

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 DEP'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, partial support, non support) of the aquatic life use:

Variable (# indicates reference)	Support —Data available clearly indicates support. Minor excursions from chemical criteria (Table 3) may be tolerated if the biosurvey results demonstrate support.	Partial Support – Uncertainty about support in the chemical or toxicity testing data, or there is some minor modification of the biological community. Excursions not frequent or prolonged.	Non Support – 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) II or III (4)	Non-Impaired	Slightly Impaired	Moderately or Severely Impaired
Fish Community (4)	BPJ*	BPJ*	BPJ*
Habitat and Flow (4)	BPJ*	BPJ*	Dry Streambed due to artificial regulation or channel alteration
Macrophytes (4)	No non-native plant species present, BPJ	Non-native plant species present, but not dominant, BPJ	Non-native plant species dominant, BPJ
Plankton/ Periphyton (4)	No algal blooms	Occasional algal blooms	Persistent algal blooms
TOXICITY TESTS			
Water Column (4)	>75% survival either 48 hr or 7-day exposure	>50 - <75% survival either 48 hr or 7-day exposure	<50% survival either 48 hr or 7-day exposure
Effluent (4)	Meets permit limits	(NOTE: if limit is not met, the stream is listed as threatened for 1.0 river mile downstream from the discharge.)	
Sediment (4)	>75% survival	>50 - <75% survival	<50% survival
CHEMISTRY- WATER			
DO (3, 6)	Criteria (Table 3)	Criteria exceed in 11-25% of measurements.	Criteria exceeded >25% of measurements.
pH (3, 6)	Criteria (Table 3)	Criteria exceed in 11-25% of measurements.	Criteria exceeded >25% of measurements.
Temperature (3, 6) ***	Criteria (Table 3), ***	Criteria exceed in 11-25% of measurements.	Criteria exceeded >25% of measurements.
Turbidity (4)	Δ 5 NTU due to a discharge	BPJ*	BPJ*
Suspended Solids (4)	25 mg/L max., Δ10 mg/L due to a discharge	BPJ*	BPJ*
Nutrients (3) Phosphate-P (4)	Table 3, (Site-Specific Criteria; Maintain Balanced Biocommunity, no pH/DO violations)	BPJ*	BPJ*
Toxic Pollutants (3, 6) Ammonia-N (3, 4) Chlorine (3, 6)	Criteria (Table 3) 0.254 mg/L **** NH ₃ -N 0.011 mg/L TRC	Criterion is exceed in ≤ 10% of samples.	Criterion is exceed in > 10% of samples.
CHEMISTRY – SEDIMENT			
Toxic Pollutants (5)	< L-EL ****	One pollutant between L-EL and S-EL	One pollutant ≥ S-EL
Nutrients (5)	< L-EL	between L-EL and S-EL	≥ S-EL
Metal Normalization to Al or Fe (4)	Enrichment Ratio ≤ 1	Enrichment Ratio >1 but ≤10	Enrichment Ratio ≥10
CHEMISTRY- EFFLUENT			
Compliance with permit limits (4)	In-compliance with all limits	NOTE: If the facility is not in compliance with their permit limits, the information is used to threaten one river mile downstream from the discharge.	
CHEMISTRY-TISSUE			
PCBs – whole fish (1)	<500 µg/Kg wet weight	BPJ*	BPJ*
DDT (2)	<14.0 µg/Kg wet weight	BPJ*	BPJ*
PCBs in aquatic tissue (2)	<0.79 ng TEQ/Kg wet weight	BPJ*	BPJ*

*BPJ = Best Professional Judgement, ***maximum daily mean temp. in a month (minimum of 6 measurements evenly distributed over 24-hours) < criterion, ****Ammonia levels for pH of 9.0, actual "criterion" varies with pH and is evaluated case-by-case, *****L-EL = Low Effect Level and S-EL = Severe Effect Level

FISH CONSUMPTION USE

Pollutants shall not result in unacceptable concentrations in edible portions of marketable fish or shellfish or for the recreational use of fish, shellfish, other aquatic life or wildlife for human consumption. This assessment is made using the most recent list of Fish Consumption Advisories issued by the Massachusetts Executive Office of Health and Human Services, Department of Public Health (MDPH), Bureau of Environmental Health Assessment. Following is an overview of the guidance used to assess the status (support, partial support, non support) of the fish consumption use.

Variable (# indicates reference)	Support —No restrictions or bans in effect	Partial Support — A "restricted consumption" fish advisory is in effect for the general population or a sub-population that could be at potentially greater risk (e.g., pregnant women, and children	Non Support — 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
MDPH Fish Consumption Advisory List (8)	Not applicable, precluded by statewide advisory (Hg)	Not applicable	Waterbody on MDPH Fish Consumption Advisory List

* NOTE: In 1994, MDPH issued a statewide *Interim Freshwater Fish Consumption Advisory* for mercury. This precautionary measure was aimed at pregnant women only; the general public was not considered to be at risk from fish consumption. The advisory encompasses all freshwaters in Massachusetts therefore the *fish consumption use* will no longer be assessed as support.

DRINKING WATER USE

The 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). This use is assessed by DEP's Drinking Water Program (DWP). The use is not assessed when the source has been placed on "emergency or backup" status since no testing is required. Below is an overview of the guidance used to assess the status (support, partial support, non support) of the drinking water use.

Variable (# indicates reference)	Support — No closures or advisories (no contaminants with confirmed exceedences of MCLs, conventional treatment is adequate to maintain the supply).	Partial Support — Is one or more advisories or more than conventional treatment is required	Non Support — One or more contamination-based closures of the water supply
Drinking Water Program (DWP) Evaluation	Reported by DWP	Reported by DWP	Reported by DWP

PRIMARY CONTACT RECREATIONAL 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 (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, partial support, non support) of the primary contact use.

Variable (# indicates reference)	Support — Criteria are met, no aesthetic conditions that preclude the use	Partial Support —Criteria exceeded intermittently (neither frequent nor prolonged), marginal aesthetic violations	Non Support —Frequent or prolonged violations of criteria, formal bathing area closures, or severe aesthetic conditions that preclude the use
Fecal Coliform Bacteria (3, 9) *	Criteria met (Table 3) OR <u>Dry Weather Guidance</u> <5 samples—<400/100 ml maximum <u>Wet Weather Guidance</u> Dry weather samples meet and wet samples <2000/100 ml	Guidance exceeded in 11-25% of the samples OR <u>Wet Weather</u> Dry weather samples meet and wet samples ≥2000/100 ml	Guidance exceeded in > 25% of the samples
pH (3, 6)	Criteria (Table 3) exceeded in ≤10 % of the measurements	Criteria exceeded in 11-25% of the measurements	Criteria exceeded in >25% of the measurements
Temperature (3)	Criteria met (Table 3)	Criteria exceeded 11-25% of the time	Criteria exceeded 25% of the time
Color and Turbidity (3, 6)	Δ 5 NTU (due to a discharge) exceeded in <10 % of the measurements	Guidance exceeded in 11-25% of the measurements	Guidance exceeded in >25% of the measurements
Secchi disk depth (10) **	Lakes - ≥1.2 meters (≥4')	Infrequent excursions from the guidance	Frequent and/or prolonged excursions from the guidance
Oil & Grease (3)	Criteria met (Table 3)	Criteria exceeded 11-25% of the time	Criteria exceeded >25% of the time
Aesthetics (3) Biocommunity (4)**	No nuisance organisms that render the water aesthetically objectionable or unusable; Lakes – cover of macrophytes < 50% of lake area at maximum extent of growth.	Lakes – cover of macrophytes 50-75% of lake area at their maximum extent of growth.	Lakes – cover of macrophytes >75% of lake area at their maximum extent of growth.

Note: Excursions from criteria due to natural conditions are not considered impairment of use.

* Fecal Coliform bacteria interpretations require additional information in order to apply this use assessment guidance. Bacteria data results (fecal coliform) are interpreted according to whether they represent dry weather or wet weather (stormwater runoff) conditions. Accordingly, it is important to interpret the amount of precipitation received in the study region immediately prior to sampling and streamflow conditions.

** Lakes exhibiting impairment of the primary contact recreation use (swimmable) because of macrophyte cover and/or transparency (Secchi disk depth) are assessed as either *partial* or *non support*. If no fecal coliform bacteria data are available and the lake (entirely or in part) met the transparency (Secchi disk depth) and aesthetics guidance this use is *not assessed*.

SECONDARY CONTACT RECREATIONAL 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, partial support, non support) of the secondary contact use.

Variable (# indicates reference)	Support — Criteria are met, no aesthetic conditions that preclude the use	Partial Support —Criteria exceeded intermittently (neither frequent nor prolonged), marginal aesthetic violations	Non Support —Frequent or prolonged violations of criteria, or severe aesthetic conditions that preclude the use
Fecal Coliform Bacteria (4) *	<u>Dry Weather Guidance</u> <5 samples--<2000/100 ml maximum >5 samples--<1000/100 ml geometric mean ≤ 10% samples ≥2000/100 ml <u>Wet Weather Guidance</u> Dry weather samples meet and wet samples <4000/100 ml	<u>Wet Weather Guidance</u> Dry weather samples meet and wet samples ≥4000/100 ml	Criteria exceeded in dry weather
Oil & Grease (3)	Criteria met (Table 3)	Criteria exceeded 11-25% of the time	Criteria exceeded >25% of the time
Aesthetics (3) Biocommunity (4) **	No nuisance organisms that render the water aesthetically objectionable or unusable; Lakes – cover of macrophytes < 50% of lake area at their maximum extent of growth.	Macrophyte cover is between 50 – 75%	Macrophyte cover exceeds 75% of the lake area.

Note: Excursions from criteria due to natural conditions are not considered impairment of use.

* Fecal Coliform bacteria interpretations require additional information in order to apply this use assessment guidance. Bacteria data results (fecal coliform) are interpreted according to whether they represent dry weather or wet weather (stormwater runoff) conditions. Accordingly it is important to interpret the amount of precipitation received in the subject region immediately prior to sampling and streamflow conditions.

** In lakes if no fecal coliform data are available, macrophyte cover is the only criterion used to assess the secondary contact recreational use.

For the Primary and Secondary Contact Recreational uses the following steps are taken to interpret the fecal coliform bacteria results:

1. Identify the range of fecal coliform bacteria results,
2. Calculate the geometric mean (monthly, seasonally, or on dataset), (Note: the geometric mean is only calculated on datasets with >5 samples collected within a 30 day period.)
3. Calculate the % of sample results exceeding 400 cfu/100 mls,
4. Determine if the samples were collected during wet or dry weather conditions (review precipitation and streamflow data),
 - Dry weather can be defined as: No/trace antecedent (to the sampling event) precipitation that causes more than a slight increase in stream flow.
 - Wet weather can be defined as: Precipitation antecedent to the sampling event that results in a marked increase in stream flow.
5. Apply the following to interpret dry weather data:
 - <10% of the samples exceed criteria (step 2 and 3, above) assessed as Support,
 - 11-25% of the samples exceed criteria (step 2 and 3, above) assessed as Partial Support,
 - >25% of the samples exceed criteria (step 2 and 3, above) assessed as Non Support.

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, partial support, non support) of the aesthetics use.

Variable (# indicates reference)	Support — 1.No objectionable bottom deposits, floating debris, scum, or nuisances; 2. objectionable odor, color, taste or turbidity, or nuisance aquatic life	Partial Support — Objectionable conditions neither frequent nor prolonged	Non Support — Objectionable conditions frequent and/or prolonged
Aesthetics (3)* Visual observation (4)	Criteria met (Table 3)	BPJ (spatial and temporal extent of degradation)	BPJ (extent of spatial and temporal degradation)

Note: For lakes, the aesthetic use category is generally assessed at the same level of impairment as the more severely impaired recreational use category (primary or secondary contact).

SHELLFISHING USE

This use is assessed using information from the Department of Fisheries, Wildlife and Environmental Law Enforcement's Division of Marine Fisheries. The information is in the form of various classifications of shellfish closures and restrictions. Shellfish areas under management orders are *not assessed*.

Variable (# indicates reference)	Support — SA Waters—open for shellfish harvesting without depuration (Open areas) SB Waters—open for shellfish harvesting with depuration (Open, conditionally approved, restricted areas)	Partial Support — SA Waters—Seasonally closed/open, conditionally approved and restricted SB Waters—Seasonally closed, seasonally open, conditionally restricted areas	Non Support — SA Waters—Closed areas SB Waters—Closed areas
Division of Marine Fisheries Shellfish Project Classification Area Information (11)	Reported by DMF	Reported by DMF	Reported by DMF

References

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2. Environment Canada. 04 November 1999. Canadian Environmental Quality Guidelines. [Online]. Environment Canada. http://www.ec.gc.ca/ceqg-rcqe/tistbl_e.doc [28 September 1998].
3. MA DEP. 1996. (Revision of 1995 report). *Massachusetts surface water quality standards*. Massachusetts Department of Environmental Protection, Division of Water Pollution Control, Technical Services Branch. Westborough, MA (Revision of 314 CMR 4.00, effective June 23, 1996).
4. MA DEP. 1999. Open File. *Division of Watershed Management 305(b) Assessment Guidance*. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA
5. Persaud, D., R. Jaagumagi, and A. Hayton. 1993. *Guidelines for the protection and management of aquatic sediment quality in Ontario*. Water Resources Branch, Ontario Ministry of the Environment. Queen's Printer for Ontario. Canada.
6. USEPA. 1997. Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement. Assessment and Watershed Protection Division (4503F), Office of Wetlands, Oceans and Watersheds, Office of Water, U.S. Environmental Protection Agency. Washington, DC.
7. USEPA. 19 November 1999. Federal Register Document. [Online]. United States Environmental Protection Agency. <http://www.epa.gov/fedrgstr/EPA-WATER/1998/December/Day-10/w30272.htm>.
8. MA MDPH. 1999. *Freshwater Fish Consumption Advisory List*. The Commonwealth of Massachusetts, Bureau of Environmental Health Assessment. Boston, MA.
9. Kimball, W.A., 1996. Memorandum to 305(b) Committee. *Re: Small data sets/ wet weather data*. Massachusetts Department of Environmental Protection, Office of Watershed Management. Grafton, MA.
10. MA MDPH. 1969. *Article 7 Regulation 10.2B of the State Sanitary Code*. Commonwealth of Massachusetts. Department of Public Health. Boston, MA.
11. Churchill, N. 1999. Personal Communication. *Shellfish Project Classification Area Information as of 1 January 1999*. Department of Fisheries, Wildlife, and Environmental Law Enforcement, Division of Marine Fisheries. Pocasset, MA.

TEN MILE RIVER BASIN DESCRIPTION and CLASSIFICATION

Tucked into the southeast corner of the state, the Ten Mile River Basin is flanked by the Blackstone River, Charles River, Taunton River, and Narragansett Bay Watersheds (Figure 3). A small piece (5.4 square miles) of the southern portion of the watershed is located in the State of Rhode Island. The watershed covers most of following four municipalities: Plainville, North Attleborough, Seekonk, and Attleboro.

The Ten Mile River Basin, with a total drainage area of about 50 square miles, is the smallest of the 27 major Massachusetts watersheds. The Ten Mile River's headwaters begin in Plainville and the river flows south through many impoundments before flowing into the Seekonk and Providence Rivers and ultimately Narragansett Bay. The Ten Mile River has two major tributaries, the Sevenmile River and the Bungay River. The Sevenmile River begins in North Attleborough, flows south through Attleboro and joins the Ten Mile River in Seekonk. Unnamed tributaries to the Bungay River originate in the Town of Foxborough and flow south into Greenwood Lake located in Mansfield and North Attleborough. The Bungay River originates at the outlet of Greenwood Lake and flows south to join the Ten Mile River in Attleboro. In addition to three minor tributaries (Fourmile Brook, Coles Brook, and Scott's Brook), there are also a total of 45 lakes and ponds covering 1296 acres located in the Ten Mile River Basin.

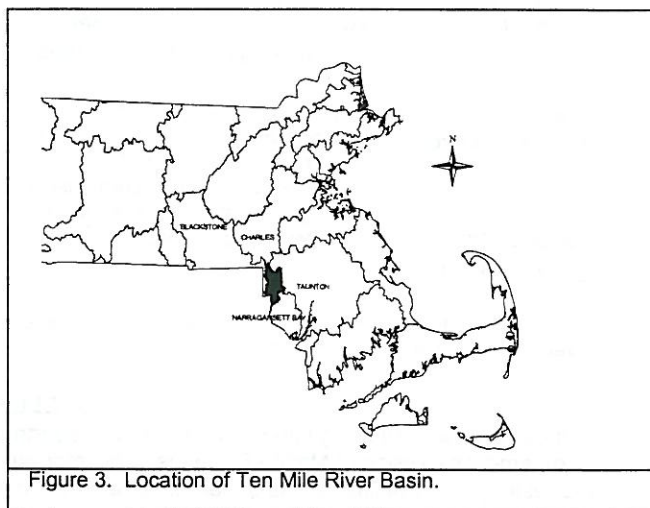


Figure 3. Location of Ten Mile River Basin.

The Ten Mile River Basin supplies both surface water (3 withdrawal sites) and groundwater (29 wells) to six municipal public water supply systems and five privately owned public water supply systems. These suppliers withdraw up to 10.54 MGD from these sources and are permitted to increase the withdrawals an additional 1.23 MGD by the year 2011. The watershed also receives wastewater discharges from two municipal treatment facilities and nine non-municipal sources. Details about these water withdrawals and wastewater discharges can be found in the segment by segment summaries.

Background/Historical Perspective (EOEA 1996)

Historically, Native Americans from the Wampanoag and Narragansett tribes lived on opposite banks of the Ten Mile River when Europeans arrived in the 17th century. The Narragansetts carried out numerous raids on their neighbors before the English acquired waterfront land from the Wampanoags that served to separate the two tribes. European settlers included Roger Williams, William Blackstone, and Reverend Samuel Newman.

Manufacturing in the watershed began in the late 1700s. The completion of the Boston-Providence Railroad in the mid-1800s provided an important link to industry in the area which by the turn of the century was a diversified mix, led by jewelry and textiles. The river also supported paper, primary metals, and machinery industries. The river served as an excellent source of power and process water as well as an excellent conduit for the disposal of wastewater. As a result of increasing levels of industrial use and residential development, the Ten mile River was grossly polluted by the mid 1900s.

Funding for sewage treatment plants associated with the Clean Water Act and Amendments of 1972 and 1977, including pre-treatment requirements for metal industries connected to the wastewater treatment plants, has resulted in the Ten Mile being much cleaner today than it was in the 1960s and 70s. However, nutrient enrichment and high concentrations of metals in the water column and sediments continue to impact biological communities and diminish recreational potential.

Consistent with the National Goal Uses of "fishable and swimmable waters", the classification of waters in the Ten Mile River Basin according to the SWQS, include the following (MA DEP 1996):

"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 (ORW's) under 314 CMR 4.04(3)."

The designation of ORW is applied to those waters with exceptional socio-economic, recreational, ecological and/or aesthetic values. 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. ORWs include certified vernal pools and all designated *Class A Public Water Supplies*, and may include surface waters found in National Parks, State Forests and Parks, Areas of Critical Environmental Concern (ACEC) and those protected by special legislation (MA DEM 1993). Wetlands that border ORWs are designated as ORWs to the boundary of the defined area. In the Ten Mile Basin, all designated ORWs are associated with *Class A Public Water Supplies* (Rojko et al. 1995).

In the Ten Mile River Basin, the following waters are classified as A, Public Water Supply:

- Sevenmile River, source to Orrs Pond outlet and those tributaries thereto

"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."

In the Ten Mile River Basin the following waters are classified as B, Warm Water Fishery, High Quality Water:

- Ten Mile River, source to Whiting Pond Dam

The following waters are classified as B, Warm Water Fishery:

- Ten Mile River, Whiting Pond Dam to state line
- Bungay River, entire length
- Speedway (also known as "Thatcher") Brook, entire length

Unlisted waters not otherwise designated in the SWQS, are designated *Class B, High Quality Water*. Where fisheries designations are necessary they shall be made on a case-by-case basis.

OBJECTIVES

This report summarizes information generated in the Ten Mile River Basin through *Year 1* (information gathering in 1996) and *Year 2* (environmental monitoring in 1997) activities established in the "Five-Year Cycle" of the Watershed Initiative. Data collected by DWM in 1997, in accordance with the Quality Assurance Project Plan (QAPP) (MA DEP 1998a), are provided in Appendix A and B (QA/QC and data tables, respectively). Appendix C is a technical memorandum of the 1990 Ten Mile River Biological Assessment. Together with other sources of information identified in each segment assessment (e.g., EPA, UMass North Dartmouth, etc.), the status of current water quality conditions of lakes and streams in the Ten Mile River Basin was assessed in accordance with EPA's and DEP's use assessment methods. It is important to realize, however, that not all waters in the Ten Mile River Basin are included in the DEP/EPA Water Body System database (WBS) (Dallaire 1999) or this report.

The objectives of this assessment report are to:

1. Evaluate whether or not individual segments (defined in the WBS) currently meet water quality standards,
2. evaluate the status of each designated use that is applicable to the segment,
3. identify major point and nonpoint sources that could effect the segment (water withdrawals, wastewater discharges, land use practices, etc),
4. identify the presence or absence of any non-native macrophytes in lakes,
5. identify waters (or segments) of concern that require additional data to fully assess the water quality conditions, and
6. recommend additional monitoring needs and/or remediation actions in order to better determine the level of impairment or to improve/restore water quality.

SEGMENT REPORT FORMAT

The segment order in this assessment report follows the Massachusetts Stream Classification Program (Halliwell *et al.* 1982) hierarchy. Stream segments are organized hydrologically (from most upstream to downstream). Tributary summaries follow the segment into which they discharge. Lakes segment summaries are presented after the stream segments. Each segment summary is formatted as follows:

SEGMENT IDENTIFICATION

name, water body identification number (WBID) (Dallaire 1999), location, length, and classification.

Sources of information: coding system (waterbody identification number e.g., MA11-01) used by DEP to reference the stream segment in databases such as 305(b) and 303(d), the Massachusetts SWQS (MA DEP 1996), and other descriptive information.

SEGMENT DESCRIPTION

flow direction, tributary confluences, and major land-use estimates (the top three uses for the subwatershed and 100' riparian zone)

Sources of information: descriptive information from USGS topographical maps, base geographic data from MassGIS, land use statistics from a GIS analysis using the MassGIS land use coverage developed at a scale of 1:25,000 and based on aerial photographs taken in 1985 and 1990-1992 (EOEA 1997 and 1999).

SEGMENT LOCATOR MAP

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

Sources of information: MassGIS (EOEA 1999) data layers (stream/lake segments, and quadrangle maps).

WITHDRAWALS AND DISCHARGES

WMA, NPDES, and stormwater permit information

Sources of information: WMA Database Printout (LeVangie 1997); open permit files located in Worcester and Lakeville DEP Offices (MA DEP 1999a and 1999b).

USE ASSESSMENT

Aquatic Life, Fish Consumption, Drinking Water (where applicable), Primary Contact, Secondary Contact, and Aesthetics

Sources of information: recent DWM survey data (Appendix B) and synoptic lake survey data (MA DEP 1997) as well as the following: data from the DEP DWM Toxicity Testing Database "TOXTD" (Dallaire 2000), USGS streamflow data (Socolow *et al.* 1998), a nonpoint source pollution assessment report for the Coles Brook subwatershed (Fennessey 1999), preliminary sediment quality data from EPA (Hellyer 1999a and b), and the MDPH Freshwater Fish Consumption Advisory List (MDPH 1998) was used to determine the Fish Consumption Use.

SUMMARY

Use summary table (uses, status)

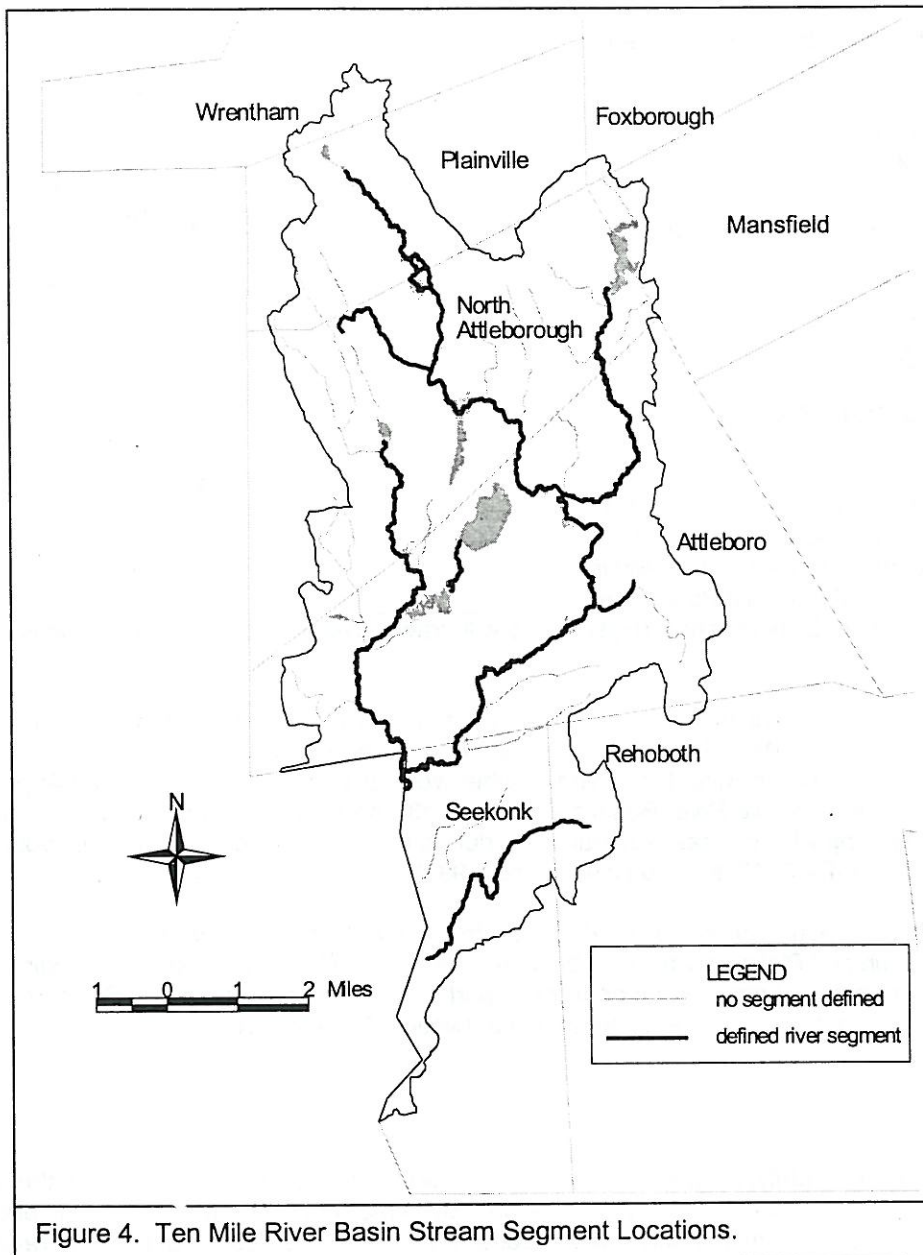
RECOMMENDATIONS

Additional monitoring and implementation needs.

RIVER SEGMENT ASSESSMENTS

The following segments in the Ten Mile River Basin are included in this report (Figure 4):

- Ten Mile River, Segment MA52-01
- Ten Mile River, Segment MA52-02
- Scotts Brook, Segment MA52-09
- Ten Mile River, Segment MA52-03
- Bungay River, Segment MA52-06
- Speedway Brook, Segment MA 52-05
- Sevenmile River, Segment MA52-07
- Fourmile Brook, Segment MA52-10
- Sevenmile River, Segment MA52-08
- Coles Brook, Segment MA52-11



TEN MILE RIVER (SEGMENT MA52-01)

Location: Outlet of Cargill Pond to West Bacon Street, Plainville. Segment length 1.6 miles.

Classification: Class B, Warm Water Fishery.

SEGMENT DESCRIPTION

The Ten Mile River begins in the north central section of the Town of Plainville. The first order stream flows south through two small ponds and an area which has been heavily mined for sand and gravel. The river then flows through a small, forested wetland area before entering industrialized area just upstream of West Bacon Street in Plainville.

Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	52%
Residential	18%
Industrial	14%

Land-use estimates in the 100' riparian zone from the streambanks:

Forest	32%
Wetlands	26%
Open Land	19%

WITHDRAWALS AND DISCHARGES

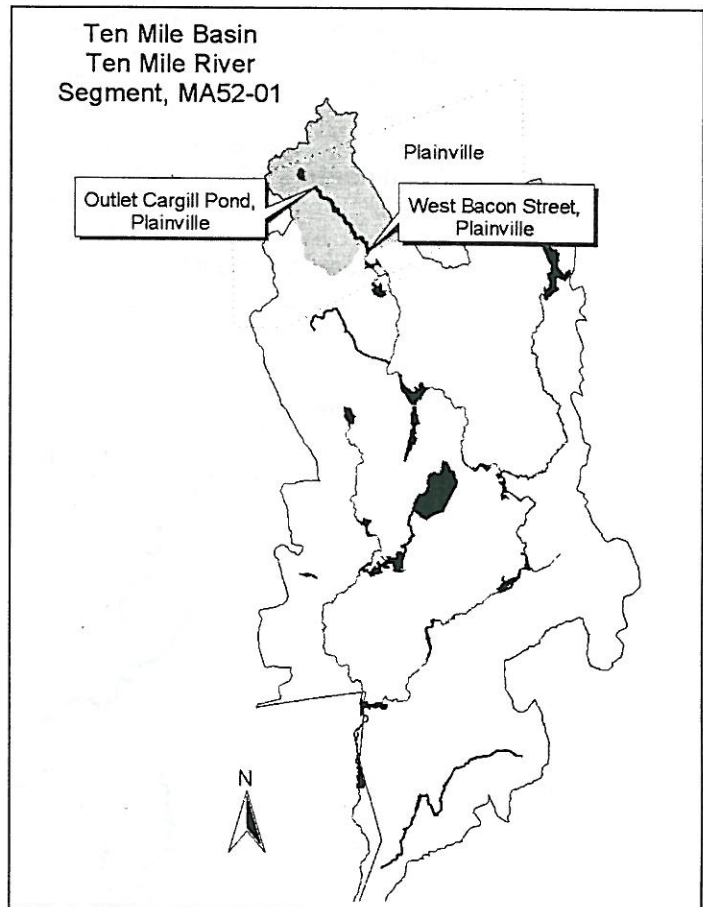
WMA:

1. The North Attleborough Water Department is registered (42721103) to withdraw from four wells along this segment of the Ten Mile River between Fuller Pond and Plainville Pond. The North Attleborough Water Department is registered to withdraw a system wide total (seven wells) of 2.1 MGD.
2. The Plainville Water Department is registered (42723801) to withdraw 0.23 MGD from one well (#3) along this segment of the Ten Mile River near Plainville Pond. The Plainville Water Department also has three other wells in the Taunton River Basin and another well currently in the New Source Approval process. However, their Ten Mile River Basin source, well #3 "has been unavailable to the Town of Plainville as a water supply for the past several years due to the threat of contamination by volatile organic compounds (VOCs)" (Whitman & Howard, Inc. 1993).

A water treatment plant has been approved by DEP for construction to treat the five wells mentioned above for both North Attleborough and Plainville which will bring the Plainville well (#3) back on-line. Funding for the construction of the water treatment plant will be provided in part through a joint (both towns) State Revolving Fund (SRF) project. This plant is scheduled to be on line between 2000/2001, at which time Well #3 will again be pumping.

USE ASSESSMENT






Limited water quality sampling (July, August, and September 1997) was conducted by DWM in the Ten Mile River, downstream of Fuller Street in Plainville (station TM01) (Appendix B, Table B1). This effort included fecal coliform bacteria sampling and *in-situ* measurements of dissolved oxygen, temperature and other variables using a Hydrolab®. Benthic macroinvertebrates were also sampled by DWM biologists at TM01 in September 1997. The North Attleborough WWTP has also conducted quarterly toxicity tests on



their effluent since December 1992. The facility collects water from the Ten Mile River at Fuller St., Plainville for use as dilution water in their toxicity tests. This ambient data (including physico-chemical and test organism survival data) was also reviewed (Dallaire 2000).

- **Bioassessment/Habitat** -- The benthic macroinvertebrate community analysis resulted in a total metric score of 28 (as compared to 40 at regional reference site SM00) which indicated slight impairment (Appendix B, Table B6). Reduced numbers of mayflies, stoneflies, and caddisflies (i.e., EPT taxa) - typically the most pollution-sensitive taxa - as well as a generally dissimilar community compared to the regional reference station (SM00) lowered the overall score (Appendix B, Table B5). A lack of diverse riffle habitat (depth and velocity) and fish habitat resulted in an overall low habitat assessment (130/200) (Appendix B, Table B9). Based on this analysis, the aquatic life use is assessed as partial support. Causes and sources of impairment are unknown.
- **Water Quality** – TM01 - Of the three early morning (pre-dawn) dissolved oxygen measurements, the percent saturation standard was violated (54%) once (Appendix B, Table B2). All other *in-situ* measurements met water quality standards (Table 3). The fecal coliform dataset was too limited to assess the status of either the primary or secondary contact recreational uses.
- **Ambient toxicity testing** – Survival of both *Ceriodaphnia dubia* and *Pimephales promelas* exposed to Ten Mile River water (dilution water control) met or exceeded 80% in seven day chronic tests conducted between September 1996 and March 1998 (Dallaire 2000). No instream toxicity problems are suspected.
- **Aesthetics** -- Upstream of Fuller Pond the aesthetic quality is unassessed. Downstream from Fuller Pond the aesthetics use is supported based on the 1997 DWM habitat assessment (Appendix B, Table B9) and visual observations of field sampling staff (Maietta 1998).

SUMMARY

Designated Uses	Status
Aquatic Life 	PARTIAL SUPPORT. The macroinvertebrate analysis indicated slight impairment, therefore the aquatic life use is assessed as partial support for the entire 1.6 miles of this segment. Causes and sources of impairment are unknown.
Fish Consumption 	NOT ASSESSED.
Primary Contact 	NOT ASSESSED.
Secondary Contact 	NOT ASSESSED.
Aesthetics 	NOT ASSESSED. The upper 0.7 mile reach (upstream of Fuller Pond) is not assessed due to a lack of data. SUPPORT. The lower 0.9 mile reach (downstream of Fuller Pond) fully supports the use.

RECOMMENDATIONS - Ten Mile River (Segment MA52-01)

- Conduct the 5-year review of the North Attleborough and Plainville water departments WMA registrations. Minimize water withdrawals via conservation measures.
- Additional monitoring data is necessary to evaluate the primary and secondary contact recreational uses (particularly fecal coliform sampling).

RECOMMENDATIONS (CONTINUED) - Ten Mile River (Segment MA52-01)

- Investigate compliance with storm water performance standards for the sand and gravel mining operation along the upper reach of the Ten Mile River upstream of Fuller Pond. Historical problems have been documented. Habitat assessment would be helpful in determining use support for unassessed categories and in the reach upstream of Fuller Pond.
- Streambank stabilization measures should be implemented to correct erosion at the Fuller Street Road Crossing. A stream cleanup for the river and its floodplain area to remove trash should be undertaken.

TEN MILE RIVER (SEGMENT MA 52-02)

Location: West Bacon Street, Plainville, to the North Attleborough WWTP discharge, Attleboro.
Segment length: 4.8 miles. Classification: Class B, Warm Water Fishery.

SEGMENT DESCRIPTION

The Ten Mile River from West Bacon Street, Plainville to the North Attleborough WWTP flows through a series of ponds (Wetherells, Whiting, and Falls Ponds) and picks up flow from one named tributary (Scotts Brook). The watershed is primarily residential/industrial and the river is channelized along much of its length.

Land-use estimates for the subwatershed (map inset, gray shaded area):

Forest	39%
Residential	34%
Open Land	9%

Land-use estimates in the 100' riparian zone from the streambanks:

Residential	20%
Forest	19%
Wetlands	8%

WITHDRAWALS AND DISCHARGES

WMA:

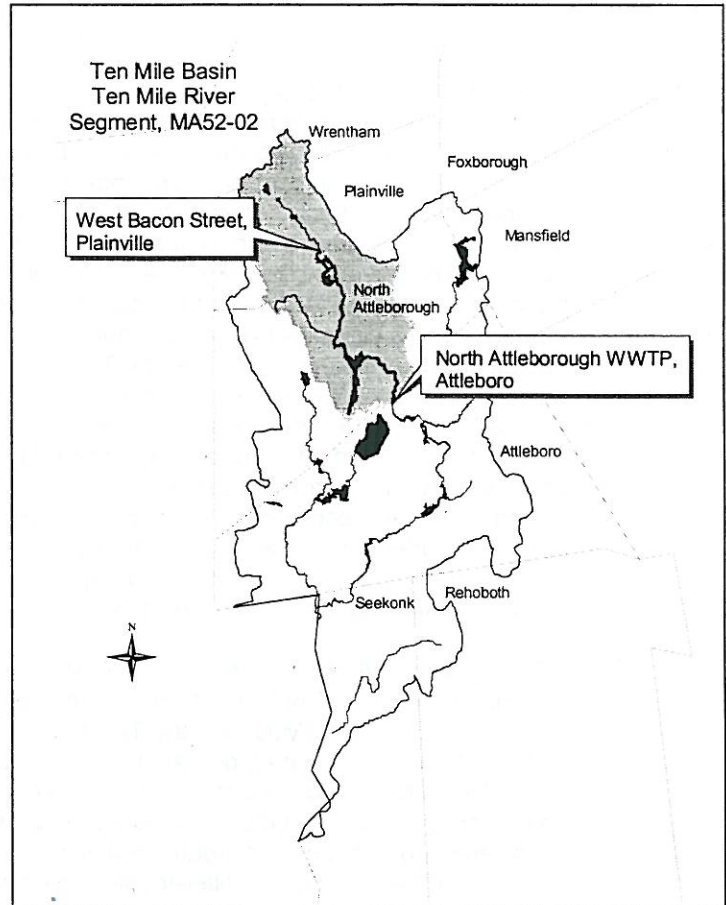
1. The North Attleborough Water Department is registered (42721103) to withdraw from one well along this segment of the Ten Mile River near Whiting Pond. The North Attleborough Water Department is registered to withdraw a system wide total (seven wells) of 2.1 MGD.

NPDES:

1. MA0001589 –L.G. Balfour Co., Inc. Plant #2 submitted a letter on 6 July 1989 indicating that the company ceased its operation and the facility was sold. The facility has since been demolished.

USE ASSESSMENT

Water quality sampling (July, August, and September 1997) was conducted by DWM in the Ten Mile River upstream of Route 1 and upstream of Cedar Road in North Attleborough (stations TM04 and TM06, respectively) (Appendix B, Table B1). This effort included fecal coliform sampling and *in-situ* measurements of dissolved oxygen and other variables using a Hydrolab®. Benthic macroinvertebrate sampling, qualitative periphyton sampling, and habitat assessments were also conducted by DWM biologists at TM04 and TM06 as well as one additional station (TM02) located downstream from West Bacon Street in North Attleborough in September 1997. Fish population sampling was conducted by DWM at three locations along this segment of the Ten Mile River (station TM02 - upstream of Wetherells Pond near West Bacon Street in Plainville, TM05 and TM06 - two consecutive 100 m reaches upstream of Cedar Road/the North Attleborough WWTP in North Attleborough). In September 1997, DWM sampled Falls Pond (North Basin) for fish toxics monitoring to fulfill a public information request. Three species of fish (three each of largemouth bass, white perch, and black crappie) were collected and composite samples were prepared. The samples were analyzed for Cd, Pb, Hg, As, Se, % lipids, PCB and organochlorine pesticides. EPA sampled surficial sediments using a petit ponar dredge from three locations within this segment in March 1998: Wetherells Pond Dam (WETH01), Falls Pond Dam



(TENM01), and the Ten Mile River upstream of Cedar Street (NATP01) (Hellyer 1999b). Sediment samples were analyzed chemically for the following: metals, mercury, semivolatile organic compounds (SVOC), polychlorinated biphenyls (PCB), pesticides, simultaneously extracted metals and acid volatile sulfide (AVS/SEM), grain size and total organic carbon (TOC). Toxicity tests were also conducted by EPA using two freshwater macroinvertebrate species, *Chironomus tentans* and *Hyallolela azteca*.

- Bioassessment/Habitat - TM02 – The benthic macroinvertebrate sample from the Ten Mile River near West Bacon St., Plainville was compared against two reference stations, the Sevenmile River (SM00) and the Ten Mile River at Fuller St. Plainville (TM01). Results of the RBP III analyses indicated moderate (35% comparability) and slight (52% comparability) impairment respective to each reference station condition (Appendix B, Tables B6 and B7). Reduction of taxa richness--including the loss of pollution sensitive EPT taxa--as well as the dominance (43%) of the benthos assemblage by a single taxon, was most responsible for total metric score reductions for the TM02 benthic community and the low percent comparability to reference conditions. A lack of diverse riffle habitat (depth and velocity), some evidence of sediment (sand) deposition and substrate embeddedness (possibly from road runoff), and a reduced riparian vegetative zone were impacting habitat quality at this station (Appendix B, Table B9). Habitat degradation in the form of sedimentation, coupled with dense macrophyte cover, may be responsible for the displacement of EPT taxa – which generally require coarse substrates – by amphipods. *Lyngbia*, a blue-green algae, was also very abundant (Appendix B, Table B11). Although fish habitat was marginal at best due to shallow water, fish sampling resulted in the collection of five species of fish (Appendix B, Table B10). Young-of-the-year and year 1+ eastern brook trout, *Salvelinus fontinalis*, were present suggesting at least some adequate spawning habitat. Redfin pickerel, *Esox americanus americanus*, was a second stream species present. A number of stocked trout were also collected from the single pool within the sampling reach (just downstream of the road crossing).
- Bioassessment/Habitat - TM04 - The benthic macroinvertebrate sample collected from the Ten Mile River upstream from Route 1 in North Attleborough was compared against two reference stations, the Sevenmile River (SM00) and the Ten Mile River at Fuller St. Plainville (TM01). Results of the RBP III analyses indicated moderate (40% comparability) and slight (57% comparability) impairment respective to each reference station condition (Appendix B, Tables B6 and B7). The benthic community was dominated by tubificid worms and amphipods, both of which are generally considered highly tolerant of organic pollution (Appendix B, Table B5). The predominance of these taxa, coupled with numerous filter-feeding organisms (e.g., Hydropsychidae), suggests a somewhat unbalanced community responding to an overabundance of particulate organic matter (POM) (Appendix B, Table B5). A reduction in taxa richness compared to both reference stations and a loss of pollution sensitive EPT taxa relative to reference conditions at SM00, also indicated water quality degradation. In addition, a reduced riparian zone and poorly developed riffle areas may limit community structure at TM04 (Appendix B, Table B9). Excessive instream aquatic vegetation and dense algal growth (*Spirogyra*) provided further evidence of enrichment in this portion of the Ten Mile River (Appendix B, Table B11).
- Fish Toxics –Results of the fish toxics sampling in Falls Pond (North Basin) are provided in Appendix B, Table B12. MDPH reviewed the data. No advisory was issued. The fish consumption use is therefore not assessed (refer to assessment methodology for Fish Consumption Use).
- Fish Population - TM05 - Although fish habitat was considered good to excellent, fish sampling resulted in the collection of only five fish (Appendix B, Table B10). Four of the five fish captured were young-of-the-year that likely came downstream from the north basin of Falls Pond (Maietta 1998). Although water quality appeared adequate to support fish in this reach, the paucity of fishes was considered an indicator of an unknown problem. Water quantity problems resulting from flow management (dam repair) at Falls Pond may have also affected the fish community in this reach of the Ten Mile River. Sediment sampling was conducted by EPA in March 1998 (see sediment quality at NATP01) to characterize sediment quality.
- Bioassessment/Habitat - TM06 - The benthic macroinvertebrate sample from the Ten Mile River upstream of the North Attleborough WWTP was compared against two reference stations, the Sevenmile River (SM00) and the Ten Mile River at Fuller St. Plainville (TM01). Results of the RBP III