style-type: none"> Fecal coliform bacteria: Shall not exceed a geometric mean of 1000 cfu/100 mls, nor shall 10% of the samples exceed 2000 cfu/100 mls. <p><u>Class SA:</u></p> <ul style="list-style-type: none"> Fecal coliform bacteria: Waters approved for open shellfishing shall not exceed a geometric mean (most probable number (MPN) method) of 14 MPN/100 mls, nor shall more than 10% of the samples exceed 43 MPN/100 mls. At public bathing beaches, as defined by MA DPH, where <i>Enterococci</i> are the chosen indicator: No single <i>Enterococci</i> sample shall exceed 104 <i>Enterococci</i> /100 mls and the geometric mean of the five most recent <i>Enterococci</i> levels within the same bathing season shall not exceed 35 <i>Enterococci</i> /100 mls . Current standards for other waters (not designated as shellfishing areas or public bathing beaches), where fecal coliform bacteria are the chosen indicator: Waters shall not exceed a geometric mean of 200 cfu/100 mls in any representative set of samples, nor shall more than 10% of the samples exceed 400 cfu/100 mls. (This criterion may be applied on a seasonal basis at the discretion of the MassDEP.) <p><u>Class SB:</u></p> <ul style="list-style-type: none"> Fecal coliform bacteria: In waters approved for restricted shellfish, a fecal coliform median or geometric mean (MPN method) of <88 MPN/100 mls and <10% of the samples >260 MPN/100 mls. At public bathing beaches, as defined by MA DPH, where <i>Enterococci</i> are the chosen indicator: No single <i>Enterococci</i> sample shall exceed 104 <i>Enterococci</i> /100 mls and the geometric mean of the most recent five <i>Enterococci</i> levels within the same bathing season shall not exceed 35 <i>Enterococci</i> /100 mls . Current standards for other waters (not designated as shellfishing areas or public bathing beaches), where fecal coliform bacteria are the chosen indicator: Waters shall not exceed a geometric mean of 200 cfu/100 mls in any representative set of samples, nor shall more than 10% of the samples exceed 400 cfu/100 mls. (This criterion may be applied on a seasonal basis at the discretion of the MassDEP.) <p><u>Class SC:</u></p> <ul style="list-style-type: none"> Fecal coliform bacteria: Shall not exceed a geometric mean of 1000 cfu/100 mls, nor shall 10% of the samples exceed 2000 cfu/100 mls.
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DESIGNATED USES

The Massachusetts Surface Water Quality Standards designate the most sensitive uses for which the surface waters of the Commonwealth shall be enhanced, maintained and protected. Each of these uses is briefly described below (MassDEP 1996a).

- *AQUATIC LIFE* - suitable habitat for sustaining a native, naturally diverse, community of aquatic flora and fauna. Two subclasses of aquatic life are also designated in the standards for freshwater bodies; *Cold Water Fishery* - capable of sustaining a year-round population of cold water aquatic life, such as trout, and *Warm Water Fishery* - waters that are not capable of sustaining a year-round population of cold water aquatic life.
- *FISH CONSUMPTION* - pollutants shall not 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.
- *DRINKING WATER* - used to denote those waters used as a source of public drinking water. They may be subject to more stringent regulation in accordance with the Massachusetts Drinking Water Regulations (310 CMR 22.00). These waters are designated for protection as Outstanding Resource Waters under 314 CMR 4.04(3).
- *SHELLFISH HARVESTING* (in SA and SB segments) – Class SA waters in approved areas (Open Shellfish Areas) shellfish harvested without depuration shall be suitable for consumption. Class SB waters in approved areas (Restricted Shellfish Areas) shellfish harvested with depuration shall be suitable for consumption.
- *PRIMARY CONTACT RECREATION* - suitable for any recreation or other water use in which there is prolonged and intimate contact with the water with a significant risk of ingestion of water. These include, but are not limited to, wading, swimming, diving, surfing and water skiing.
- *SECONDARY CONTACT RECREATION* - suitable for any recreation or other water use in 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.
- *AESTHETICS* - all surface waters shall be 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.
- *AGRICULTURAL AND INDUSTRIAL* - suitable for irrigation or other agricultural process water and for compatible industrial cooling and process water.

The guidance used to assess the *Aquatic Life*, *Fish Consumption*, *Drinking Water*, *Shellfish Harvesting*, *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses follows.

AQUATIC LIFE USE

This use is suitable for sustaining a native, naturally diverse, community of aquatic flora and fauna. The results of biological (and habitat), toxicological, and chemical data are integrated to assess this use. The nature, frequency, and precision of the MassDEP's data collection techniques dictate that a weight of evidence be used to make the assessment, with biosurvey results used as the final arbiter of borderline cases. The following chart provides an overview of the guidance used to assess the status (support or impaired) of the *Aquatic Life Use*.

Variable	Support Data available clearly indicates support or minor modification of the biological community. Excursions from chemical criteria (Table 1) not frequent or prolonged and may be tolerated if the biosurvey results demonstrate support.	Impaired There are frequent or severe violations of chemical criteria, presence of acute toxicity, or a moderate or severe modification of the biological community.
BIOLOGY		
Rapid Bioassessment Protocol (RBP) III*	Non/Slightly impacted	Moderately or Severely Impacted
Fish Community	Best Professional Judgment (BPJ)	BPJ
Habitat and Flow	BPJ	Dewatered streambed due to artificial regulation or channel alteration, BPJ
Eelgrass Bed Habitat (Howes et al. 2002)	No/minimal loss, BPJ	Moderate/severe loss, BPJ
Macrophytes	BPJ	Exotic species present, BPJ
Plankton/Periphyton	No/infrequent algal blooms	Frequent and/or prolonged algal blooms
TOXICITY TESTS**		
Water Column/Ambient	≥75% survival either 48 hr or 7-day exposure	<75% survival either 48 hr or 7-day exposure
Sediment	≥75% survival	<75% survival
CHEMISTRY -WATER**		
DO/percent saturation (MassDEP 1996a, EPA 1997)	Infrequent excursion from criteria (Table 1), BPJ (minimum of three samples representing critical period)	Frequent and/or prolonged excursion from criteria [river and shallow lakes: exceedences >10% of measurements; deep lakes (with hypolimnion): exceedences in the hypolimnetic area >10% of the surface area].
pH (MassDEP 1996a, EPA 1999)	Infrequent excursion from criteria (Table 1)	Criteria exceeded >10% of measurements.
Temperature (MassDEP 1996a, EPA 1997)	Infrequent excursion from criteria (Table 1) ¹	Criteria exceeded >10% of measurements.
Toxic Pollutants (MassDEP 1996a, EPA 1999) Ammonia-N (MassDEP 1996a, EPA 1999) Chlorine (MassDEP 1996a, EPA 1999)	Infrequent excursion from criteria (Table 1) Ammonia is pH and temperature dependent ² 0.011 mg/L (freshwater) or 0.0075 mg/L (saltwater) total residual chlorine (TRC) ³	Frequent and/or prolonged excursion from criteria (exceeded >10% of measurements).
CHEMISTRY -SEDIMENT**		
Toxic Pollutants (Persaud et al. 1993)	Concentrations ≤ Low Effect Level (L-EL), BPJ	Concentrations ≥ Severe Effect Level (S-EL) ⁴ , BPJ
CHEMISTRY -TISSUE		
PCB – whole fish (Coles 1998)	≤500 µg/kg wet weight	BPJ
DDT (Environment Canada 1999)	≤14.0 µg/kg wet weight	BPJ
PCB in aquatic tissue (Environment Canada 1999)	≤0.79 ng TEQ/kg wet weight	BPJ

* rapid bioassessment protocol (RBP) II analysis may be considered for assessment decision on a case-by-case basis, **For identification of impairment, one or more of the following variables may be used to identify possible causes/sources of impairment: NPDES facility compliance with whole effluent toxicity test and other limits, turbidity and suspended solids data, nutrient (nitrogen and phosphorus) data for water column/sediments. ¹Maximum daily mean T in a month (minimum six measurements evenly distributed over 24-hours) less than criterion. ²Saltwater is temperature dependent only. ³The minimum quantification level for TRC is 0.05 mg/L. ⁴For the purpose of this report, the S-EL for total polychlorinated biphenyl compounds (PCB) in sediment (which varies with Total Organic Carbon (TOC) content) with 1% TOC is 5.3 ppm while a sediment sample with 10% TOC is 53 ppm.

Note: National Academy of Sciences/National Academy of Engineering (NAS/NAE) guideline for maximum organochlorine concentrations (i.e., total PCB) in fish tissue for the protection of fish-eating wildlife is 500µg/kg wet weight (ppb, not lipid-normalized). PCB data (tissue) in this report are presented in µg/kg wet weight (ppb) and are not lipid-normalized to allow for direct comparison to the NAS/NAE guideline.

FISH CONSUMPTION USE

Pollutants shall not 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 this 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 (MA DPH), Bureau of Environmental Health Assessment (MA DPH 2004). The MA DPH list identifies waterbodies where elevated levels of a specified contaminant in edible portions of freshwater species pose a health risk for human consumption. Hence, the Fish Consumption Use is assessed as non-support in these waters.

In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury (Hg) contamination (MA DPH 2001).

1. The MA DPH "...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, MA DPH 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 (MA DPH 2001)."
2. Additionally, MA DPH "...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 (MA DPH 2001)."

Other statewide advisories that MA DPH has previously issued and are still in effect are as follows (MA DPH 2001):

1. Due to concerns about chemical contamination, primarily from polychlorinated biphenyl compounds (PCB) and other contaminants, no individual should consume lobster tomalley from any source. Lobster tomalley is the soft green substance found in the tail and body section of the lobster.
2. Pregnant and breastfeeding women and those who are considering becoming pregnant should not eat bluefish due to concerns about PCB contamination in this species.

The following is an overview of EPA's guidance used to assess the status (support or impaired) of the *Fish Consumption Use*. Because of the statewide advisory no waters can be assessed as support for the *Fish Consumption Use*. Therefore, if no site-specific advisory is in place, the *Fish Consumption Use* is not assessed.

Variable	Support	Impaired
	No restrictions or bans in effect	There is a "no consumption" advisory or ban in effect for the general population or a sub-population for one or more fish species or there is a commercial fishing ban in effect
MA DPH Fish Consumption Advisory List (MA DPH 2004, MA DPH 2001)	Not applicable, precluded by statewide advisory (Hg)	Waterbody on MA DPH Fish Consumption Advisory List

Note: MA DPH's statewide advisory does not include fish stocked by the state Division of Fisheries and Wildlife or farm-raised fish sold commercially.

DRINKING WATER USE

The term *Drinking Water Use* denotes those waters used as a source of public drinking water. These waters may be subject to more stringent regulation in accordance with the Massachusetts Drinking Water Regulations (310 CMR 22.00). They are designated for protection as Outstanding Resource Waters in 314 CMR 4.04(3). MassDEP's Drinking Water Program (DWP) has primacy for implementing the provisions of the federal Safe Drinking Water Act (SDWA). Except for suppliers with surface water sources for which a waiver from filtration has been granted (these systems also monitor surface water quality) all public drinking water supplies are monitored as finished water (tap water). Monitoring includes the major categories of contaminants established in the SDWA: bacteria, volatile and synthetic organic compounds, inorganic compounds and radionuclides. The DWP maintains current drinking supply monitoring data. The status of the supplies is currently reported to MassDEP and EPA by the suppliers on an annual basis in the form of a consumer confidence report (<http://yosemite.epa.gov/ogwdw/ccr.nsf/Massachusetts>). Below is EPA's guidance to assess the status (support or impaired) of the drinking water use.

Variable	Support	Impaired
	No closures or advisories (no contaminants with confirmed exceedences of maximum contaminant levels, conventional treatment is adequate to maintain the supply).	Has one or more advisories or more than conventional treatment is required or has a contamination-based closure of the water supply.
Drinking Water Program (DWP) Evaluation	See note below	See note below

Note: While this use is not assessed in this report, information on drinking water source protection and finish water quality is available at and from the Taunton River Watershed's public water suppliers.

SHELLFISH HARVESTING USE

This use is assessed using information from the Department of Fisheries, Wildlife and Environmental Law Enforcement's Division of Marine Fisheries (DMF). A designated shellfish growing area is an area of potential shellfish habitat. Growing areas are managed with respect to shellfish harvest for direct human consumption and comprise at least one or more classification areas. The classification areas are the management units, which range from being approved to prohibited (described below) with respect to shellfish harvest. Shellfish areas under management closures are *not assessed*. Not enough testing has been done in these areas to determine whether or not they are fit for shellfish harvest, so they are closed for the harvest of shellfish.

Variable	Support	Impaired
	SA Waters—Approved ¹ SB Waters— Approved ¹ , Conditionally Approved ² or Restricted ³	SA Waters— Conditionally Approved ² , Restricted ³ , Conditionally Restricted ⁴ , or Prohibited ⁵ SB Waters—Conditionally Restricted ⁴ or Prohibited ⁵
DMF Shellfish Project Classification Area Information (MA DFG 2000)	Reported by DMF	Reported by DMF

NOTE: Designated shellfish growing areas may be viewed using the MassGIS datalayer available from MassGIS at <http://www.state.ma.us/mgis/dsga.htm>. This coverage currently reflects classification areas as of July 1, 2000.

¹ **Approved** - "...open for harvest of shellfish for direct human consumption subject to local rules and regulations..."

An approved area is open all the time and closes only due to hurricanes or other major coastwide events.

² **Conditionally Approved** - "...subject to intermittent microbiological pollution..." During the time the area is open, it is "...for harvest of shellfish for direct human consumption subject to local rules and regulations..." A conditionally approved area is closed some of the time due to runoff from rainfall or seasonally poor water quality. When open, shellfish harvested are treated as from an approved area.

³ **Restricted** - area contains a "limited degree of pollution." It is open for "harvest of shellfish with depuration subject to local rules and state regulations" or for the relay of shellfish. A restricted area is used by DMF for the relay of shellfish to a less contaminated area.

⁴ **Conditionally Restricted** - "...subject to intermittent microbiological pollution..." During the time area is restricted, it is only open for "the harvest of shellfish with depuration subject to local rules and state regulations." A conditionally restricted area is closed some of the time due to runoff from rainfall or seasonally poor water quality. When open, only soft-shell clams may be harvested by specially licensed diggers (Master/Subordinate Diggers) and transported to the DMF Shellfish Purification Plant for depuration (purification).

⁵ **Prohibited** - Closed for harvest of shellfish.

PRIMARY CONTACT RECREATION USE

This use is suitable for any recreational or other water use in which there is prolonged and intimate contact with the water with a significant risk of ingestion of water during the primary contact recreation season (1 April to 15 October). These include, but are not limited to, wading, swimming, diving, surfing and water skiing. The chart below provides an overview of the guidance used to assess the status (support or impaired) of the *Primary Contact Recreation Use*. Excursions from criteria due to natural conditions are not considered impairment of the use.

Variable	Support	Impaired
Bacteria (MassDEP 1996a and MA DPH 2002a)	<p>Criteria are met, no aesthetic conditions that preclude the use</p> <p>At “public bathing beach” areas: Formal beach postings/advisories neither frequent nor prolonged during the swimming season (the number of days posted or closed cannot exceed 10% during the locally operated swimming season).</p> <p>Other waters: Samples* collected during the primary contact season must meet criteria (Table 1).</p> <p>Shellfish Growing Area classified as “Approved” by DMF.</p>	<p>Frequent or prolonged violations of criteria and/or formal bathing area closures, or severe aesthetic conditions that preclude the use</p> <p>At “public bathing beach” areas: Formal beach closures/postings >10% of time during swimming season (the number of days posted or closed exceeds 10% during the locally operated swimming season).</p> <p>Other waters: Samples* collected during the primary contact season do not meet the criteria (Table 1).</p>
<p><i>Aesthetics (MassDEP 1996a) - All surface waters shall be 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 [growth or amount] species of aquatic life</i></p>		
<p>Odor, oil and grease, color and turbidity, floating matter</p> <p>Transparency (MA DPH 1969)</p> <p>Nuisance organisms</p>	<p>Narrative “free from” criteria met or excursions neither frequent nor prolonged, BPJ.</p> <p>Public bathing beach and lakes – Secchi disk depth ≥ 1.2 meters ($\geq 4'$) (minimum of three samples representing critical period).</p> <p>No overabundant growths (i.e., blooms) that render the water aesthetically objectionable or unusable, BPJ.</p>	<p>Narrative “free from” criteria not met - objectionable conditions either frequent and/or prolonged, BPJ.</p> <p>Public bathing beach and lakes - Secchi disk depth < 1.2 meters ($< 4'$) (minimum of three samples representing critical period).</p> <p>Overabundant growths (i.e., blooms and/or non-native macrophyte growth dominating the biovolume) rendering the water aesthetically objectionable and/or unusable, BPJ.</p>

* Data sets to be evaluated for assessment purposes must be representative of a sampling location (minimum of five samples per station recommended) over the course of the primary contact season. Samples collected on one date from multiple stations on a river are not considered adequate to assess this designated use. An impairment decision will not be based on a single sample (i.e., the geometric mean of five samples is < 200 colony forming unit (cfu)/100mL but one of the five samples exceeds 400 cfu/100mL). The method detection limit (MDL) will be used in the calculation of the geometric mean when data are reported as less than the MDL (e.g. use 20 cfu/100mL if the result is reported as < 20 cfu/100mL). Those data reported as too numerous to count (TNTC) will not be used in the geometric mean calculation; however, frequency of TNTC sample results should be presented.

SECONDARY CONTACT RECREATION USE

This use is suitable for any recreation or other water use in 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. Following is an overview of the guidance used to assess the status (support or impaired) of the *Secondary Contact Use*. Excursions from criteria due to natural conditions are not considered impairment of use.

Variable	Support	Impaired
Fecal Coliform Bacteria (MassDEP 1996a)	Criteria are met, no aesthetic conditions that preclude the use Other waters: Samples* collected must meet the Class C or SC criteria (see Table 1).	Frequent or prolonged violations of criteria, or severe aesthetic conditions that preclude the use Other waters: Samples* collected do not meet the Class C or SC criteria (see Table 1).
<i>Aesthetics (MassDEP 1996a) - All surface waters shall be 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 [growth or amount] species of aquatic life</i>		
Odor, oil and grease, color and turbidity, floating matter	Narrative “free from” criteria met or excursions neither frequent nor prolonged*, BPJ.	Narrative “free from” criteria not met - objectionable conditions either frequent and/or prolonged*, BPJ.
Transparency (MA DPH 1969)	Public bathing beach and lakes – Secchi disk depth ≥ 1.2 meters ($\geq 4'$) (minimum of three samples representing critical period).	Public bathing beach and lakes - Secchi disk depth < 1.2 meters ($< 4'$) (minimum of three samples representing critical period).
Nuisance organisms	No overabundant growths (i.e., blooms) that render the water aesthetically objectionable or unusable, BPJ.	Overabundant growths (i.e., blooms and/or non-native macrophyte growth dominating the biovolume) rendering the water aesthetically objectionable and/or unusable, BPJ.

*Data sets to be evaluated for assessment purposes must be representative of a sampling location (minimum of five samples per station recommended) over time. Samples collected on one date from multiple stations on a river are not considered adequate to assess this designated use.

AESTHETICS USE

All surface waters shall be 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. The aesthetic use is closely tied to the public health aspects of the recreational uses (swimming and boating). Below is an overview of the guidance used to assess the status (support or impaired) of the *Aesthetics Use*.

Variable	Support	Impaired
	Narrative “free from” criteria met	Objectionable conditions frequent and/or prolonged
Odor, oil and grease, color and turbidity, floating matter	Narrative “free from” criteria met or excursions neither frequent nor prolonged, BPJ.	Narrative “free from” criteria not met - objectionable conditions either frequent and/or prolonged, BPJ.
Transparency (MA DPH 1969)	Public bathing beach and lakes – Secchi disk depth ≥ 1.2 meters ($\geq 4'$) (minimum of three samples representing critical period).	Public bathing beach and lakes - Secchi disk depth < 1.2 meters ($< 4'$) (minimum of three samples representing critical period).
Nuisance organisms	No overabundant growths (i.e., blooms) that render the water aesthetically objectionable or unusable, BPJ.	Overabundant growths (i.e., blooms and/or non-native macrophyte growth dominating the biovolume) rendering the water aesthetically objectionable and/or unusable, BPJ.

TAUNTON RIVER WATERSHED DESCRIPTION AND CLASSIFICATION

DESCRIPTION

The Taunton River Watershed is the second largest river watershed in Massachusetts with a drainage area of 562 square miles contained wholly within Massachusetts boundaries. Located in southeastern Massachusetts, the watershed encompasses all or portions of 40 cities and towns. The Taunton River Watershed has the flat to low hilly topography typical of eastern Massachusetts watersheds shaped by glaciation. The Taunton River has one of the flattest courses in the state, falling approximately 21 feet over its length. This level terrain creates extensive wetlands throughout the watershed. The watershed contains over 94 square miles of wetlands, 12,883 acres of lakes, and some of the most productive cranberry bogs in the country. Hockomock Swamp, located in the north-central portion of the watershed, is the largest vegetated freshwater wetland system in the state.

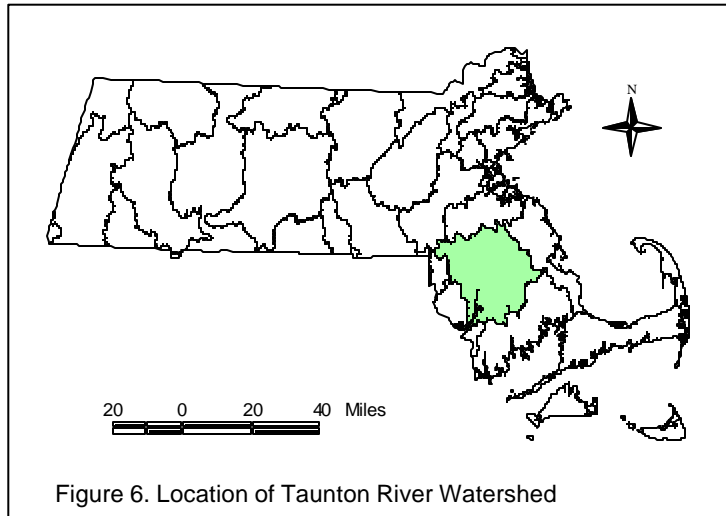


Figure 6. Location of Taunton River Watershed

There are two Areas of Environmental Concern (ACECs) in the Taunton River Watershed, the Hockomock Swamp and the Canoe River Aquifer (Snake River, Watson Pond, and Lake Sabbatia). The Hockomock Swamp is located in the towns of Bridgewater, Easton, Norton, Raynham, Taunton, and West Bridgewater. The Canoe River Aquifer is located in the towns of Easton, Foxborough, Mansfield, Norton, Sharon, and Taunton.

The Hockomock Swamp ACEC was officially designated on 10 February 1990. Its associated wetlands and water bodies comprise the largest vegetated freshwater wetland system in Massachusetts (MA DCR 2005). The boundaries of the Hockomock Swamp ACEC include approximately 16,950 acres in the southeastern part of the state. The wetlands act as a huge water reservoir and serve as the headwaters for the Town River, which flows into the Taunton River. The wetlands and floodplains are connected hydrologically with an extensive underlying system of medium- and high-yield aquifers. It is also the location of at least 13 rare and endangered species. According to the Massachusetts Historical Commission, the archaeological sites in the vicinity of this wetland complex are known to span a period of 9000 years. The potential quality and significance of these archaeological resources are enormous. The Division of Fisheries and Wildlife (DFW) owns approximately 5000 acres of the Hockomock Swamp within all six communities. The Hockomock Swamp Wildlife Management Area provides public access to the swamp and to several recreational areas. Additional public and nonprofit lands are located within the ACEC.

The 17,200-acre Canoe River Aquifer ACEC was officially designated on 18 May 1991. The Canoe River Aquifer ACEC is characterized by an extensive system of surface waters, wetlands, floodplains and high-yield aquifers. The aquifers are recharged with water percolating through the permeable soils of the area and provide high-quality drinking water to over 66,000 people in four of the towns located within the ACEC. There are ten municipal wells located in the ACEC and numerous private wells that draw from the aquifers. More than a hundred rivers, brooks, streams and creeks and the extensive wetlands and floodplains support a rich and diverse habitat for wildlife. The upland portions of the area are a mix of open fields, deep woods, transitional woodlands, and over a thousand acres of productive farmland and cranberry bogs. There are occurrences of rare and endangered species, and increasingly rare Atlantic White Cedar swamps. The open space of the ACEC also includes approximately 3,500 acres of municipal and nonprofit conservation and recreational lands (MA DCR 2005).

The major issue in the Taunton River Watershed is dealing with the current and projected growth due to proposed transportation links. At this time over half the watershed is forested, recreational, and open land, while approximately 20 percent of the watershed area is residential.

The cities of Brockton and Taunton rely on surface water for drinking water needs, while the other watershed communities rely almost exclusively on groundwater resources. MassDEP's Water Management Program, which regulates surface and ground water withdrawals in excess of an average of 100,000 gpd (gallons per day), has issued 30 permits and 139 registrations (for withdrawals in existence prior to 1986) in the Taunton River Watershed. Additional applications are under review for new sources of public drinking water supplies and development of cranberry bogs.

Streamflow in the Taunton River fluctuates slowly due to the wetland areas, underlying stratified drift, and the flat gradient. Flow is measured continuously at four US Geological Survey (USGS) gaging stations: the Wading River near Norton, the Threemile River at North Dighton, the Segreganset River near Dighton, and the Taunton River at Bridgewater. On average, Taunton River streamflow is highest in March and lowest in August. The Taunton River and many of its tributaries (subwatersheds) have relatively strong low flows under natural conditions, due primarily to the stratified drift deposits that underlie much of the watershed (approximately 62%). These deposits store and yield groundwater to streamflow between precipitation events.

The confluence of the Salisbury Plain River and Beaver Brook in East Bridgewater marks the beginning of the Matfield River. The Matfield River and its tributaries drain 77 square miles of the northeast portion of the Taunton River Watershed. The outflow from Lake Nippenicket joins the Hockomock River to form the Town River. The Matfield River joins the Town River in the impounded waters at the head of the Taunton River. With the exception of this major dam, the Taunton River flows without physical obstruction to Mount Hope Bay. The terrain is relatively level, so the river is slow moving with only a few short sections of rapids. The freshwater portion maintains a fairly uniform cross-section with a width of about 80 feet. The Taunton River flows southeasterly through Bridgewater and then turns southwest, forming the Bridgewater-Halifax and Bridgewater-Middleborough town boundaries. Along this section the Taunton River receives flow from two tributaries, the Winnetuxet and Nemasket Rivers.

The Winnetuxet River drains portions of Carver, Plympton, Halifax and Middleborough, while the Nemasket River flows through Lakeville and Middleborough. After being joined by these two tributaries, the Taunton River flows generally in a southwesterly direction, forming the boundaries between Raynham and Middleborough and then Raynham and Taunton. The Cotley River is a small tributary which joins the freshwater portion of the Taunton River in Taunton. In East Taunton the river becomes tidal, with tide waters from Mount Hope Bay reaching more than 18 miles upstream. In the city of Taunton, the river turns south and maintains its relatively narrow channel-like appearance. The Mill River enters the estuary in Taunton. The Mill River flows from Lake Sabbatia which is fed by the Snake River as it exits from Winnecunnet Pond. Winnecunnet Pond is fed by the Canoe River and Mulberry Meadow Brook.

Downstream from the Threemile River confluence, the Taunton widens into a broad tidal estuary. The Threemile River is formed at the confluence of the Wading and Rumford Rivers in the northwest section of the Taunton River Watershed and has a drainage area of 84.5 square miles. The lower two miles of the Threemile River are tidal. Another small tributary, the Segreganset River, joins the Taunton River estuary in Dighton. The Assonet River is the last major tributary to empty into the Taunton River Estuary. The freshwater portion of the Assonet flows through Lakeville and Freetown. The lower Assonet forms a broad estuarine finger of the Taunton River.

CLASSIFICATION

Consistent with the National Goal Uses of "fishable and swimmable waters", the classification of waters in the Taunton Watershed according to the SWQS, include the following (MassDEP 1996a):

"Class A – These waters are designated as a source of public water supply. To the extent compatible with its use they shall be an excellent habitat for fish, other aquatic life and wildlife, and suitable for primary and secondary contact recreation. These waters shall have excellent aesthetic value. These

waters are designated for protection as Outstanding Resource Waters (ORWs) under 314 CMR 4.04(3)" (Rojko *et al.* 1995).

Class A Public Water Supplies in the Taunton River Watershed

- Assawompsettt Pond, source to outlet in Lakeville and those tributaries thereto
- Great Quittacas Pond, source to outlet in Lakeville and those tributaries thereto
- Little Quittacas Pond, source to outlet in Lakeville and those tributaries thereto
- Long Pond, source to outlet in Lakeville and those tributaries thereto
- Pocksha Pond, source to outlet in Lakeville and those tributaries thereto
- Somerset Reservoir, source to outlet in Somerset and those tributaries thereto
- Monponsett Pond, source to outlet in Halifax and those tributaries thereto
- Elders Pond, source to outlet in Lakeville and those tributaries thereto
- Brockton Reservoir (Avon Reservoir, Salisbury Brook Reservoir) source to outlet in Avon and those tributaries thereto
- Segreganset River, from a wetland north of Glebe Street in Taunton to the pumping station in Dighton

"Class B – These waters are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value."

Class B Warm Water Fisheries in the Taunton River Watershed

- Taunton River, Source to Route 24 Bridge
- Salisbury Plain & Matfield Rivers, Brockton STP to confluence
- Town River, Bridgewater STP to confluence
- Nemasket River, Middleborough STP to confluence
- Saw Mill Brook, Entire length
- Mill Brook, Wittenton Street to confluence
- Threemile River, Source to confluence
- Wading River, From Chartley Brook to confluence

"Class SB – These waters are designated as a habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. In approved areas they shall be suitable for shellfish harvesting with depuration (Restricted Shellfishing Areas). These waters shall have consistently good aesthetic value. "

Class SB in the Taunton River Watershed (other restrictions as noted)

- Taunton River, Route 24 Bridge to mouth, Shellfishing (R) and CSO

The Massachusetts Surface Water Quality Standards contain antidegradation provisions (314 CMR 4.04) to maintain existing uses and the level of water quality necessary to protect those uses. As part of these provisions, waters with exceptional socio-economic, recreational, ecological and/or aesthetic values are designed as Outstanding Resource Waters (ORWs) (Rojko *et al.* 1995). ORWs include vernal pools, certified as such by the Natural Heritage Program of the Massachusetts Division of Fisheries and Wildlife, and all designated Class A Public Water Supplies (PWS). Other waters designated as ORWs may include those found in National Parks, State Forests and Parks, and Areas of Critical Environmental Concern (ACECs) designated by the Secretary of Environmental Affairs and those protected by special legislation (MA DEM 1993). Wetlands which border these ORWs are designated ORWs to the boundary of the defined area.

ORWs have more stringent requirements than other waters because the existing use is so exceptional, or the perceived risk of harm is such that no lowering of water quality is permissible. Generally, new or increased discharges of pollutants are prohibited for wastewater and stormwater. The discharge of dredge or fill material to a certified vernal pool and within 500 feet of a water supply reservoir is prohibited unless a variance is granted under 314 CMR 9.00 (401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging and Dredged Material Disposal in Waters of the United States within

the Commonwealth). The discharge of dredged or fill material into other ORWs is permitted for certain specified projects only after an alternatives analysis and minimization and mitigation of adverse impacts.

Unlisted waters in the Taunton Watershed not otherwise designated in the SWQS, are designated *Class B, High Quality Waters* for inland waters and *Class SA, High Quality Waters* for coastal and marine waters. According to the SWQS, where fisheries designations are necessary, they shall be made on a case-by-case basis.

SOURCES OF INFORMATION

Multiple local, state and federal agencies provided information used in this water quality assessment of the Taunton River Watershed. Within the Massachusetts Department of Environmental Protection (MassDEP) information was obtained from three programmatic bureaus: Bureau of Resource Protection (BRP, see below), Bureau of Waste Prevention (industrial wastewater discharge information) and the Bureau of Waste Site Cleanup (hazardous waste site cleanup information). Specifically, water quality (Appendices A and B), lake survey data (Appendix C), habitat assessment and biological data (Appendices D and E), toxics in fish flesh data (Appendix F), and the results of periphyton sampling (Appendix H) were provided by MassDEP BRP Division of Watershed Management Watershed Planning Program. Water withdrawal and wastewater discharge permit information (Water Management Act and National Pollutant Discharge Elimination System) were provided by the DWM Watershed Permitting Program and the MassDEP Southeast Regional Office (Appendix G). [Note: The BRP DWM Drinking Water Program evaluates the status of the *Drinking Water Use* and this information is therefore not provided in this assessment report.] Projects funded through various MassDEP grant and loan programs also provide valuable information that may be used in the water quality assessment report. A summary of these projects for the Taunton River Watershed is provided in Appendix I.

Other state agencies contributing information to this report include: the Massachusetts Department of Public Health (MA DPH), the Department of Fish and Game (MA DFG), formerly the Department of Fisheries, Wildlife, and Environmental Law Enforcement or MDFW and the Division of Marine Fisheries (DMF), and the MA Department of Conservation and Recreation (MA DCR), formerly the Department of Environmental Management or MA DEM. Federal agencies contributing include the EPA and USGS.

A New England Coastal Basin (NECB) Mercury Study was also initiated by USGS in 1999 when the results of their National Mercury Pilot Study showed some of the highest mercury concentrations in the country were in the NECB study area (USGS 2003). The dominant source of mercury identified in the NECB study area was atmospheric deposition. In collaboration with the USGS Toxics Substances Hydrology Program (an extension of the National Mercury Pilot Study), Urban Land Use Gradient Study - part of the National Water-Quality Assessment (NAWQA) Program - and the MassDEP Merrimack Valley Fish Study, USGS collected sediment, water, and/or fish tissue for total and/or methyl mercury analysis from 22 streams north of Boston in 1999 and 30 sites in the NECB in 2000. The Wading River in Norton and the Matfield River in East Bridgewater were sampled by USGS between October 1999 and September 2001.

ENSR International conducted an investigation to evaluate instream site-specific copper criteria for streams in the Taunton River Watershed and for three municipal treatment plants (Mansfield WPAF, the Middleborough WWTP and the Bridgewater WWTF) discharging to the Taunton River and its tributaries. Water quality sampling was conducted during March, May, July, August and September of 2001 (ENSR 2002). The study was prompted by the concern that many dischargers in the Taunton River watershed have NPDES permits with very low concentration limits for copper and these limits have been proven to be difficult or impossible to meet on a consistent basis. Additionally, there was a concern that the copper criterion currently in place is overly protective to aquatic organisms.

In August 2001 the Massachusetts "Beach Bill" was enacted by the legislature and signed by the Governor (MGL. C111. S5S). This act created minimum standards for public bathing waters adjacent to any public or semi-public bathing beach in the Commonwealth. A "public bathing beach" is defined as a beach open to the general public whether or not any entry fee is charged that permits access to bathing waters. A "semi-public bathing beach" is defined as a bathing beach used in connection with a hotel,

motel, trailer park, campground, apartment house, condominium, country club, youth club, school, camp, or similar establishment where the primary purpose of the establishment is not the operation of the bathing beach and where admission to the use of the bathing beach is included in the fee paid for use of the premises. A semi-public bathing beach shall also include a bathing beach operated and maintained solely for the use of members and guests of an organization that maintains such bathing beach. Under the Beach Bill, the Massachusetts Department of Public Health (MA DPH) was directed to establish minimum uniform water quality standards for coastal and inland beach waters and determining the frequency and location of testing, reporting requirements, and requirements for notifying the public of threats to human health or safety. *105 CMR 445.000: Minimum Standards for Bathing Beaches (State Sanitary Code, Chapter VII)* outlines MA DPH's guidelines for the Beach Bill. Additionally, under the Beach Bill and MA DPH guidelines, local boards of health and state agencies are responsible for collecting samples from public beaches using testing procedures consistent with the American Public Health Association's *Standard Methods for Examination of Water and Waste Water* or methods approved by EPA. Operators of semi-public beaches are responsible for the costs of testing their beaches. Results of testing, monitoring, and analysis of public and semi-public beaches must be submitted in an annual report to MA DPH by 31 October of each year (MA DPH 2002b).

The National Shellfish Sanitation Program (NSSP) includes federal and state governments cooperatively administering a battery of public health regulations designed to assure the sanitary integrity of shellfish and shellfish products (ISSC 2000). A key regulatory role assigned to coastal states by the NSSP is shellfish classification. According to methods, procedures and standards set forth in the *NSSP Guide For The Control Of Molluscan Shellfish*, a designated state agency must determine whether shellfish from coastal growing waters are safe or may be made safe for human consumption. The determination is based, in large part, upon the presence of fecal coliform bacteria within the growing waters. In September 2003 the Massachusetts Department of Marine Fisheries (DMF) prohibited all shellfish growing areas in the Taunton River Watershed due to elevated fecal coliform concentrations (Sawyer 2003).

In Massachusetts the DMF Shellfish Management Program maintains information used to classify (e.g., approved, conditionally approved, prohibited, etc.) their shellfish management areas (MA DFG 2000). These classifications are subsequently used to regulate the harvesting of various shellfish.

DMF achieves public health protection as a result of their sanitary surveys of shellfish growing areas to determine each area's suitability as shellfish sources for human consumption. The principal components included in a sanitary survey include: 1) an evaluation of pollution sources that may affect an area; 2) evaluation of hydrographic and meteorological characteristics that may affect distribution of pollutants; and 3) an assessment of water quality. These surveys also include shellfish species identification, habitat location, relative abundance and documentation of related fisheries (Kennedy 2001). Supplementary analysis may be required for naturally occurring pathogens (e.g., *Vibrio* sp.), marine biotoxins (e.g., Paralytic Shellfish Poisoning) and hazardous wastes in growing areas with a known history of contamination by these harmful substances.

Each growing area must have a complete sanitary survey every twelve years, a triennial evaluation every three years and an annual review in order to maintain a classification, which allows shellfish harvesting (MA DFG 2002). Minimum requirements for sanitary surveys, triennial evaluations, annual reviews and annual water quality monitoring are established by the Interstate Shellfish Sanitation Conference (ISSC) and set forth in the NSSP. Each year water samples are collected at 2,320 stations in 294 growing areas in Massachusetts's coastal waters at a minimum frequency of five times while open to harvesting. Water and shellfish samples are tested for fecal coliform bacteria at two *Marine Fisheries* laboratories located in Gloucester and Pocasset using a Most Probable Number method for classification purposes and a membrane filtration technique (usually M-tec) for pollution source identification. A growing area classification may be downgraded and management plans amended, based on the findings of annual and triennial reviews (Kennedy 2001). Classification upgrades can only be made based on the findings of a full sanitary survey.

The following types of NPDES surface water discharges occur in the Taunton River Watershed (Appendix G, Tables G1, G2, and G3).

Municipal and Sanitary Wastewater Treatment Plants

- Avon Custom Mixing Services, Inc. (MA0026883) discharges to Trout Brook (Segment MA62-07).
- Bridgewater Wastewater Treatment Plant (WWTP) (MA0100641) discharges to Town River (Segment MA62-13).
- Brockton Advanced Water Reclamation Facility (MA0101010) discharges to Salisbury Plain River (Segment MA62-06).
- Dighton-Rehoboth Regional School District (MA0022586) discharges to unnamed tributary to Segreganset River (Segment MA62-53).
- East Bridgewater Public Schools (MA0022446) discharges to unnamed tributary to Matfield River (Segment MA62-32).
- Mansfield WPAF (MA0101702) discharges to Threemile River (Segment MA62-56).
- MCI Bridgewater Water Pollution Control Facility (WPCF) (MA0102237) discharges to Sawmill Brook (Segment MA62-36). Middleborough WWTP (MA0101591) discharges to Nemasket River (Segment MA62-26).
- Oak Point Retirement Community (MA0032433) discharges to Taunton River (Segment MA62-01).
- Somerset WPCF (MA0100676) discharges to Taunton River (Segment MA62-04).
- Taunton WWTP (MA0100897) discharges to Taunton River (Segment MA62-02).
- Town of West Bridgewater - Howard School (MA010753) discharges to Town River (Segment MA62-11).
- Town of West Bridgewater - Rose L. MacDonald School (MA01012061) discharges to West Meadow Brook to Town River (Segment MA62-11).
- Wheaton College (MA0026182) discharges to Rumford River (Segment MA62-40).

Industrial discharges

- BIW Cable Systems, Inc. discharges process wastewater and non-contact cooling water to Threemile River (Segment MA62-56).
- Shell Oil Company, Fall River (MA0004871) discharges oil and grease to Taunton River (Segment MA62-04).
- Somerset Power LLC (MA0001856) discharges treated wastewater, condenser cooling water, and stormwater to Taunton River (Segment MA62-04).
- Taunton Municipal Lighting Plant (MA0002241) discharges cooling water and stormwater to Taunton River (Segment MA62-02).
- Tweave, Inc. (MA0005355) discharges treated process wastewater to Wading River (Segment MA62-49).

Municipal Public Drinking Water Treatment Plants

- Abington/Rockland Joint Water Works (MAG640009) discharges to wetland adjacent to Shumatuscacant River (Segment MA62-33).
- Richmond Park WTP (MAG640008) discharges Turkey Swamp that flows into Palmer Mill Brook then flows to Winnetuxet River (Segment MA62-24).

Industrial non-process discharges

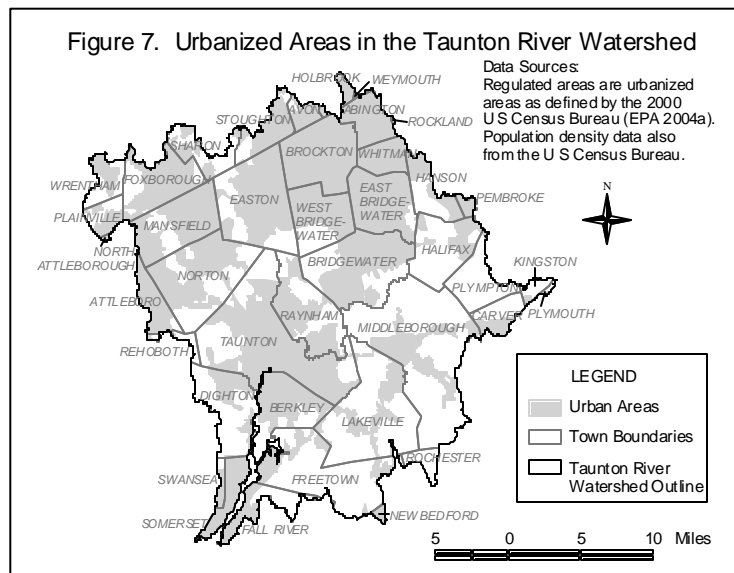
- Several industries have general permits issued to the facilities by EPA for the discharge of non-contact cooling water and stormwater. While these discharges are authorized and controlled under general permits, the associated impacts from these facilities are minimal and do not get significant review from MassDEP.

General Stormwater Phase I and Phase II discharges

- *Phase I* - In 1987 Congress amended the Clean Water Act to require EPA to establish phased NPDES requirements for stormwater discharges. As part of Phase I certain categories of stormwater discharges associated with industrial activity and for discharges from municipal separate storm sewer systems located in municipalities with a population of 100,000 or more were required to submit permit applications. In the Taunton River Watershed, many facilities have submitted NOIs for coverage under the Multi-Sector General Permit (See Appendix G, Table G4 for a listing of these facilities and location). Currently the Multi-Sector General Permit published in the Federal Register on 30 October 2000 (which replaced the 1995 permit) will expire in 2005. A Notice of Intent must be submitted by the permittees to maintain coverage for the next permit cycle.
- *Phase II* – The NPDES Phase II General Permit program also requires NPDES permit coverage for stormwater discharges from small municipal separate storm sewer systems (MS4s) and

construction activity disturbing one acre or more of land in a mapped "urbanized area" defined and delineated by the US Bureau of Census in 2000 <http://www.epa.gov/npdes/pubs/fact2-2.pdf>. Large and medium MS4s were permitted during Phase I of the NPDES Stormwater Program. Under EPA's Phase II program the definition of "municipal" includes Massachusetts communities, U.S. military installations, state or federal owned facilities such as hospitals, prison complexes, state colleges or universities and state highways. An MS4 is a system that: discharges at one or more point sources; is a separate storm sewer system (not designed to carry combined stormwater and sanitary waste water); is operated by a public body; discharges to the Waters of the United States or to another MS4; and, is located in an "Urbanized Area". The NPDES Phase II General Permit requires operators of regulated MS4s to develop and implement a stormwater management program that prevents harmful pollutants from being washed or dumped directly into the storm sewer system, which is subsequently discharged into local waterbodies. Certain Massachusetts communities were automatically designated (either in full or part) by the Phase II Rule based on the urbanized area delineations from the 2000 U.S. Census.

As a result of the census mapping, all 40 communities in the Taunton River Watershed were located either totally or partially in the regulated Urbanized Area: Abington, Attleboro, Avon, Berkley, Bridgewater, Brockton, Carver, Dighton, East Bridgewater, Easton, Fall River, Foxborough, Freetown, Halifax, Hanson, Holbrook, Kingston, Lakeville, Mansfield, Middleborough, New Bedford, North Attleborough, Norton, Pembroke, Plainville, Plymouth, Raynham, Rehoboth, Rockland, Sharon, Somerset, Stoughton, Swansea, Taunton,



Walpole, West Bridgewater, Weymouth, Whitman and Wrentham (Figure 7). The Town of Plympton was granted a waiver from the program by US EPA. The communities applied to EPA and MassDEP for coverage under the Phase II stormwater general permit, issued on 1 May 2003. Municipalities that are totally regulated must implement the requirements of the Phase II permit in the entire town, while communities that are partially regulated need to comply with the Phase II permit only in the mapped Urbanized Areas (see <http://www.epa.gov/region01/npdes/stormwater/ma.html> for detailed maps for each community and copies of the Notices of Intent). Stormwater general permits were issued jointly by EPA and MassDEP after administrative review by EPA. A thorough review of the communities' stormwater management program will be completed by EPA in coordination with MassDEP during the five year permit term. Annual reports will be submitted to EPA and MassDEP by the permittees on May 1st in years 2004 through 2008 (inclusive). Phase II stormwater general permits will expire on 1 May 2008 (Domizio 2004).

NPDES Toxicity Testing Discharge Monitoring Reports (DMRs)

Sixteen of the permittees in the Taunton River Watershed have submitted toxicity testing reports to EPA and MassDEP as required by their NPDES permit. Data from these toxicity reports are maintained by DWM in a database entitled "Toxicity Testing Data – TOXTD". Information from these reports includes; survival of test organisms exposed to ambient river water (used for dilution water), physicochemical analysis (e.g., hardness alkalinity, pH, total suspended solids) of dilution water, and the whole effluent toxicity test results. Data reported by the facilities were reviewed and summarized for use in the assessment of current water quality conditions in the Taunton River Watershed. These include:

- Avon Custom Mixing Services, Inc. (MA0026883) August 2004
- Bridgewater Wastewater Treatment Facility (MA0100641) October 1998 to August 2004

Brockton Advanced Water Reclamation Facility (MA0101010) November 1999 to August 2004
C. A. Richardson, Inc. (MA0001805) March 1995 to February 2000
Foxborough Company (Highland Plant) (MA0004103) March 1997 to March 1999
Howard School Wastewater Facility (MA0101753) November 2004
Mansfield Water Pollution Abatement Facility (MA0101702) December 2000 to August 2004
MCI Bridgewater Water Pollution Control Facility (MA0102237) January 1999 to July 2004
Middleborough Wastewater Treatment Plant (MA0101591) October 2000 to August 2004
Oak Point Retirement Community, Middleborough (MA0032433) July 1999 to July 2004
Rose L. MacDonald School Wastewater Facility (MA0102061) November 2004
Somerset Power LLC and Somerset Operations, Inc., (MA0001856) April 1995 to April 2004
Somerset Water Pollution Control Facility (MA0100676) July 1999 to August 2004
Taunton Wastewater Treatment Plant (MA0100897) October 1996 to August 2004
Texas Instruments, Inc. (MA0001791) October 1996 to October 1999
Tweave, Inc. (MA0005355) September 2000 to August 2004

A list of registered and permitted Water Management Act (WMA) withdrawals (both public water suppliers and other industrial users) is provided in Appendix G, Table G5 (LeVangie 2002). Registration and permit files (both public water suppliers and other industrial users) were reviewed to determine where stream segments might be affected by water withdrawal activities. The information is summarized in the segments where the withdrawals occur.

In addition to state and federal agencies, regional and local groups provide information for the watershed management process which may be used to indicate areas of both high and degraded water quality, and causes and sources of contamination. The Taunton River Watershed Alliance (TRWA) is a non-profit alliance of concerned individuals, businesses, and organizations dedicated to protecting and restoring the Taunton River Watershed – its tributaries, wetlands, floodplains, river corridors and wildlife. TRWA conducts water quality monitoring at sites along the Taunton River and its tributaries with volunteers playing a critical role in water quality sampling. In 1998 USFilter entered into a twenty-year contract with the City of Taunton to operate and maintain their wastewater treatment plant and manage and administer a pollution prevention program which includes collaborating with the TRWA for their volunteer monitoring program (Domingos 2003b). This work has led to the correction of pollution problems on the Taunton River and its tributaries. Monitoring data are also forwarded to the City of Taunton Department of Public Works and have been critical in pinpointing areas where sewage outbreaks have occurred. EPA and MassDEP reviewed a draft Quality Assurance Project Plan (QAPP) for TRWA generated data in 2001. However, a final QAPP has not been approved and their data are not quality-assured. For the purpose of this report data reported by TRWA for 2002/2003 were reviewed for consistency with other quality-assured data sources. Where TRWA identified water quality problems not otherwise documented by quality-assured data the issue was identified with an Alert Status in this report.

Since 1999 Dr. Kevin Curry of the Bridgewater State College Watershed Access Lab (WAL) has been monitoring significant tributaries to the upper Taunton River (Matfield, Town, Raven and Nemasket Rivers) to determine both their water quality and contribution of nutrients to the Taunton River. In 2004 the Taunton River Wild and Scenic Study Committee contributed funding in order to expand the study to additional tributaries (Cotley, Mill and Threemile Rivers) in the upper watershed on a rotating schedule each month from June through September. For the purpose of this report data reported by WAL were reviewed for consistency with other quality-assured data sources. Where WAL identified water quality problems not otherwise documented by quality-assured data the issue was identified with an Alert Status in this report.

On October 2, 1968 the Wild and Scenic Rivers Act was signed into law. The Act established a process for building a legacy of protected rivers. Only 2.5% of all rivers in the United States have been identified as potential candidates for a Wild and Scenic designation. Of those only a tiny fraction have even received official consideration through a congressionally authorized study. The Upper Taunton River in Southeastern Massachusetts is one of these rivers (Taunton 2003). The Wild & Scenic study process typically requires three years from launch to completion. The National Parks Service and the Department of the Interior administered the Taunton River Study Bill which was signed by President Clinton in October of 2000. From the outset of the study period, the National Park Service staff work closely with

representatives of local and state governments, river conservation groups, regional planning agencies and other concerned citizens, brought together to form an advisory committee. Together, this study team guides the process, determining whether the river meets the criteria for designation. More importantly, they develop a conservation plan to protect the river's free-flowing character and significant resources. The plan relies on state and local land use requirements and nonfederal land acquisition to achieve river conservation goals. A Wild and Scenic designation blocks construction of any new federal dams or water resource projects that would harm the free-flow of the river or any of the values for which it was designated (Taunton 2003).

The Department of Fish and Game's Adopt-A-Stream program working with the Wild and Scenic staff and local partners, started six Stream Teams in the Taunton River Watershed. Five stream teams are on tributary streams (Forge River in Raynham, Matfield River in West Bridgewater, Nemasket River in Middleborough, Winnetuxet River in Halifax and Town River in Bridgewater) and one is on the mainstem of the river in Somerset. The Stream Teams were organized by Wild and Scenic staff and were led by local steering committees. Each Stream Team conducted a Shoreline Survey of their areas. The Adopt-A-Stream program provided training and technical assistance to each group and facilitation for the development of each group's action plan and report. Information from the shoreline survey reports on the Nemasket, Forge, and Winnetuxet Rivers are included in this report (MA DFG 2004).

The Taunton River Stewardship Program, established in 1996 to promote the preservation of the upper Taunton River corridor and its major tributaries as an intact resource, has been instrumental in helping to facilitate land protection efforts along the corridor over the past six years. Thanks to the combined efforts of the Stewardship Program's partners, including the Towns of Bridgewater, Halifax, Middleborough, and Raynham, the City of Taunton, the Massachusetts Division of Fisheries and Wildlife, The Wildlands Trust of Southeastern Massachusetts, the Natural Resources Trust of Bridgewater, SRPEDD, and other contributors (notably the Massachusetts Department of Environmental Management), 695 acres have been protected in the towns of Bridgewater, Halifax, Middleborough, and Raynham. The Upper Taunton River Greenway, the focus of the Wild and Scenic Study, stretches for 22-1/2 miles from the confluence of the Town and the Matfield Rivers in Bridgewater to where the Forge River meets the Taunton River near the Taunton/Raynham town lines (Taunton 2003).

The ESS Group, Inc. produced a report, *Matfield and Salisbury Plain River Watersheds Nonpoint Source Pollution Assessment Report and Management Plan*, at the request of local, state, regional, and federal stakeholders participating in the ongoing watershed planning process. The project was funded under the Massachusetts Watershed Initiative (MWI), a former program of the Massachusetts Executive Office of Environmental Affairs (EOEA) and was administered through MassDEP (ESS 2003). The project was designed to identify significant and potential sources of Nonpoint Source Pollution (NPS), prioritize these sources and design a management plan with recommendations for specific actions to protect and improve water quality and enhance recreational opportunities. The project study area included some or all of the following eight municipalities: Abington, Avon, Brockton, Bridgewater, East Bridgewater, West Bridgewater, Holbrook and Whitman.

Additionally, MassDEP provides funding for various grant and loan programs that provide valuable information that may be used in the water quality assessment report. A summary of these projects for the Taunton River Watershed is provided in Appendix I.

MASSACHUSETTS YEAR 2002 INTEGRATED LIST OF WATERS

Section 305(b) of the CWA defines the process whereby states monitor and assess the quality of their surface and groundwater and report on the status of those waters every two years. Section 303(d) of the CWA requires states to periodically identify and list those waterbodies for which existing controls on point and nonpoint sources of pollutants are not stringent enough to attain or maintain compliance with applicable surface water quality standards. Through the year 2000 the MassDEP fulfilled the 305(b) and 303(d) reporting requirements in two completely separate documents. In 2001 the EPA released guidance that provided states with the option of preparing a single Integrated List of Waters to be submitted in 2002 that would meet the reporting requirements of both Sections 305(b) and 303(d) of the CWA.

The Massachusetts Year 2002 Integrated List of Waters was published by the MassDEP in September 2003 (MassDEP 2003). In that report each waterbody segment was placed in one of five major categories. Category 1 included those waters that were meeting all designated uses. No Massachusetts waters were listed in Category 1 because a state-wide health advisory pertaining to the consumption of fish precludes any waters from being in full support of the fish consumption use. Waters listed in Category 2 were found to support some of the uses for which they were assessed but other uses were not assessed. Category 3 contained those waters for which insufficient or no information was available to assess any uses.

Waters exhibiting impairment for one or more uses were placed in either Category 4 (impaired but not requiring TMDLs) or Category 5 (impaired and requiring one or more TMDLs) according to the EPA guidance. Category 4 was further divided into three sub-categories – 4A, 4B and 4C – depending upon the reason that TMDLs were not needed. Category 4A included waters for which the required TMDL(s) had already been completed and approved by the EPA. However, since segments could only appear in one category waters that had an approved TMDL for some pollutants, but not others, remained in Category 5. Category 4B was to include waters for which other pollution control requirements were reasonably expected to result in the attainment of the designated use before the next listing cycle (i.e., 2004). Because of the uncertainty related to making predictions about conditions in the future the MassDEP made a decision not to utilize Category 4B in the 2002 Integrated List. Finally, waters impaired by factors, such as flow modification or habitat alteration, that are not subjected to TMDL calculations because the impairment is not related to one or more pollutants were included in Category 4C.

TOTAL MAXIMUM DAILY LOADS (TMDLs)

While the EPA's guidance for the preparation of the Integrated List provides an overall framework for a five-part list of waters, the development, submittal, and review of Category 5 is subject to the prevailing regulation governing the implementation of Section 303(d) of the CWA and, so, this category was approved as the Massachusetts 2002 303(d) List by the EPA on October 1, 2003. States must develop TMDLs for each of the waterbodies in Category 5 and establish pollution control strategies to restore these waters to meet water quality standards. A TMDL is the greatest amount of a pollutant that a waterbody can accept and still meet water quality standards. Further information on the 303(d) List and the TMDL Program is available on the MassDEP website at: <http://www.mass.gov/dep/water/resources/tmdls.htm>. Table 2 identifies those waterbodies in the Taunton River Watershed that were included on this list.

Table 2. Massachusetts Year 2002 Integrated List of Waters – Category 5 “Waters Requiring a TMDL” in the Taunton River Watershed (MassDEP 2003).

Waterbody (Description)	Waterbody Identification Code (WBID)	Cause of Impairment
Assonet River (From Tisdale Dam north of Route 79/Elm Street intersection, Freetown to the confluence with the Taunton River, Freetown)	MA62-20	Pathogens
Matfield River (Confluence of Beaver Brook and Salisbury Plain River, East Bridgewater to confluence with Town River and Taunton River, Bridgewater)	MA62-32	Pathogens
Rumford River (Outlet Gavins Pond, to confluence with Wading and Threemile Rivers, Norton)	MA62-15	Pesticides, organic enrichment/low DO, pathogens
Salisbury Brook (Outlet Cross Pond to confluence with Trout Brook, Brockton)	MA62-08	Siltation, pathogens
Salisbury Plain River (Confluence of Trout Brook and Salisbury Brook, Brockton to Brockton WWTP)	MA62-05	Siltation, other habitat alterations, pathogens, suspended solids
Salisbury Plain River (Brockton WWTP, Brockton to confluence with Beaver Brook and Matfield River, East Bridgewater)	MA62-06	Cause unknown, pathogens
Taunton River (Route 24 Bridge, Taunton to Berkley Bridge, Dighton/Berkley)	MA62-02	Pathogens
Taunton River (Berkley Bridge to Fall River/Freetown/Somerset boundary)	MA62-03	Organic enrichment/low DO, pathogens

Table 2 (cont). Massachusetts Year 2002 Integrated List of Waters – Category 5 “Waters Requiring a TMDL” (MassDEP 2003).

Waterbody (Description)	Waterbody Identification Code (WBID)	Cause of Impairment
Taunton River (Fall River/Freetown/Somerset boundary to mouth at Braga Bridge, Somerset/Fall River)	MA62-04	Organic enrichment/low DO, pathogens
Threemile River (Confluence of Wading and Rumford Rivers, Norton to confluence with Taunton River, Dighton)	MA62-16	Pathogens
Trout Brook (Source northeast of Argyle Avenue and west of Conrail Line, Avon to the confluence with the Salisbury Plain River, Brockton)	MA62-07	Siltation, organic enrichment/low DO, pathogens
Wading River (Source in wetland, north of West Street, Foxborough to confluence with Rumford River, Norton)	MA62-17	Cause unknown, organic enrichment/low DO, pathogens
Ames Long Pond, Stoughton/Easton	MA62001	Noxious aquatic plants, turbidity, exotic species
Big Bearhole Pond, Taunton	MA62011	Organic enrichment/low DO, noxious aquatic plants, exotic species
Cabot Pond, Mansfield	MA62029	Pesticides
Cain Pond, Taunton	MA62030	Organic enrichment/low DO, turbidity
Cocasset Lake, Foxborough	MA62043	Turbidity
Fulton Pond, Mansfield	MA62075	Pesticides
Hobart Pond, Whitman	MA62090	Turbidity, exotic species
Hodges Pond (Kingman Pond), Mansfield	MA62091	Pesticides
Island Grove Pond, Abington	MA62094	Noxious aquatic plants, turbidity, exotic species
Monponsett Pond, Halifax/Hanson	MA62119	Turbidity, exotic species
Monponsett Pond, Halifax	MA62218	Metals
Muddy Cove Brook Pond, Dighton	MA62124	Noxious aquatic plants, turbidity
Norton Reservoir, Norton/Mansfield	MA62134	Pesticides, nutrients, noxious aquatic plants, turbidity, exotic species
Segreganset River Ponds, Taunton	MA62169	Noxious aquatic plants, turbidity
Somerset Reservoir, Somerset	MA62174	Metals
Stetson Pond, Pembroke	MA62182	Nutrients, organic enrichment/low DO, exotic species
Watson Pond, Taunton	MA62205	Nutrients, organic enrichment/low DO, exotic species, turbidity, noxious aquatic plants
Woods Pond, Middleborough	MA62220	Turbidity, exotic species

RIVERS AND ESTUARIES

MassDEP is required to produce a TMDL for various causes of impairment including pesticides, siltation, suspended solids, and organic enrichment/low DO. This work has not been specifically scheduled yet. Pathogens are also listed as a cause of impairment but the statewide TMDL being developed by the EPA for pathogens may be applied to those waterbodies. Additional data will need to be collected to determine whether or not those segments are impaired because of organic enrichment/low DO result from natural conditions prior to pursuing the need for a TMDL. For those segments impaired by siltation and/or suspended solids, TMDLs will be developed subsequent to establishing scientifically based target goals (Isaac 2005).

The Southeastern Regional Planning and Economic Development District (SRPEDD), in collaboration with the University of Massachusetts' School of Marine Science and Technology (SMAST), is conducting a water quality monitoring program in Mt. Hope Bay and Taunton River sub-watersheds consistent with the Massachusetts Estuaries Project (MEP) water quality data requirements (Appendix I). Data from this

sampling effort will be used to develop a Total Maximum Daily Nitrogen Load for Mt. Hope Bay. Sampling stations will include locations around Mt. Hope Bay and locations on several tributaries (Taunton River, Three mile River, Segreganset River, Assonet River, and Quequechan River) flowing into Mt. Hope Bay. Gauging stations are established on these tributaries and flow data collected monthly for one year to construct rating curves. Water quality samples are collected weekly at each gauging station and analyzed for: total nitrogen (nitrate + nitrite nitrogen, ammonia nitrogen, dissolved organic nitrogen, particulate organic nitrogen), total phosphorus, orthophosphate, particulate carbon and nitrogen and TSS (in 2005).

LAKES

Of the 18 lakes listed as impaired, 13 are impaired by nutrient-related impairments (i.e., noxious aquatic plant, turbidity, nutrients, and/or organic enrichment/low DO). A nutrient TMDL will be developed for these lakes. Since four of these lakes (Monponsett ponds east and west basins, Stetson Pond, and Woods Pond) are downstream from cranberry bogs, the TMDLs for them will be based in part on the results of a University of Massachusetts Cranberry Experiment Station S 319 study of phosphorus export from cranberry bogs which should be completed in June 2005 (Appendix I, Project 01-12/319). The TMDLs for these ponds will be developed after June 2005 as time permits (Mattson 2005).

There are two lakes, East Monponsett Pond (Halifax) and Somerset Reservoir (Somerset) in the Taunton River Watershed for which MA DPH has issued site-specific fish consumption advisories due to elevated levels of mercury.

Additionally, MA DPH has issued site-specific fish consumption advisories for the Rumford River downstream from Glue Factory Pond Dam and for four lakes (Fulton, Kingman, & Cabot ponds; Norton Reservoir) because of dioxins and pesticides (MA DPH 2004). The Rumford River and Cabot, Fulton, and Hodges ponds and the Norton Reservoir are all in Category 5 because of "pesticide" impairment. These waterbodies all have a MA DPH advisory to eat no fish for the portion of the Rumford River between Glue Factory Pond dam in Foxborough and Norton Reservoir in Mansfield (including Fulton, Kingman and Cabot ponds). The MA DPH advisory was issued due to elevated dioxin and pesticides levels in fish tissue as a result of contamination from the Hatheway and Patterson Company (HPC) site, a former wood preserving facility, which ceased operation in 1993. Additional information is needed to complete a Remedial Investigation for this site.

OBJECTIVES

This report summarizes information generated in the Taunton River Watershed through *Year 1* (information gathering in 2000) and *Year 2* (environmental monitoring in 2001) activities established in the "Five-Year Cycle" of the Watershed Initiative. Data collected by DWM are provided in Appendices A and B of this report. Together with other sources of information (identified in each segment assessment) these data were used to assess the status of water quality conditions of rivers, estuaries and lakes in the Taunton River Watershed in accordance with EPA's and MassDEP's use assessment methods. Not all waters in the Taunton River Watershed are included in the MassDEP/EPA WBS database or this report.

The objectives of this water quality assessment report are to:

1. evaluate whether or not surface waters in the Taunton River Watershed, defined as segments in the WBS database, currently support their designated uses (i.e., meet surface water quality standards);
2. identify water withdrawals (habitat quality/water quantity) and/or major point (wastewater discharges) and nonpoint (land-use practices, stormwater discharges, etc.) sources of pollution that may impair water quality conditions;
3. identify the presence or absence of any non-native macrophytes in lakes;
4. identify waters (or segments) of concern that require additional data to fully assess water quality conditions;
5. recommend additional monitoring needs and/or remediation actions in order to better determine the level of impairment or to improve/restore water quality; and
6. provide information for use in development of a watershed action plan for the Taunton River Watershed.

REPORT FORMAT

RIVER, MARINE AND LAKE SEGMENTS

The river and marine segments assessed in the Taunton River Watershed are presented within their respective subwatershed section (mainstem Taunton River, Other Tributaries, Matfield River, Town River, Mill River, Threemile River, Nemasket River and Assonet River subwatersheds) and are formatted as shown in the text box below. The assessed lakes, identified with their WBID code numbers, are listed alphabetically in the Lake Assessment section of this report.

Segment identification

Name, waterbody identification number (WBID), location, size, and classification.

Sources of information: coding system (waterbody identification number, e.g., MA62-01, used by MassDEP to reference the segments in databases such as 305(b) and 303(d), the Massachusetts SWQS (MassDEP 1996), and other descriptive information.

Segment description

Major land-use estimates (the top three uses for the recharge area and % impervious cover) and other descriptive information.

Sources of information: descriptive information from USGS topographical maps, base geographic data from MassGIS, land use statistics from a geographic information system (GIS) analysis using the MassGIS land use coverage developed at a scale of 1:25,000 and based on aerial photographs taken in 1999 (UMass Amherst 1999).

Cranberry Bog Cultivation:

For the purpose of this report water use for cranberry cultivation within the recharge area has been estimated by using a volume of 10 acre-feet of water per acre of bog per year (1 acre-foot = 325,900 gallons). The acreage of cranberry bog within the recharge area has been estimated by using the Cranberry Bog category of the MassGIS Land-Use data layer. The figure of 10 acre-feet of water per acre of bog per year is based on a study conducted by the Cape Cod Cranberry Growers Association for the Massachusetts Water Management Act Program. It should be noted that this figure is used for "old style" bogs, those bogs that do not employ best management practices (BMPs) for conserving water. Most bogs constructed today, and many renovated older bogs, use BMPs, such as laser leveling, on-site reservoirs, tailwater recovery, etc., which result in reduced water usage (between 5 and 6 acre-feet of water per acre of bog per year). Therefore, the estimate of water usage within the subwatershed for cranberry cultivation is a conservative number (O'Shea 2002).

Subwatershed and/or Segment locator maps

Subwatershed map, major river location(s), segment origin and termination points, and segment drainage area (gray shaded).

Sources of information: MassGIS data layers (stream segments and quadrangle maps from MassGIS 2002).

Water withdrawals and wastewater discharge permit information

Water withdrawal and NPDES wastewater discharge summaries.

Sources of information: WMA Database Printout (LeVangie 2002) and open permit files located in the MassDEP Offices in Boston, Lakeville, and Worcester (MassDEP 2005).

Use assessment

Aquatic Life, Fish Consumption, Shellfishing, Primary Contact Recreation, Secondary Contact Recreations, and Aesthetics.

Sources of information include: MassDEP DWM 2001 survey data (Appendices A, C, D, F, and H) and MassDEP DWM Toxicity Testing Database (TOXTD). The MA DPH Freshwater Fish Consumption Advisory Lists (MA DPH 2001 and MA DPH 2004) were used to assess the *Fish Consumption Use*. The DMF shellfish status was used to assess the *Shellfishing Use* (Sawyer 2003). Where other sources of information were used to assess designated uses, citations are included.

[Note: Although the *Drinking Water Use* itself was not assessed in this water quality assessment report, the Class A waters were identified.]

Summary

Use summary table (uses, status, causes and sources of impairment).

Recommendations

Additional monitoring and implementation needs.