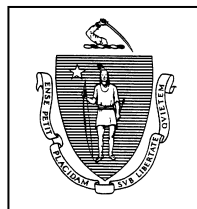


# **FRENCH & QUINEBAUG RIVER WATERSHEDS 2004-2008 WATER QUALITY ASSESSMENT REPORT**

**COMMONWEALTH OF MASSACHUSETTS**  
**EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS**  
IAN BOWLES, SECRETARY  
**MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
LAURIE BURT, COMMISSIONER  
**BUREAU OF RESOURCE PROTECTION**  
GLENN HAAS, ASSISTANT COMMISSIONER  
**DIVISION OF WATERSHED MANAGEMENT**  
GLENN HAAS, DIRECTOR



## **NOTICE OF AVAILABILITY**

**LIMITED COPIES OF THIS REPORT ARE AVAILABLE AT NO COST BY WRITTEN REQUEST TO:**

**MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF WATERSHED MANAGEMENT  
627 MAIN STREET  
WORCESTER, MA 01608**

This report is also available from MA DEP's home page on the World Wide Web at:

<http://www.mass.gov/dep/water/resources/wqassess.htm>

Furthermore, at the time of first printing, eight copies of each report published by this office are submitted to the State Library at the State House in Boston; these copies are subsequently distributed as follows:

- On shelf; retained at the State Library (two copies);
- Microfilmed retained at the State Library;
- Delivered to the Boston Public Library at Copley Square;
- Delivered to the Worcester Public Library;
- Delivered to the Springfield Public Library;
- Delivered to the University Library at UMass, Amherst;
- Delivered to the Library of Congress in Washington, D.C.

Moreover, this wide circulation is augmented by inter-library loans from the above-listed libraries. For example a resident in Dudley can apply at their local library for loan of any MA DEP DWM report from the Worcester Public Library.

A complete list of reports published since 1963 is updated annually and printed in July. This report, entitled, "Publications of the Massachusetts Division of Watershed Management – Watershed Planning Program, 1963- (current year)", is also available by writing to the DWM in Worcester.

## **DISCLAIMER**

References to trade names, commercial products, manufacturers, or distributors in this report constituted neither endorsement nor recommendations by the Division of Watershed Management for use.

FRENCH & QUINEBAUG RIVER WATERSHEDS  
2004-2008 WATER QUALITY ASSESSMENT REPORT

Department of Environmental Protection  
Division of Watershed Management

Report Number:

41/42-AC-2

DWM Control Number: 178.5

Massachusetts Department of Environmental Protection  
Division of Watershed Management  
Worcester, Massachusetts

NOVEMBER 2009

## ACKNOWLEDGEMENTS

Coordination of local, state and federal agencies and private organizations is fundamental to the success determining the health of our aquatic resources and carrying out their restoration. Data and information used in this report were provided in part by the following agencies and organizations:

### State

- Massachusetts Department of Environmental Protection (MassDEP):
  - Bureau of Resource Protection
  - Bureau of Strategic Policy and Technology's Wall Experiment Station
  - Bureau of Waste Prevention
  - Bureau of Waste Site Cleanup
- Massachusetts Department of Public Health (MA DPH)
- Massachusetts Department of Fish and Game
  - Division of Fisheries and Wildlife (MassWildlife)
  - Riverways Program
- Massachusetts Department of Conservation and Recreation (MA DCR)

### Federal

- United States Environmental Protection Agency (EPA)
- United States Army Corps of Engineers (US ACOE)
- United States Geological Survey (USGS)
  - Water Resources Division

It is impossible to thank everyone who contributed to the assessment report process: field, laboratory, data management, writing, editing, and graphics, as well as meetings, phone calls, and many e-mails. All of these contributions are very much appreciated.

## TABLE OF CONTENTS

Table of Contents .....	i
List Of Appendicies .....	iii
List Figures.....	iii
List of Acronyms.....	iv
List of Units.....	iv
Executive Summary .....	v
Introduction.....	1
Objectives.....	1
French & Quinebaug River Watersheds Description .....	2
French River Watershed - River Segment Assessments .....	7
Unnamed Tributary (Segment MA42-01).....	9
Town Meadow Brook (Segment MA42-02).....	10
Burncoat Brook (Segment MA42-07).....	11
Grindstone Brook (MA42-18) .....	13
Bartons Brook (MA42-08) .....	15
French River (Segment MA42-03) .....	16
French River (Segment MA42-04) .....	19
Wellington Brook (Segment MA42-11) .....	23
Unnamed Tributary (MA42-20) .....	25
Little River (Segment MA42-13).....	27
Little River (Segment MA42-14).....	30
Unnamed Tributary (MA42-19) .....	32
Mine Brook (MA42-16) .....	34
Sucker Brook (MA42-15).....	36
Mill Brook (Segment MA42-10) .....	39
French River (Segment MA42-05) .....	41
French River (Segment MA42-06) .....	44
French River Watershed - Lake Assessments .....	46
Bouchard Pond (MA42003) .....	48
Buffum Pond (MA42004).....	49
Buffumville Lake (MA42005).....	51
Burncoat Pond (MA42007) .....	54
Cedar Meadow Pond (MA42009) .....	55
Dresser Hill Pond (MA42014) .....	57
Dutton Pond (MA42015) .....	58
Gore Pond (MA42018) .....	60
Granite Reservoir (MA42019) .....	62
Greenville Pond (West Basin) (MA42022) .....	64
Greenville Pond (MA42023).....	65
Hayden Pond (MA42024).....	66
Hudson Pond (MA42029).....	67
Jones Pond (MA42030) .....	68
Larner Pond (MA42068).....	69
Low Pond (MA42033) .....	71
Lowes Pond (MA42034).....	72
Mckinstry Pond (MA42035).....	73
Merino Pond (MA42036) .....	74
New Pond (MA42037).....	75
Packard Pond (MA42040).....	76
Peter Pond (MA42042) .....	77
Pierpoint Meadow Pond (MA42043) .....	78
Pikes Pond (MA42044) .....	80
Robinson Pond (MA42047).....	81
Rochdale Pond (MA42048).....	82
Sargent Pond (MA42049) .....	83

Shepherd Pond (MA42051) .....	84
Stiles Reservoir (MA42055) .....	85
Mosquito Pond (MA42060) .....	86
Wallis Pond (MA42062) .....	87
Webster Lake (MA42064) .....	88
Quinebaug River Watershed - River Segment Assessments .....	91
Hollow Brook (MA41-24) .....	93
Mountain Brook (MA41-18) .....	94
West Brook (MA41-17) .....	96
Unnamed Tributary (MA41-16) .....	98
Unnamed Tributary (MA41-27) .....	101
Mill Brook (Segment MA41-07) .....	102
Browns Brook (MA41-20) .....	104
Stevens Brook (MA41-19) .....	106
Quinebaug River (Segment MA41-01) .....	108
Hamant Brook (MA41-15) .....	112
Hatchet Brook (MA41-14) .....	115
Mckinstry Brook (MA41-13) .....	117
Quinebaug River (Segment MA41-02) .....	120
Cady Brook (Segment MA41-05) .....	122
Cady Brook (Segment MA41-06) .....	123
Cohasse Brook (MA41-12) .....	125
Lebanon Brook (MA41-11) .....	128
Quinebaug River (Segment MA41-09) .....	130
Unnamed Tributary (MA41-23) .....	132
Quinebaug River (Segment MA41-03) .....	134
Quinebaug River (Segment MA41-04) .....	136
Tufts Branch (MA41-10) .....	138
Rocky Run (MA41-22) .....	140
Leadmine Brook (MA41-21) .....	142
Unnamed Tributary (MA41-26) .....	144
Unnamed Tributary (MA41-25) .....	145
Quinebaug River Watershed - Lake Assessments .....	146
Alum Pond (MA41001) .....	148
Cedar Pond (MA41008) .....	150
East Brimfield Reservoir (MA41014) .....	152
Lake George (MA41016) .....	154
Glen Echo Lake (MA41017) .....	155
Hamilton Reservoir (MA41019) .....	156
Holland Pond (MA41022) .....	158
Little Alum Pond (MA41029) .....	160
No. 4 Reservoir (MA41039) .....	161
Pistol Pond (MA41057) .....	162
Prindle Lake (MA41043) .....	163
Railroad Pond (MA41058) .....	164
Sherman Pond (MA41046) .....	165
Sibley Pond (MA41047) .....	166
Sylvestri Pond (MA41049) .....	167
Walker Pond (MA41052) .....	168
Wielock Pond (MA41056) .....	170
References .....	171

## LIST OF APPENDICIES

Appendix A	Assessment Methodology for Evaluating Designated Use Status of Massachusetts Surface Waters .....	A1
Appendix B	French and Quinebaug River Basins 2004 Water Quality Technical Memorandum (TM-41/42-5).....	B1
Appendix C	French & Quinebaug River Watershed 2004 Benthic Macroinvertebrate Bioassessment (TM-41/42-6).....	C1
Appendix D	2004 French and Quinebaug River Watersheds Fish Population Assessment .....	D1
Appendix E	Excerpt from Baseline Lake Survey 2004 Technical Memo.....	E1
Appendix F	Summary of NPDES Permitting Information French & Quinebaug River Watersheds .....	F1
Appendix G	Summary WMA Permitting Information in the French & Quinebaug River Watersheds....	G1
Appendix H	2004 Merrimack and French & Quinebaug Periphyton Study.....	H1

## LIST FIGURES

Figure 1:	French and Quinebaug River Basin Aquatic Life Use Summary.....	vii
Figure 2:	French and Quinebaug River Basin Fish Consumption Use Summary .....	ix
Figure 3:	French and Quinebaug River Basin Primary Contact Recreational Use Summary .....	xi
Figure 4:	French and Quinebaug River Basin Secondary Contact Recreational Use Summary .....	xiii
Figure 5:	French and Quinebaug River Basin Aesthetics Use Summary.....	xv
Figure 6:	Locations of French and Quinebaug Watersheds .....	2
Figure 7:	French River Watershed River and Lake Segments .....	3
Figure 8:	Quinebaug River Watershed Stream and Lake Segments .....	5
Figure 9:	French River Watershed River Segments .....	8
Figure 10:	French River Watershed Lake Segments.....	47
Figure 11:	Quinebaug River Watershed Stream Segments. ....	91
Figure 12:	Quinebaug River Watershed Lake Segments .....	147

## LIST OF ACRONYMS

US ACOE	Army Corps of Engineers
ADB	Assessment Database
BPJ	Best professional judgment
CNOEC	Chronic no observed effect concentration
CT DEP	Connecticut Department of Environmental Protection
CWA	Clean Water Act
DO	dissolved oxygen
DFG	Massachusetts Department of Fish and Game
DWM	Division of Watershed Management
EPA	United States Environmental Protection Agency
EPT	Ephemeroptera, Plecoptera, and Trichoptera
FERC	Federal Energy Regulatory Commission
FPOM	Fine particulate organic matter
HBI	Hilsenhoff Biotic Index
LC <sub>50</sub>	lethal concentration to 50% of the test organisms
L-EL	Low effect level
Mass DEP	Massachusetts Department of Environmental Protection
MA DPH	Massachusetts Department of Public Health
NPDES	National Pollutant Discharge Elimination System
PAH	Polycyclic aromatic hydrocarbons
PALIS	Pond and Lake Information System
PCB	Polychlorinated biphenyls
RBP	Rapid bioassessment protocol
SARIS	Stream and River Inventory System
S-EL	Severe effect limit
SMART	Strategic Monitoring and Assessment for Riverbasin Teams
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
TOXTD	MA DEP DWM Toxicity Testing Database
USGS	United States Geological Survey
WBS	Waterbody System Database
WSD	Water Sewer District
WWTF	Wastewater treatment facility
WWTP	Wastewater treatment plant

## LIST OF UNITS

cfs	cubic feet per second
cfu	colony forming unit
MGD	million gallons per day
µg/kg	microgram per kilogram
mg/L	milligram per liter
PPB	parts per billion
PPM	parts per million
SU	standard units



## EXECUTIVE SUMMARY

The Massachusetts Surface Water Quality Standards (SWQS) designate the most sensitive uses for which surface waters in the state shall be protected. The assessment of current water quality conditions is a key step in the successful implementation of the Clean Water Act. This critical phase provides an assessment of whether or not the designated uses are supported or impaired, or are not assessed, as well as basic information needed to focus resource protection and remediation activities later in the watershed management planning process.

This report presents a summary of current water quality data/information in the French and Quinebaug River Watersheds used to assess the status of the designated uses as defined in the SWQS. The designated uses, where applicable, include: *Aquatic Life*, *Fish Consumption*, *Drinking Water*, *Primary* and *Secondary Contact Recreation* and *Aesthetics*. Each use, within a given assessment segment, is individually assessed as support or impaired. When insufficient data/information exists or no reliable data are available for an assessment segment the use is not assessed. However, if there is some indication of water quality impairment, which is not “naturally-occurring”, the use is identified with an “Alert Status”. It is important to note that many rivers miles and lakes do not have an assigned assessment segment and the status of their designated uses has never been investigated or reported to the EPA in the Commonwealth’s Summary of Water Quality Report 305(b) Report nor is information on these waters maintained in the Waterbody System (WBS) or the new Assessment Database (ADB). All uses are not assessed for any waters not currently assigned an assessment segment. A summary of the use assessments for the rivers and lakes in both the French River Watershed and the Quinebaug River Watershed is detailed in Figures 1-5.

Page Intentionally Left Blank

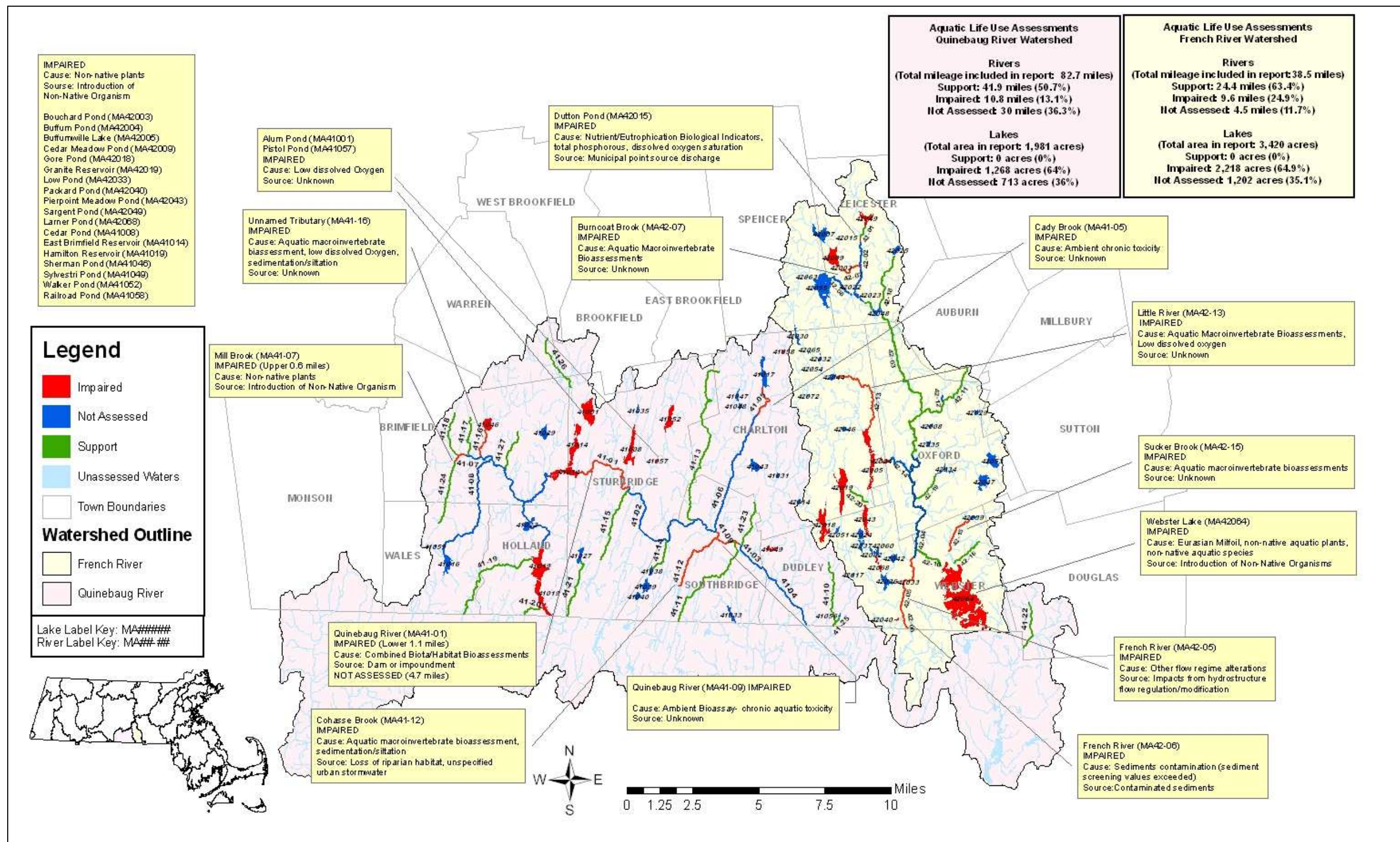


Figure 1: French and Quinebaug River Basin *Aquatic Life Use* Summary

Page Intentionally Left Blank



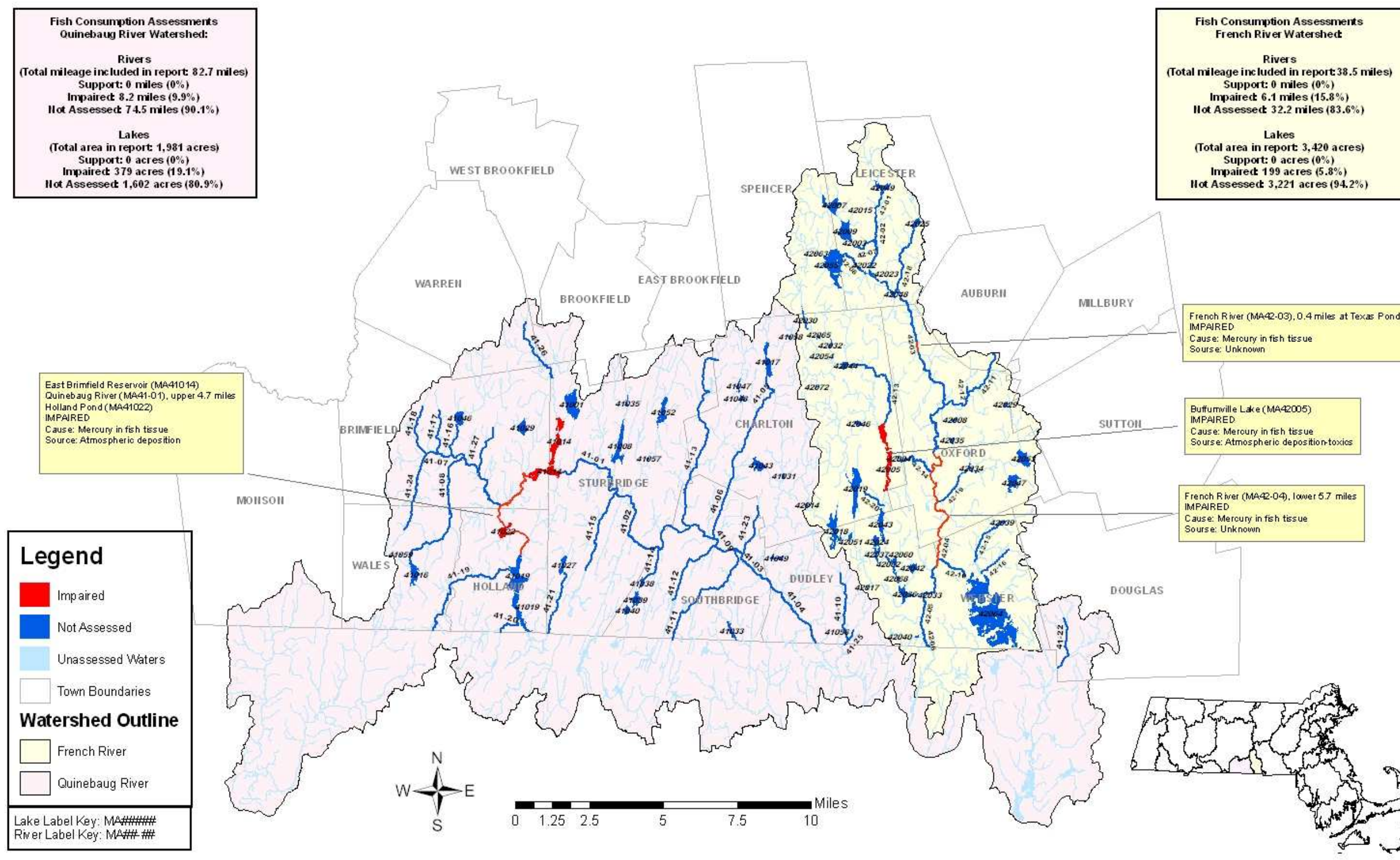


Figure 2: French and Quinebaug River Basin *Fish Consumption Use Summary*

Page Intentionally Left Blank



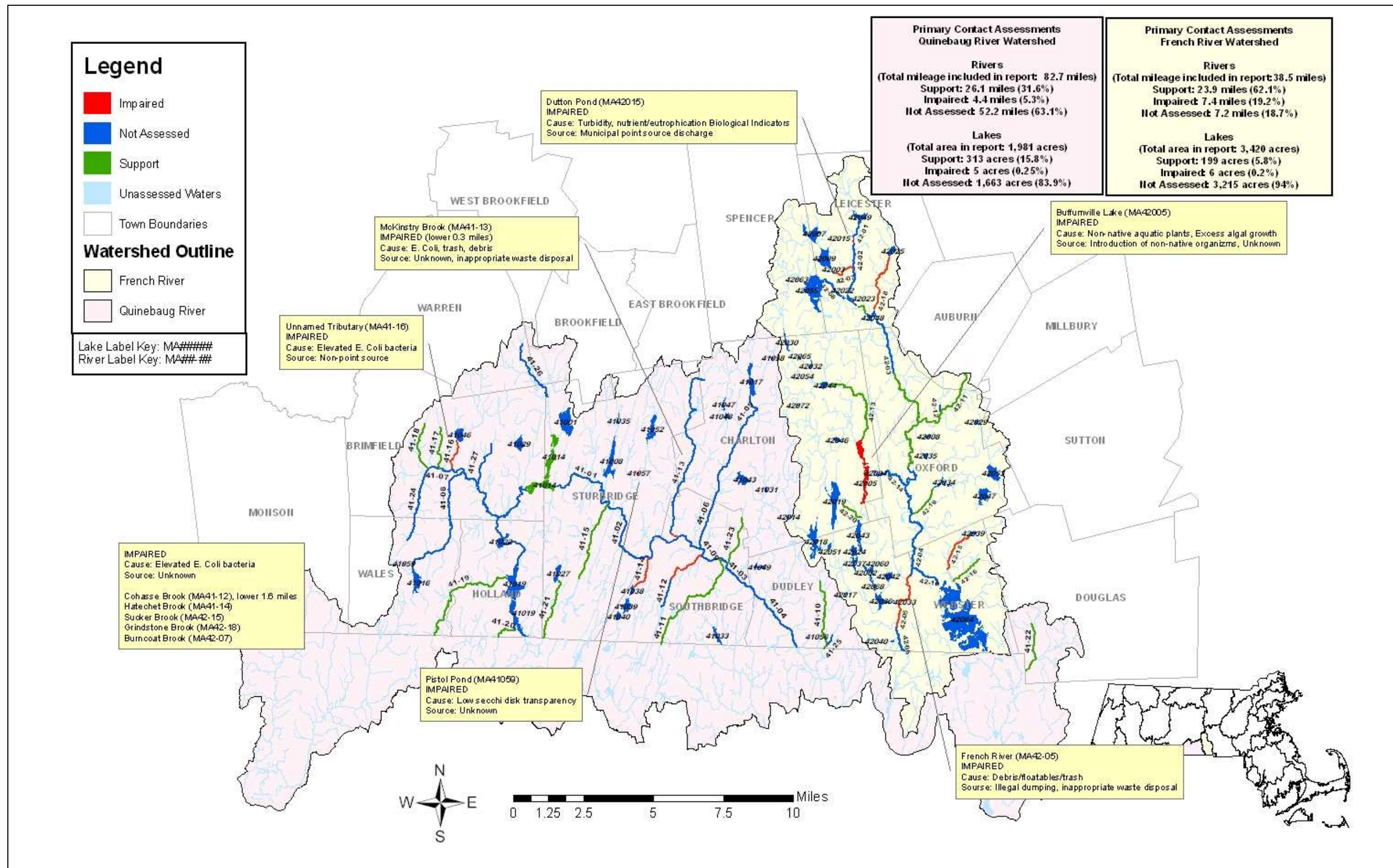


Figure 3: French and Quinebaug River Basin *Primary Contact Recreational Use Summary*

Page Intentionally Left Blank



**Legend**

- Impaired
- Not Assessed
- Support
- Unassessed Waters
- Town Boundaries

**Watershed Outline**

- French River
- Quinebaug River

Lake Label Key: MA#####  
 River Label Key: MA###-##

**Secondary Contact Assessments  
Quinebaug River Watershed**

**Rivers**  
 (Total mileage included in report: 82.7 miles)  
 Support: 27.4 miles (33.1%)  
 Impaired: 3.1 miles (3.8%)  
 Not Assessed: 52.2 miles (63.1%)

**Lakes**  
 (Total area in report: 1,981 acres)  
 Support: 517 acres (26.1%)  
 Impaired: 5 acres (0.3%)  
 Not Assessed: 1,459 acres (73.6%)

**Secondary Contact Assessments  
French River Watershed**

**Rivers**  
 (Total mileage included in report: 38.5 miles)  
 Support: 28.9 miles (75.1%)  
 Impaired: 2.4 miles (6.2%)  
 Not Assessed: 7.2 miles (18.7%)

**Lakes**  
 (Total area in report: 3,420 acres)  
 Support: 199 acres (5.8%)  
 Impaired: 6 acres (0.2%)  
 Not Assessed: 3,215 acres (94%)

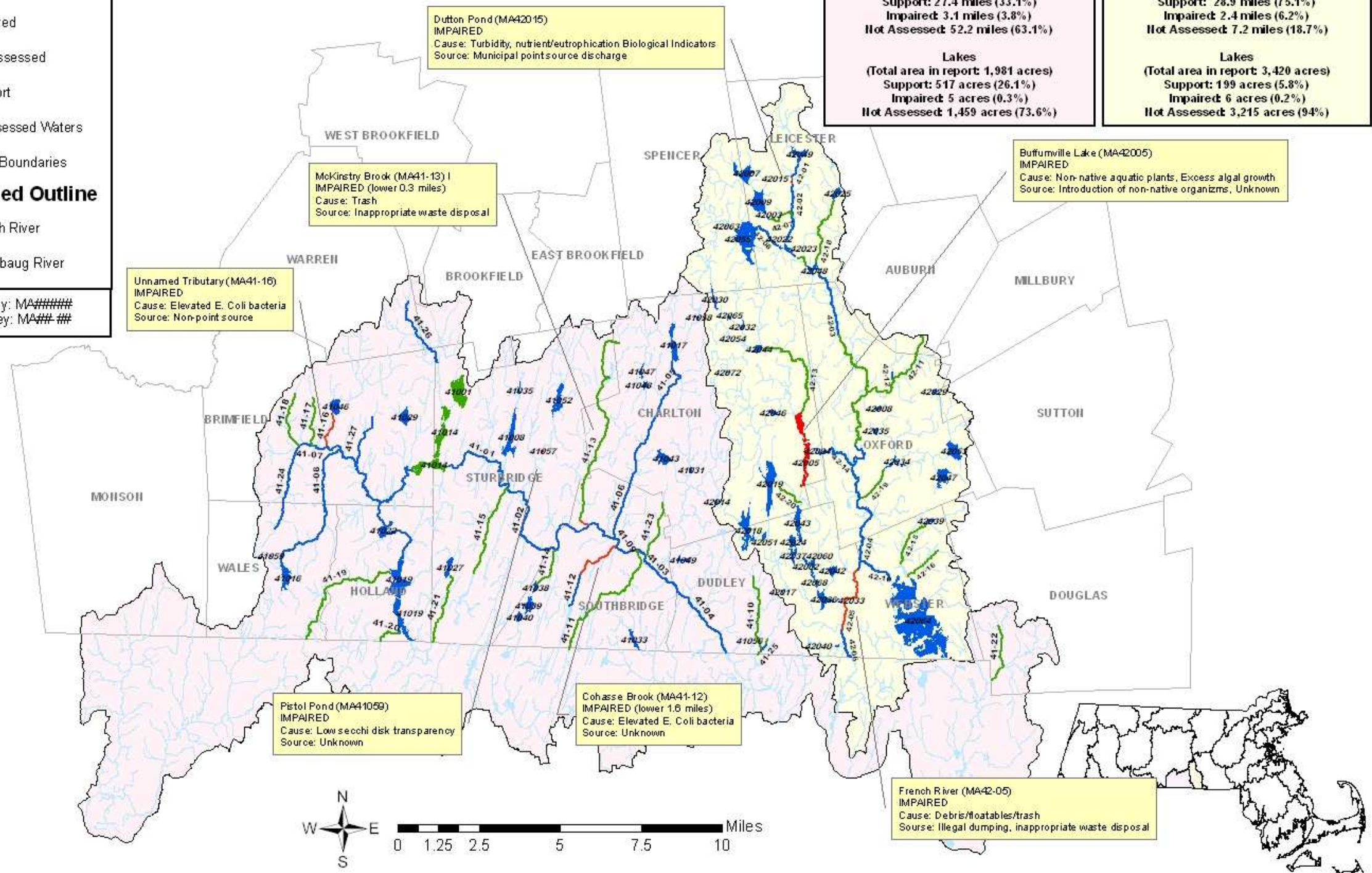


Figure 4: French and Quinebaug River Basin *Secondary Contact Recreational Use* Summary

Page Intentionally Left Blank



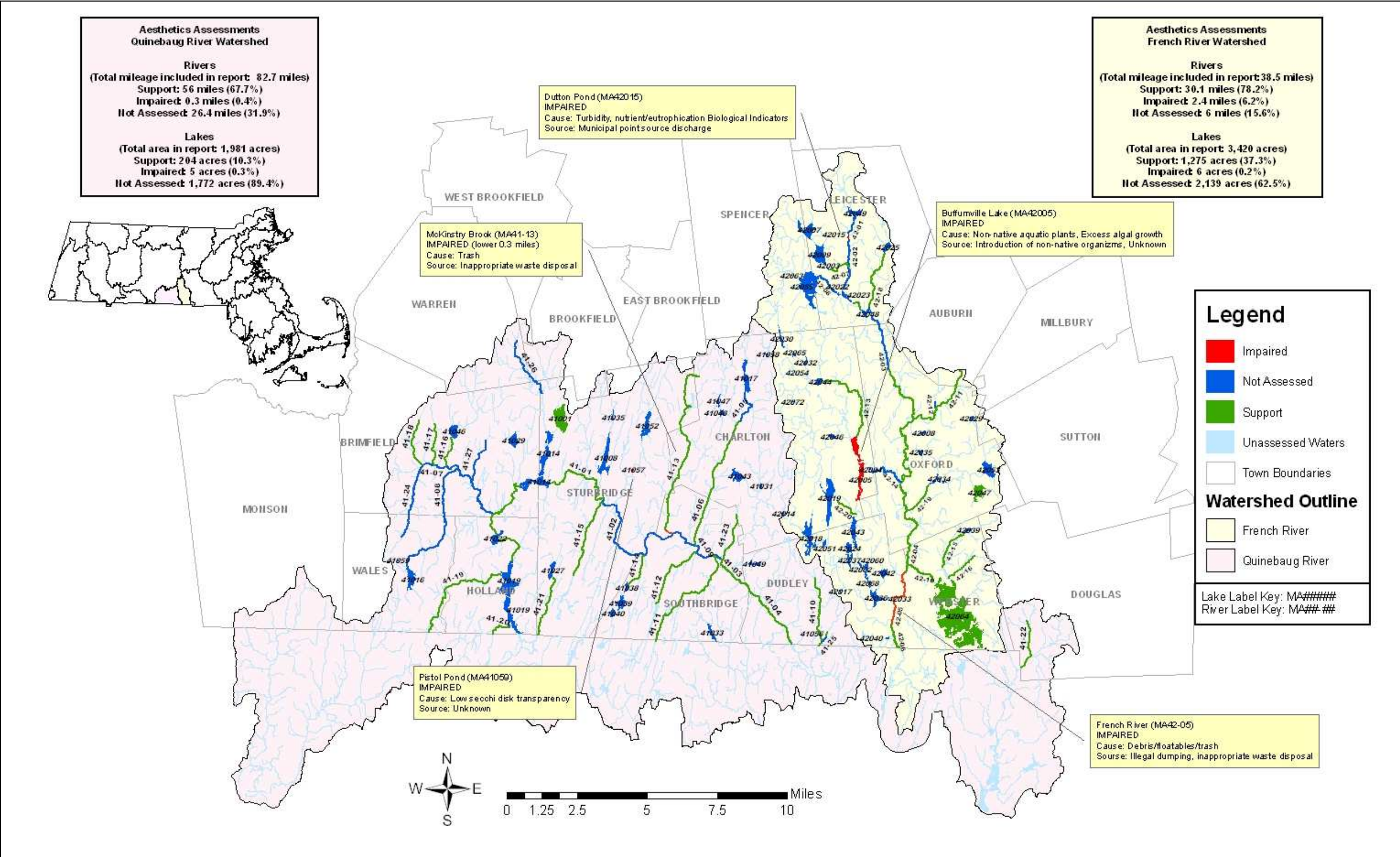


Figure 5: French and Quinebaug River Basin Aesthetics Use Summary

Page Intentionally Left Blank

## **INTRODUCTION**

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 U.S. 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, MassDEP must submit a statewide report every two years to the EPA, which describes the status of water quality in the Commonwealth. 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. Individual watershed surface water quality assessment reports are used as the supporting documentation for the Integrated List. The most recent list approved by EPA for Massachusetts is the 2008 Integrated List (MassDEP 2008a and Moraff 2009). 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. Quality assured in-stream 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 in the Appendix A: Assessment Methodology Guidelines for Evaluating Designated Use Status of Massachusetts Surface Waters.

This report presents the current assessment of water quality conditions in the French and Quinebaug River Watersheds. Assessments are based on information that has been researched and developed by the Massachusetts Department of Environmental Protection (MassDEP) through the first three years (information gathering, monitoring, and assessment) of the five-year basin cycle in partial fulfillment of MassDEP's federal mandate to report on the status of the Commonwealth's waters under the CWA. Specifically, water quality monitoring data collected by MassDEP Division of Watershed Management staff in 2004 were utilized to make assessment decisions. All of these data are available from the MassDEP upon request. Water quality data from other sources used to make use assessment decisions are available from those agencies and organizations.

## **OBJECTIVES**

This report summarizes information generated or published since the last French and Quinebaug River Watersheds water quality assessment report published in 2002. The methodology used to assess the status of water quality conditions of rivers and lakes in accordance with EPA's and MassDEP's use assessment methods is provided in Appendix A.

Not all waters in the French and Quinebaug River Watersheds are included in the MassDEP/EPA databases (either the waterbody system database -- WBS, or the newer assessment database -- ADB) or this report.

The objectives of this water quality assessment report are to:

1. Evaluate whether or not surface waters in the French and Quinebaug River Watershed, defined as segments in the MassDEP databases, currently support their designated uses (i.e., meet surface water quality standards [MassDEP 2006]).
2. Identify sources of stressors that are impairing designated use.
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.

## FRENCH & QUINEBAUG RIVER WATERSHEDS DESCRIPTION

The French and Quinebaug River watersheds are encompassed within the Quinebaug and Shetucket Rivers Valley National Heritage Corridor, a special type of park that includes 35 towns and numerous villages in Massachusetts and Connecticut. Local and state governments, businesses, non-profit cultural and environmental organizations, the National Park Service and other federal agencies are collaborating in their efforts to conserve and protect this region's natural resources.

### FRENCH RIVER WATERSHED DESCRIPTION

The French River Watershed (Figure 6, Figure 7) is located in the south-central portion of Massachusetts and extends across the Massachusetts border into Connecticut. The watershed (or basin) is bordered by the Quinebaug River Basin to the west and a small portion to the southeast; the Chicopee River Basin to the northwest; and by the Blackstone River Basin to the east. The river flows generally south into Connecticut. Ten communities, including Auburn, Charlton, Douglas, Dudley, Leicester, Millbury, Oxford, Spencer, Sutton, and Webster, lie wholly or partially within the area drained by the French River.

The French River is a major tributary of the Quinebaug River and extends 26 miles from its source in Greenville Pond, Leicester, to the confluence with the Quinebaug River in Thompson, Connecticut. From its headwaters at Sargent Pond, Leicester (this portion is known as Town Meadow Brook and extends from Sargent Pond to Greenville Pond) the French River flows generally south through Oxford, Dudley, and Webster to Thompson, Connecticut. Probably the best-known natural feature within the French River Watershed is Lake Chargoggagoggmanchaugagoggchaubunagungamaugg (also known as Webster Lake), which not only has the longest recorded name for a lake, but is also the largest natural freshwater lake in the state (1,181 acres). In addition, the construction of the Buffumville Army Corps Flood Control Project created Buffumville Lake, an impoundment on the Little River (a French River tributary) in Charlton, with an average surface area of 186 acres. The French River also passes through the Army Corps Hodges Village Project in Oxford -- a dry-bed flood control reservoir.

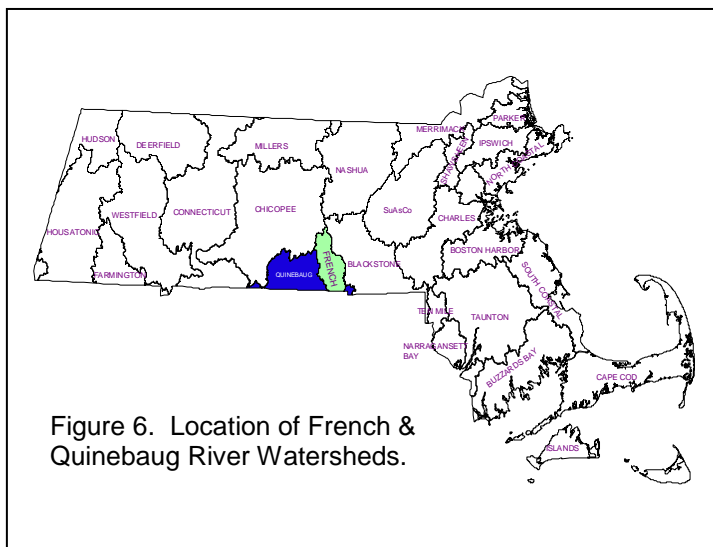


Figure 6. Location of French & Quinebaug River Watersheds.

Tributaries discharging to the French River in Massachusetts are generally small (other than the Little River) and include Burncoat, Bartons and Grindstone Brooks in Leicester; Wellington Brook, Little River and Lowes Brook in Oxford; Mill Brook in Webster; and Potash Brook in Dudley. Three municipal wastewater treatment plants discharge in the Massachusetts portion of the French River Basin. The Leicester wastewater treatment plant (WWTP) discharges to a tributary of Town Meadow Brook and both the Oxford-Rochdale and the Webster/Dudley WWTPs discharge to the French River. One industrial facility, American Polymers, Inc. of Oxford, discharged contact and non-contact cooling water to the Little River until the facility was closed in 2008.

There are 15 named streams in the French River Basin that have been assigned Stream and River Inventory System (SARIS) code numbers (Halliwell *et al.* 1982). These streams and rivers are approximately 34.6 miles in length. A total of 68 lakes, ponds and impoundments (the term "lakes" will hereafter be used to include all) have been identified and assigned Pond and Lake Information System (PALIS) code numbers in the French River Basin (Ackerman 1989 and MA DEP 2001a). The total surface area of the French River Basin lakes is 3,556 acres.



# French River Watershed River and Lake Segments

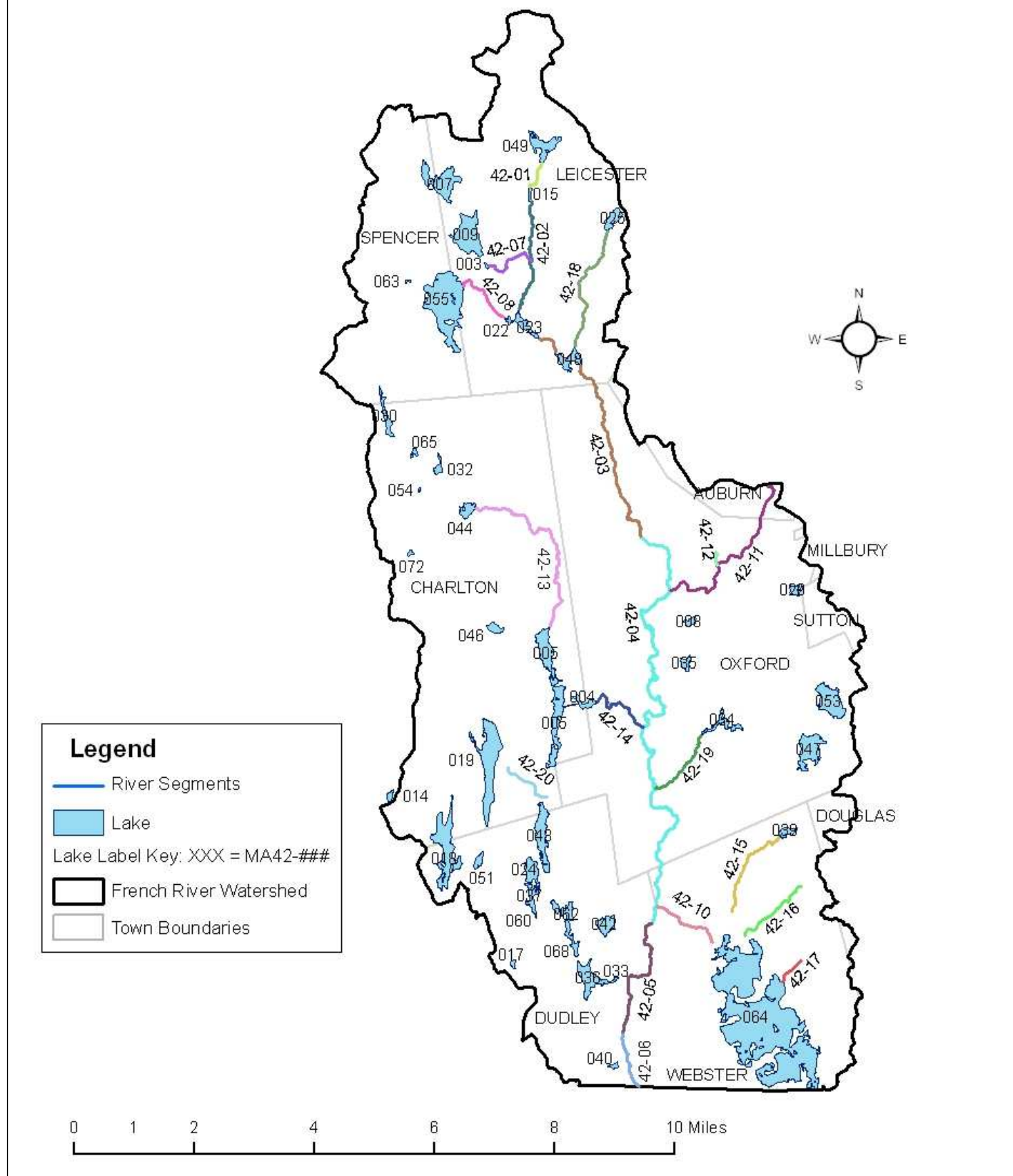


Figure 7: French River Watershed River and Lake Segments

## QUINEBAUG RIVER WATERSHED DESCRIPTION

The Quinebaug River Watershed (Figure 6, Figure 8) is located in the south-central portion of Massachusetts, and extends across the Massachusetts border into Connecticut. The Quinebaug River joins with the Shetucket River in Connecticut to form the Thames River. The basin is bordered by the Chicopee River Basin to the north and west and by the French River Basin to the east. A small portion of the Quinebaug River Watershed (draining to the Five Mile River, a tributary to the Quinebaug River in Connecticut) lies to the east of the French River Basin. The state of Connecticut borders the Quinebaug River Basin to the south. Fourteen communities, including Brimfield, Brookfield, Charlton, Douglas, Dudley, East Brookfield, Holland, Monson, Spencer, Southbridge, Sturbridge, Wales, Warren, and Webster, lie wholly or partially within the area drained by the Quinebaug River.

The beginning of the Quinebaug River varies between Goodall's Pond (aka Little Massapoag Pond which is fed by Leadmine Brook) and the northern outlet of Mashapaug Lake in Union, Connecticut (Thomas 2001). Under normal hydrologic conditions, Mashapaug Lake drains to the south into Bigelow Brook (part of the Shetucket River watershed). But, when water is released through the lake's northwest outlet structure it drains north into Goodall's Pond (into the Quinebaug River watershed). From Goodall's Pond, the Quinebaug River flows northwest into Hamilton Reservoir, which straddles the Connecticut-Massachusetts state line. Once in Massachusetts the river flows generally north through Holland then turns northeast through Brimfield. Here the river turns east and flows into the East Brimfield Reservoir. A large portion of the river is within the flood storage area of the East Brimfield Army Corps of Engineers Flood Control Project. From the outlet of the East Brimfield Reservoir the Quinebaug River flows generally east/southeast through Sturbridge and then in a southerly direction entering a second Army Corps flood control project, Westville, in Southbridge. The river is joined by Cady Brook in Southbridge and continues to flow southeast through Dudley recrossing the state line into Thompson, Connecticut. The Quinebaug River is joined by the French River in Thompson and continues south to Norwich where it is joined by the Shetucket River. This confluence forms the Thames River, which continues south to enter Long Island Sound in New London, Connecticut.

The Quinebaug River and major tributaries (including the French) historically contained many dams originally created for waterpower. All of the dams on the mainstem and many on the tributaries were decimated by floodwaters created by Hurricane Diane in August 1955 (Beaudoin 2002). In the early 1960s flood control projects were built by the Army Corps to avoid a repeat of the loss of life and property associated with similar events. The flood control projects are authorized to operate in a run-of-river manner under most hydrologic conditions. There are also two hydropower projects on the Quinebaug River: the Old Sturbridge Village Project Number 6077, owned by Old Sturbridge Village; and the West Dudley Project Number 7254, owned by the A&D Hydroelectric Company.

The Quinebaug River is 76 miles long. The 28-mile portion lying within Massachusetts drains an area of 148 square miles. Major tributaries (in a downstream direction) include: Leadmine, Hamant, Hobbs and Breakneck Brooks in Sturbridge; Hatchet, McKinsty, Cady, Cohasse, Lebanon Brook, and the unnamed brooks draining McIntyre and Sylvestri Ponds in Southbridge; and a number of unnamed streams in Dudley. Municipal wastewater treatment plants in Sturbridge and Southbridge contribute to the Quinebaug River flows, along with industrial discharges. Additionally, treated municipal effluent is discharged to Cady Brook in Charlton. The river is also influenced by two flood control projects, two hydropower operations, numerous impoundments, water withdrawals (municipal and industrial), as well as non-point source runoff.

There are 29 named streams in the Quinebaug River Basin that have been assigned SARIS code numbers (Halliwell *et al.* 1982). These streams and rivers flow an estimated 82.7 miles. A total of 51 lakes have been identified and assigned PALIS code numbers in the Quinebaug River Basin (Ackerman 1989 and MA DEP 2001a). The total surface area of the Quinebaug River Basin lakes is 2,358 acres.

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



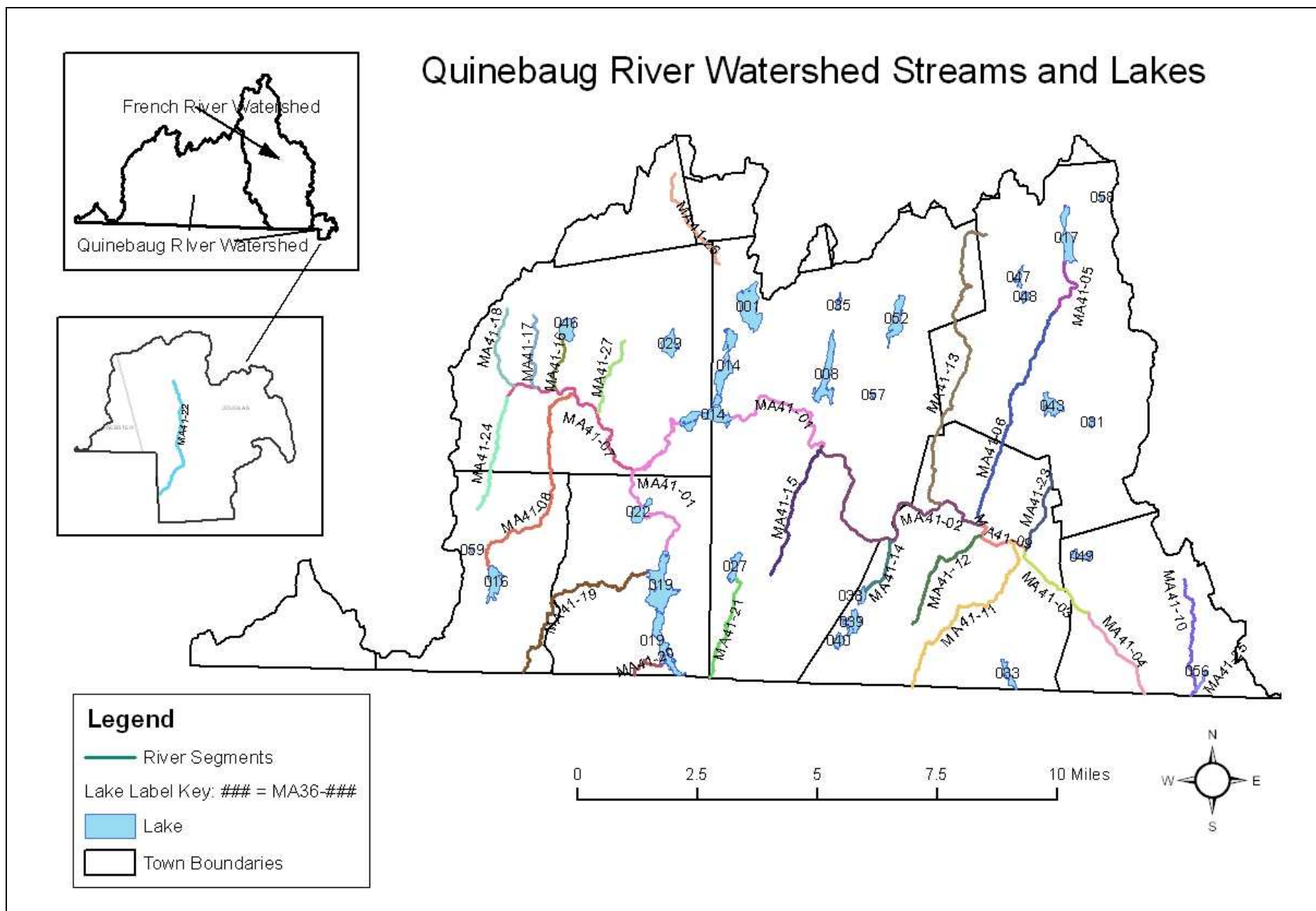


Figure 8: Quinebaug River Watershed Stream and Lake Segments

Page Intentionally Left Blank

## FRENCH RIVER WATERSHED - RIVER SEGMENT ASSESSMENTS

There are a total of 14 rivers representing 38.5 river miles in the French River Watershed assessed in this report (Figure 9). The remaining rivers are small and/or unnamed and are currently unassessed. Using the 1:24,000 National Hydrography Dataset there are approximately 97 river miles in the French River watershed (Meek 2008).

It should be noted here that water quality and biological monitoring was conducted by DWM in Browns Brook, an intermittent tributary to Webster Lake, in 2004. These data are available in the technical memoranda appended to this report (Fiorentino 2007, Maietta 2007, O'Brien-Clayton undated, and Beskenis 2009a). DWM's assessment guidance is used to evaluate status of perennial streams only and therefore it was not utilized to evaluate the condition of Browns Brook. During reconnaissance surveys in spring of 2004 (Maietta 2007, Fiorentino 2007) a number of areas of runoff from LKQ Auto Parts were observed entering the Browns Brook and a feeder tributary. Runoff included milky white discharges, reddish seeps, and rusty deposits (Maietta 2007). MassDEP fined LKQ in 2004 for violations of the Massachusetts Wetland Protection Act and subsequently a sediment control facility was installed (Dignam 2006). LKQ Auto Parts is currently in Phase V of the five phase Massachusetts Contingency Plan with a Class C Remedial Action Outcome (MassDEP 2007b). This means that the site has been temporarily cleaned, but must be reevaluated every five years as contaminants still remain on site.

One French River watershed stream segment has no updated information (TMDL completion, etc) or new information to make an assessment of designated uses. Information on this waterbody that is not assessed for all uses is summarized below.

River Name	Segment	Length (miles)	Description	2008 Integrated List Category
Unnamed Tributary	MA42-12	0.2	Unnamed tributary to Wellington Brook, perennial portion from Depot Road, Oxford to confluence with Wellington Brook, Oxford	3

# French River Watershed River Segments

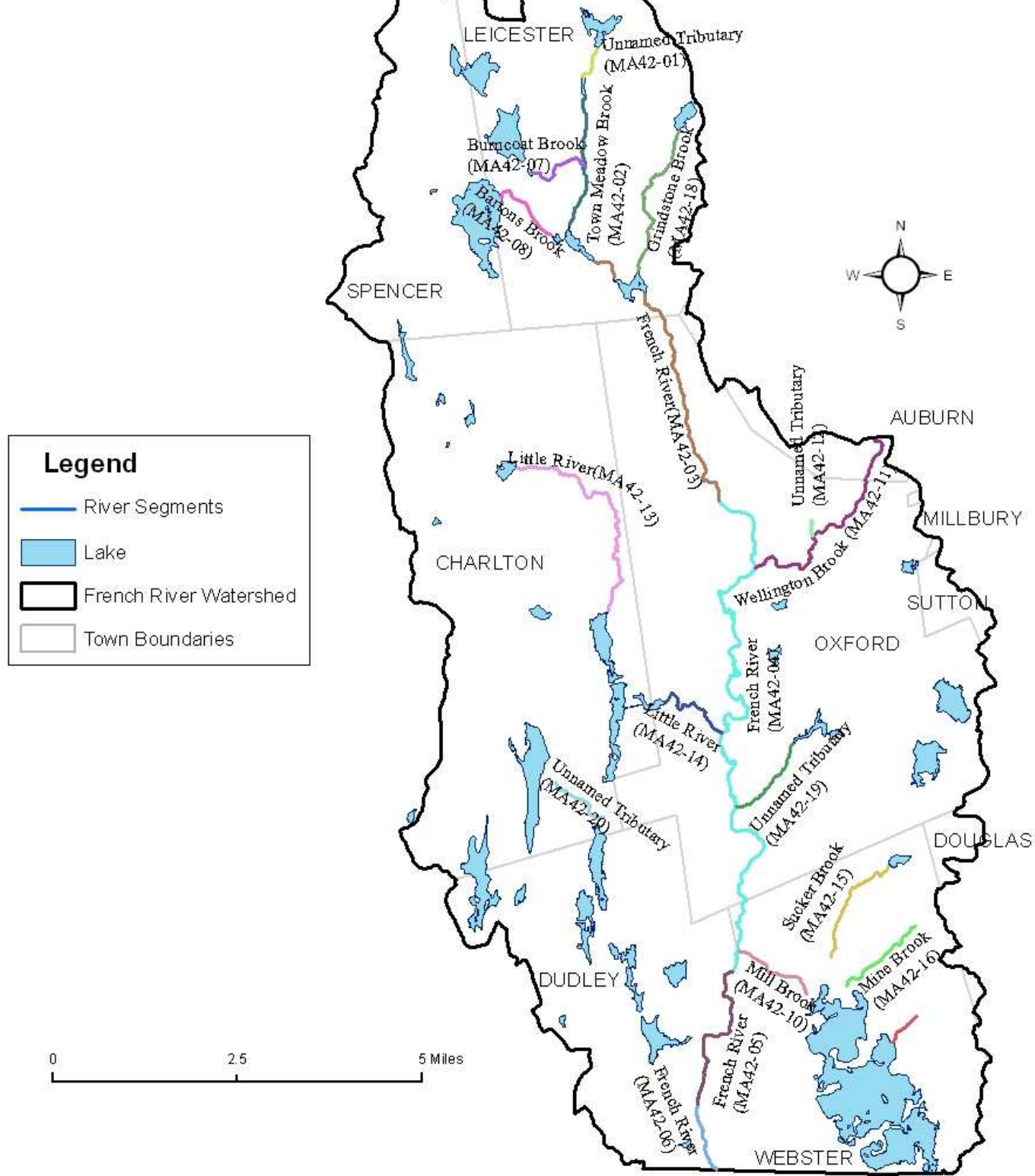


Figure 9: French River Watershed River Segments

**Unnamed Tributary (Segment MA42-01)**

Location: Unnamed tributary to Town Meadow Brook, outlet Sargent Pond, Leicester to inlet Dutton Pond, Leicester.

Segment Length: 0.5 miles

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 2 - Attaining Some Uses (Aquatic Life, Aesthetics); Others Not Assessed.

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Leicester (MAR041202)

**USE ASSESSMENT****AQUATIC LIFE**Toxicity*Ambient*

The Leicester Wastewater Treatment Facility staff collected water from the river approximately 1000' upstream from Dutton Pond for use as dilution water in the facility's whole effluent toxicity tests. Between November 2001 and November 2007, survival of *C. dubia* exposed (48 hours) to the river water ranged from 95 to 100% (n=25) and 100% (n=13) during the chronic test exposures (7-day). Hardness of the river water ranged from 14 mg/L to 40 mg/L (n=25).






*Effluent*

Effluent toxicity is detailed in the use assessment for Dutton Pond (MA42015) located in the French River Subbasin – Lake Assessment section of this report.

The *Aquatic Life Use* is assessed as support based on the consistently high survival of test organisms exposed to the river water.

All other designated uses are not assessed.

Town Meadow Brook (MA42-01) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

### Town Meadow Brook (Segment MA42-02)

Location: Headwaters, outlet Dutton Pond, Leicester to inlet Greenville Pond, Leicester.

Segment Length: 1.9 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 2 - Attaining Some Uses (Aquatic Life, Aesthetics); Others Not Assessed.

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Leicester (MAR041202)

### USE ASSESSMENT

#### AQUATIC LIFE

##### Biology






MA DFG conducted fish population sampling in Town Meadow Brook at the Green St. crossing (Site 1388) in Leicester on 23 August 2005 using backpack electroshocking equipment. A total of twenty-nine fish were collected. Nine fallfish, six white sucker, five blacknosed dace, two bluegill, two brown bullhead, two largemouth bass, two tadpole madtom and one American eel were found (Richards 2006). All fish collected are classified as tolerant or moderately tolerant to pollution (Richards 2006).

MA DFG also conducted fish population sampling in Town Meadow Brook at the Green St. crossing (Site 1023) in Leicester on 2 August 2004. A total of two hundred and forty-one fish were collected. The sample was dominated by white sucker (n=108) and fallfish (n=90) (Richards 2006). The sample was also composed of eighteen blacknose dace, nine tadpole madtom, seven pumpkinseed, three brown bullhead, three chain pickerel, two largemouth bass, and one American eel (Richards 2006). This sample was dominated by fluvial specialist/dependent species, although all species collected are classified as tolerant or moderately tolerant to pollution (Richards 2006).

A relatively low number of fish were collected at the Green St. crossing site in 2005 by MA DFG when compared to the numbers collected at the site in 2004. Both samples were dominated by fluvial dependant/specialist species although all species are classified as tolerant or moderately tolerant.

The fish population information alone does not lend itself to an assessment of the *Aquatic Life Use*. Insufficient recent quality-assured data are available for Town Meadow Brook. All designated uses are not assessed.

Town Meadow Brook (MA42-02) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

### RECOMMENDATIONS

Conduct monitoring to evaluate the status of the designated uses as well as to document any changes associated with the relocation of the Leicester WSD outfall to this segment.

### **Burncoat Brook (Segment MA42-07)**

Location: Headwaters, outlet Bouchard Pond, Leicester to confluence with Town Meadow Brook, Leicester (through former pond segment Ballard Hill Pond MA42069).

Segment Length: 1 mile.

Classification: Class B.

Ballard Hill Pond (MA42069) will no longer be reported on as it has been determined to be a run of river impoundment.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Leicester (MAR041202)

### **USE ASSESSMENT SUMMARY:**

#### ***AQUATIC LIFE***

##### Habitat and Flow

DWM performed habitat assessments in Burncoat Brook approximately 350m from the mouth of Burncoat Brook (Station BU01) in 2004 as part of macroinvertebrate and fish population surveys. The DWM fish biologists gave the site a final habitat score of 153/200 (Maietta 2007). The station is located in an active cow pasture where both cows and horses have access to the brook. This station was noted to have poor bank stability and compromised riparian zone (Maietta 2007).

DWM biologists gave Station BU01 a total habitat score of 149/200 during the macroinvertebrate survey (Fiorentino 2007). DWM biologists noted instream sediment deposition affected approximately 20% of the reach and also noticed poor bank stability and a denuded and diminished riparian and bank vegetation (Fiorentino 2007).

##### Biology

DWM conducted fish population sampling approximately 350m from the mouth of Burncoat Brook (Station BU1) on 22 September 2004. DWM fishery biologists collected five fish species including one hundred and forty fallfish, fourteen white sucker, three brown bullhead, two blacknose dace and one chain pickerel (Maietta 2007). Maietta (2007) noted that the fish composition, dominated by fluvial dependant/specialists, is indicative of a stable flow regime and that all fish collected are classified as tolerant or moderately tolerant to pollution.

DWM conducted RBP III benthic macroinvertebrate sampling approximately 350m from the mouth of Burncoat Brook (Station BU1) on 3 September 2004. When compared to the regional reference station at Browns Brook, the macroinvertebrate community in Burncoat Brook was moderately impacted (Fiorentino 2007). Filter feeders were found to dominate the benthic assemblage, which also had a low EPT score and low taxa richness. DWM biologists identified both habitat and water quality degradation from nearby pasture operations and water quality degradation due to an upstream pond as potential stressors (Fiorentino 2007). DWM biologists also estimated canopy cover (50% open) at this site (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring upstream of an unnamed dirt road south off of Pine Street, approximately 600 feet downstream of Ballard Hill Pond outlet (Station BU2) between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between midnight and 1am, n=3) and other water quality monitoring data were indicative of good water quality conditions.

Despite water quality data (temperature, dissolved oxygen and pH), which met state standards and the high fish density, Burncoat Brook is assessed as impaired for the *Aquatic Life Use* based on RBP III analysis of the benthic macroinvertebrate community as moderately impaired. Habitat and water quality degradation due to the active pasture and upstream ponds are the likely cause of a degraded benthic

macroinvertebrate community characterized by the heavy dominance of filter feeders, low EPT score and low taxa richness.






**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria from Burncoat Brook (Station BU01) in Leicester on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 214 cfu/100 mL.

DWM personnel made field observations at Station BU01 during sampling in 2004. No objectionable deposits or conditions were noted with the exception of a water odor on one occasion and limited erosion (Appendix B).

Given the high geometric mean of *E. coli* counts, the *Primary Contact Recreation Use* is assessed as impaired. The geometric mean of *E. coli* counts meets the *Secondary Contact Recreation Use* criteria and so this use is assessed as support. Given the lack of instream objectionable deposits and general lack of water color, foam and smell (i.e., objectionable conditions), the *Aesthetics Use* is assessed as support.

Burncoat Brook (MA42-07) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Aquatic Macroinvertebrate Bioassessments Source: Unknown Suspected Source: agriculture, unrestricted cattle access , other upstream impoundment
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: <i>E. coli</i> Source: Unknown Suspected Source: Managed pasture grazing, manure runoff , unrestricted cattle access
Secondary Contact		SUPPORT
Aesthetics		SUPPORT



### **Grindstone Brook (MA42-18)**

Location: Headwaters outlet Henshaw Pond, Leicester to inlet Rochdale Pond, Leicester.

Segment Length: 2.3 miles.

Classification: Class B.

This is a new segment and therefore it was not on the 2008 Integrated List.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Leicester (MAR041202)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM performed habitat assessments in Grindstone Brook approximately 170m downstream from Route 56 in Leicester (Station GR01) in 2004 as a part of macroinvertebrate and fish population surveys. DWM fisheries biologists gave the site a final habitat score of 174/200 (Maietta 2007). With the exception of sediment deposition, DWM fisheries biologists scored all habitat parameters in the either the “optimal” or “suboptimal” category (Maietta 2007).

Station GR01 received a total habitat assessment score of 162/200 during RBP III macroinvertebrate sampling. DWM biologists noted habitat was negatively impacted by both low baseflow and the impact of sediment deposition (Fiorentino 2007).

##### Biology.

MA DFG conducted fish population sampling in Grindstone Brook at the Clark St. crossing (Site 1047) in Leicester on 02 August 2004 using backpack electroshocking equipment. MA DFG biologists collected only three chain pickerel (Richards 2006). MA DFG biologists noted poor visibility due to highly tannic and dark colored water (Richards 2006).

DWM conducted fish population sampling downstream from Route 56 in Leicester (Station GR01) on 22 September 2004. Six species were collected including twenty-two pumpkinseed, sixteen brown bullhead, three bluegill, one American eel, one yellow bullhead and one chain pickerel. Maietta (2007) notes that *“given the optimal fish habitat present, the overall low numbers of fish and the relative absence of fluvial fishes (exception was a single American eel) is troubling”*. The fish population’s composition (generally macrohabitat generalists) indicates a compromised flow regime that may reflect the sampling site’s proximity to lentic habitats (Maietta 2007).

DWM conducted RBP III benthic macroinvertebrate sampling approximately approximately 170m downstream from Route 56 in Leicester (Station GR01) on 27 August 2004. The benthic community when compared to the regional reference station was slightly impacted (Fiorentino 2007). DWM biologists note that non-EPT taxa sensitive to pollution were well represented in the GR01 benthic community and that although overall EPT numbers were low compared to the reference station, those present were generally intolerant to organic pollution (Fiorentino 2007). DWM biologists indicated both habitat degradation (substrate embeddness) and suspect water quality as possible stressors. DWM biologists also estimated canopy cover (10% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Grindstone Brook downstream from Route 56 in Leicester between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 1 and 2am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions.

The *Aquatic Life Use* is assessed as support based on RBP III analysis and good dissolved oxygen measurements. It should be noted that despite a pollution intolerant benthic macroinvertebrate






community, DWM and DFG fishery biologists found an overall low abundance of fish and general lack of fluvial fish during their sampling so this use is identified with an “Alert Status”.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Grindstone Brook (Station GR01) in Leicester on five occasions between May and September 2004. The geometric mean of *E. coli* counts is 563 cfu/100 mL. DWM personnel also made field observations during sampling in 2004 and did not note objectionable deposits or conditions.

Given the high geometric mean of *E. coli* counts, the *Primary Contact Recreation Use* is assessed as impaired. The geometric mean of *E. coli* counts meets the *Secondary Contact Recreation Use* criteria and so this use is assessed as support. Given the lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is assessed as support.

Grindstone Brook (MA42-18) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: <i>E. coli</i> Source: Unknown
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

\*Alert Status issues identified, see details in use assessment

**Bartons Brook (MA42-08)**

Location: Headwaters, outlet Stiles Reservoir, Leicester to inlet Greenville Pond West, Leicester.

Segment Length: 1.1 miles.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Leicester (MAR041202)






**USE ASSESSMENT****AQUATIC LIFE**Habitat and Flow

MA DFG attempted to conduct fish population sampling in Bartons Brook at the Parker Road crossing (Site 1301) in Leicester on 23 August 2005 using backpack electroshocking equipment (Richards 2006).

Notes indicate that they checked two sites but did not survey due to water conditions: #1 outlet of Stiles Reservoir - leads into swamp area and #2 - Baldwin Rd. - ponded on both sides at crossing so not surveyed.

Too limited recent data are available so all uses are not assessed.

Bartons Brook (MA42-08) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

### **French River (Segment MA42-03)**

Location: Headwaters, outlet Greenville Pond, Leicester to the outlet of Thayer Pond, Oxford (excluding approximately 0.6 miles through Rochdale Pond segment MA42048) (through former pond segments Texas Pond MA42058 and Thayers Pond MA42059).

Segment Length: 3.8 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Metals).

Texas Pond (MA42058) will no longer be reported since the retention time of this waterbody was estimated at 3 days and therefore will be considered a run of river impoundment. Texas Pond (MA42058) is on the Massachusetts Year 2008 Integrated List of Waters – Category 5, “Waters requiring a TMDL”. Pollutants needing TMDLs: Metals, Noxious aquatic plants [7/12/2002-CN110.0] (MassDEP 2002c). The TMDL of Phosphorous for Texas Pond is to be reduced from the current estimated loading of 1401 kg/year to a target load of 1050 kg/year and the selected target total phosphorus concentration is 0.025 mg/L (MassDEP 2002c).

Thayers Pond (MA42059) will no longer be reported due to its short retention time and it is considered a run of river impoundment. Thayers Pond (MA42059) is on the Massachusetts Year 2008 Integrated List of Waters – Category 5, “Waters requiring a TMDL”. Pollutants needing TMDLs: Metals, Nutrients, Turbidity.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLES F2 AND F3):**

Oxford-Rochdale Sewer District (MA0100170)

Town of Leicester (MAR041202), Town of Oxford (MAR041147)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

Both fish and benthic macroinvertebrate habitat were considered excellent in the French River downstream from the Thayers Pond Dam (Fiorentino 2007). The station (FR04-1) received a habitat assessment score of 176/200.

##### Biology

MA DFG conducted fish population sampling in the French River downstream of the Route 56 crossing in West Oxford (Site 1034) on 22 July 2004 using backpack electroshocking equipment. A total of 174 fish were collected. Seventy-five fallfish, forty-one largemouth bass, twenty-five blacknose dace, twenty white sucker, seven tadpole madtom, and six bluegill were collected (Richards 2006). The majority of fish collected are categorized as fluvial specialist/dependent species and all are moderately tolerant or tolerant of pollution. The presence of largemouth bass, a macrohabitat generalist species, is likely the result of the impoundments located within this segment.

MA DFG conducted fish population sampling in the French River north of a Route 56 crossing (approximately 0.1 miles east of Enis Road) in Oxford (Site 1152) on 13 September 2005 using backpack electroshocking equipment. A total of 328 fish were collected; fallfish made up the majority of the fish population (n=160) (Richards 2006). The sample was also composed of sixty common shiner, thirty-six white sucker, seventeen blacknose dace, seventeen largemouth bass, twelve yellow bullhead, five bluegill, three pumpkinseed, one brown bullhead, and one American eel (Richards 2006). MA DFG fish biologists noted that the water level was very low (Richards 2006). The majority of fish collected are categorized as fluvial specialist/dependent species and all are moderately tolerant or tolerant of pollution.

DWM conducted RBP III benthic macroinvertebrate sampling in the French River slightly downstream of this segment at one station (Station FR04-1) on 30 August 2004. The benthic community when compared to Brown Brook (BR01), the regional reference station, was slightly impacted (Fiorentino 2007). The macroinvertebrate community when compared to the minimally impacted biological community sampled at LB01 (Lebanon Brook) (deemed more appropriate for comparison by the French River by DWM biologists) was also slightly impacted (Fiorentino 2007). The benthic assemblage appeared to be

structured in response to an overabundance of a food resource (60% of the sample comprised of two filter feeding taxa). For a complete description of the benthic assemblage see the French River (MA42-04) segment.

#### Toxicity

##### Ambient

The Oxford Rochdale Sewer District staff collected water from the French River upstream of their discharge at Commins Road Bridge in Oxford for use as a dilution water control in the facility's whole effluent toxicity tests. Between November 2005 and May 2008, survival of *C. dubia* exposed (7-days) to the French River water was  $\geq 90\%$  (n=12). Hardness ranged from 17 mg/L to 28 mg/L (n=11).

##### Effluent

Between March 2001 and May 2008 modified acute and chronic whole effluent toxicity tests were conducted on Oxford-Rochdale Sewer District's treated effluent using *C. dubia* (n=29). Tests were also conducted using *Pimephales promelas* between March 2001 and June 2005 (n=18). No acute whole effluent toxicity was detected by either test organism (LC<sub>50</sub>'s were all >100% effluent). Some chronic whole effluent toxicity has been detected in the effluent with CNOECs ranging from <6.25 to 50% effluent (n=9 of the 28 valid *C. dubia* tests and 2 of the 18 *P. promelas* tests). Three of the *C. dubia* tests results did not meet the CNOEC limit of 17% effluent. It should be noted that these three tests were all conducted during the August/September sampling period (2002, 2003, and 2006).

#### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in the French River slightly downstream of this segment at one station (Station FR04-1) in Oxford between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 1:45 and 2:30am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions.

The *Aquatic Life Use* is assessed as support based on the fisheries data (both samples were well represented by fluvial specialist/dependant species), the good survival of test organisms exposed to the French River water, the RBP III analysis of the benthic macroinvertebrate community, and the limited water chemistry data which suggested good water quality conditions. This use is identified with an "Alert Status" however, due to some indications of organic enrichment particularly by the benthic community structure. The presence of dams and impoundments also likely influences the fish community by supporting macrohabitat generalist fish species (i.e, largemouth bass) which then access the free flowing reaches in this segment.

#### **FISH CONSUMPTION**

In 1998 fish were collected from Texas Pond, French River Watershed, and edible fillets were analyzed for select metals, PCBs, and organochlorine pesticides (Appendix B in MassDEP 2002b). Due to the presence of mercury in largemouth bass, MA DPH issued the following advisory (MA DPH 2008) recommending:

*"Children under 12 years of age, pregnant women, nursing mothers, and women of childbearing age who may become pregnant should refrain from consuming Largemouth Bass from Texas Pond"*  
and

*"The general public should limit consumption of Largemouth Bass to two meals per month".*

Because of the site-specific fish consumption advisory for Texas Pond due to mercury contamination, the *Fish Consumption Use* is assessed as impaired for the 0.4 mile stretch of the French River as it passes through Texas Pond.

It should be noted here that the MA DPH advisory list also identifies Thayers Pond with Texas Pond. This association however is in error and since Thayers Pond has not been sampled no advisory other than the statewide advisory should be identified for Thayers Pond.






### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

FRC sampling crews did not note any objectionable conditions at their Clara Barton Road sampling site (just downstream from the outlet of Thayer Pond) (FRC 2008a and FRC 2008b).

DWM collected fecal coliform and *E. coli* bacteria samples in the French River slightly downstream from this segment just southeast of the Clara Barton Road/Route 56 junction (Station FR04-1) in Oxford on five occasions between May and September 2004. The geometric mean of *E. coli* counts is 103 cfu/100 mL (Appendix B). DWM personnel also made field observations during sampling in 2004 and did not note objectionable deposits or conditions (Appendix B).

The *Primary Contact Recreation Use*, *Secondary Contact Recreation Use* and *Aesthetics Uses* are not assessed for this segment of the French River upstream from Texas Pond (upper 2.2 mile reach) due to a lack of current data. These uses are assessed as support for the downstream from Texas Pond (lower 1.6 mile reach) based on the DWM bacteria data and the lack of objectionable conditions.

French River (MA42-03) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		IMPAIRED (0.4 miles) through Texas Pond Cause: Mercury in fish tissue Source: Unknown Suspected Source: Atmospheric deposition NOT ASSESSED (3.4 miles)
Primary Contact		NOT ASSESSED upper 2.2 mile reach SUPPORT lower 1.6 mile reach
Secondary Contact		
Aesthetics		

\*Alert Status Issues identified- see details in use assessment section

### **RECOMMENDATIONS**

Conduct benthic macroinvertebrate and water quality sampling in this segment upstream and downstream of the Oxford Rochdale Sewer District discharge to assess the *Aquatic Life Use* and determine the effects if any of the point discharge.

The Oxford-Rochdale Sewer District should be using the French River water as the diluent in their whole effluent toxicity tests rather than as a site control.

Conduct water quality sampling for dissolved metals.

**French River (Segment MA42-04)**

Location: From dam just upstream of Clara Barton Road, Oxford, to dam at North Village, Webster/Dudley.

Segment Length: 9.6 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Metals).

The US ACOE New England District maintains a dry-bed reservoir, the Hodges Village Project, in the town of Oxford within this segment of the French River. This Class I project is operated as a run-of-river project except during flooding events. No permanent pool is maintained behind the dam (US ACOE undated). The Hodges Village Dam, which was placed in operation in 1959, is part of a system of six flood control dams in the Thames River Watershed. It provides flood storage along the French and Thames rivers. The Hodges Village Dam is 2,140' long and 55' high. The drainage area above the dam is 31.1 square miles. It can impound a 13,200-acre foot reservoir, which will cover an area of 740 acres and encompass approximately 3.2 miles of the French River. The reservoir offers recreational opportunities including picnicking, fishing, hunting, hiking, mountain biking, canoeing/kayaking and horseback riding.

It should also be noted that this segment of the French River is used extensively for canoeing (Cohen 2001).

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Oxford (MAR041147), Town of Webster (MAR041170)

**USE ASSESSMENT****AQUATIC LIFE**Habitat and Flow

The US ACOE maintains a flood control project, Hodges Village Dam, on this segment of the French River. The project is operated as run-of-river with minimal/no flow manipulation, except during flood events (US ACOE undated). Since it began operation in October of 1959 the highest recorded pool was at 59% capacity (April, 1987).

Stream gaging data for the French River are available, but no longer published, from the USGS gage 01124350 located 240' downstream from the Hodges Village Dam. Average annual discharge ranged from 21.0 cfs to 86.2 cfs during the period of data publication from 1963 to 1990 (USGS 2007a). The drainage area at this gage is 31.2 mi<sup>2</sup> and Hodges Village Reservoir regulates flow at the gage (USGS 2007a).

Both fish and benthic macroinvertebrate habitat were considered excellent in the French River downstream from the Thayers Pond Dam (Fiorentino 2007). The station (FR04-1) received a habitat assessment score of 176/200. DWM biologists noted that the sampling reach was high gradient and had high canopy cover due to forested areas (Fiorentino 2007). Nearby roads and a sand and gravel operation were identified as possible contributors of non-point source pollution in the French River near Station FR04-1 (Appendix B).

Biology

MA DFG conducted fish population sampling in the French River upstream of the Clara Barton Road crossing (Station 1287) in Oxford on 13 September 2005 using backpack electroshocking equipment. A total of 424 fish representing 10 species were collected. Two hundred and sixty-one fallfish, one hundred and sixteen common shiner, twenty-one white sucker, seven pumpkinseed, four largemouth bass, three American eel, two smallmouth bass, two brown bullhead and two blacknose dace were collected (Richards 2006). Given the short reach sampled (50m), fish density was high at this site and fluvial specialist/dependant species dominated the sample.

DWM conducted RBP III benthic macroinvertebrate sampling in the French River approximately 300m downstream from Clara Barton Road (Station FR04-1) on 30 August 2004. The benthic community

when compared to Brown Brook (BR01), the regional reference station, was slightly impacted (Fiorentino 2007). The macroinvertebrate community when compared to the minimally impacted biological community sampled at LB01 (Lebanon Brook) (deemed more appropriate for comparison by the French River by DWM biologists) was also slightly impacted (Fiorentino 2007). The benthic assemblage though appeared to be structured in response to an overabundance of a food resource (60% of the sample comprised of two filter feeding taxa - *Chimarra sp.* and *Hydropsyche sp.*) (Fiorentino 2007).

MA DFG conducted fish population sampling in the French River upstream from where the railroad crosses Route 12 in Oxford (Station 1021) on 29 July 2004 using a rod and reel survey. A total of 61 fish were collected including forty-two bluegill, ten largemouth bass, four yellow perch, two pumpkinseed, two black crappie and one chain pickerel (Richards 2006). On 29 July 2004 MA DFG also deployed 2 gill nets (Station 1022) upstream and downstream of the rod and reel survey at this site and collected twelve fish including four white sucker, two yellow perch, two golden shiner, two largemouth bass, one chain pickerel, and one bluegill (Richards 2006). All the fish collected by MA DFG in this French River segment (Station 1287 and 1021) are classified as moderately tolerant or tolerant of pollution. Only one species collected in this area (white sucker) is a fluvial dependant species.

### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in the French River southeast of the Clara Barton Road/Route 56 junction (Station FR04-1) in Oxford between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 1:45 and 2:30am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions.

The French River Connection (FRC) conducted water quality monitoring at three locations along this segment of the French River: the Clara Barton Road crossing in Oxford, the Dudley Road crossing in Oxford, and the Harwood Road crossing in Oxford between May 19<sup>th</sup> and November 17<sup>th</sup>, 2007 and between March 22<sup>nd</sup> and November 15<sup>th</sup> 2008 (n=16). Parameters measured include dissolved oxygen, temperature, pH, conductivity and turbidity. All mid-day measurements of dissolved oxygen, temperature, pH (slightly <6.5 SU on several occasions but considered natural), conductivity and turbidity were indicative of good water quality conditions (FRC 2008a and 2008b). The FRC notes for their Dudley Road sampling location state that water chestnuts were observed in July (FRC 2008a). This is the only mention of a potential non-native aquatic macrophyte infestation. Further confirmation is needed prior to an impairment determination.

The *Aquatic Life Use* is assessed as support for the upper 3.9 mile reach of this segment of the French River based primarily on the biological monitoring data collected by DWM (indicative of a fairly good benthic and fish community) and limited water quality data indicative of good conditions upstream from the Hodge Village Dam flood control project. Given the protected watershed area by the flood control project, these data are considered to be representative of conditions down to the Hodges Village Dam. It should be noted that this use is identified with an "Alert Status" however because the benthic community did appear to be structured in response to some organic enrichment. The *Aquatic Life Use* is not assessed for the lower 5.7 mile reach of this segment (too limited data). The possible presence of a water chestnut infestation should be investigated.

### **FISH CONSUMPTION**

In 2006 fish were collected by DWM biologists from the pool area of the French River just downstream from Hodges Village Dam and edible fillets were analyzed for select metals, PCBs, and organochlorine pesticides (Maietta 2007b).

Based on DWM's fish toxics monitoring, the MA DPH issued a fish consumption advisory for the French River between the Hodges Village Dam in Oxford and the North Village Dam in Webster due to mercury contamination (MA DPH 2008):

1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat largemouth bass from this waterbody."



2. "The general public should limit consumption of affected fish (largemouth bass) to two meals per month."






Because of the site-specific MA DPH fish consumption advisory for the French River between the Hodges Village and North Village dams, the *Fish Consumption Use* is assessed as impaired due to mercury contamination for the lower 5.7-mile reach of this segment. It should be also noted that the statewide fish consumption advisory is also in effect.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in the French River southeast of the Clara Barton Road/Route 56 junction (Station FR04-1) in Oxford on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 103 cfu/100 mL (Appendix B). DWM personnel also made field observations during sampling in 2004 and did not note objectionable deposits or conditions (Appendix B). FRC sampling crews did not note any objectionable conditions at their Clara Barton Road sampling site with the exception of one occasion where an oil film was found on the water and the water had an oily smell (FRC 2008a and 2008b). FRC sampling crews did not note any objectionable conditions at their Dudley Road or Harwood Road sampling sites (FRC 2008).

The *Primary* and *Secondary Contact Recreational* uses are assessed as support for the upper 3.9 mile reach of this segment of the French River (to the Hodges Village Dam) based primarily on the DWM bacteria data and BPJ. Given the protected watershed area by the flood control project, these data are considered to be representative of conditions down to the Hodges Village Dam. The Recreational Uses in the lower 5.7 mile reach of this segment of the French River are not assessed due to the lack of bacteria data. The *Aesthetics Use* is assessed as support based on the lack of objectionable conditions noted by the FRC sampling crews.

French River (MA42-04) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT* Upper 3.9 miles NOT ASSESSED Lower 5.7 miles
Fish Consumption		NOT ASSESSED Upper 3.9 miles IMPAIRED: Lower 5.7 miles Cause: Mercury in fish tissue Source: Unkown Suspected Source: Atmospheric deposition – toxics
Primary Contact		SUPPORT Upper 3.9 miles NOT ASSESSED Lower 5.7 miles
Secondary Contact		SUPPORT Upper 3.9 miles NOT ASSESSED Lower 5.7 miles
Aesthetics		SUPPORT

\*Alert Status Issues identified- see details in use assessment section

## RECOMMENDATIONS

Conduct benthic macroinvertebrate and water quality (physicochemical) sampling in at least two locations in this segment to better evaluate the *Aquatic Life Use* of this segment of the French River. Given that two measurements of DO during daytime sampling by FRC at Dudley Road in Oxford in 2007 were below 6 mg/L, it is recommended that an unattended multiprobe should be deployed at this location to determine the oxygen dynamics in this reach of the river. A multiprobe should also be deployed in the impoundment behind the dam at North Village.

Conduct aquatic macrophyte surveys in this segment of the French River to determine whether or not there are any non-native plant infestations.

Conduct additional monitoring in order to evaluate whether or not there are any point source(s) contributing mercury to this segment of the French River. If no point source discharge problems are identified, it may be appropriate to list this waterbody in the Northeast Regional Mercury TMDL.

Conduct water quality sampling for dissolved metals.

**Wellington Brook (Segment MA42-11)**

Location: Headwaters south of Cedar Street, Auburn to confluence with French River, Oxford.

Segment Length: 3.4 miles.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):**

Town of Auburn (MAR041088), Town of Oxford (MAR041147)

**USE ASSESSMENT SUMMARY:*****AQUATIC LIFE***Habitat and Flow

DWM conducted water quality monitoring in Wellington Brook approximately 600 feet downstream of Chimney Pond outlet, Oxford (Station WE01) in 2004. DWM field crews made observations during the 2004 sampling season. DWM field personnel noticed that water levels on 16 June 2007 were very low with an estimated flow of less than 1 cfs and greater than 75 percent of substrates were exposed (Appendix B). Upstream of the sampling site the concrete apron outlet of Chimney Pond was observed to have only one inch of water trickling down into Wellington Brook (Appendix B). On 13 July DWM field crews noted that water in the brook was barely flowing and the brook was mainly deep isolated pools of water (Appendix B). On 19 August DWM personnel noted only one half inch of water was covering the multiprobe deployed for water quality monitoring (Appendix B).

Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Wellington Brook approximately 600 feet downstream of Chimney Pond outlet, Oxford (Station WE01) between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 4:40 and 5:40am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions.






The *Aquatic Life Use* is assessed as support based on the limited water quality data. Given the low flows observed in Wellington Brook this use is identified with an "Alert Status".

***PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES***

DWM collected fecal coliform and *E. coli* bacteria samples in Wellington Brook approximately 600 feet downstream of Chimney Pond outlet, Oxford (Station WE01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 9.5 cfu/100 mL (Appendix B). DWM personnel noted localized instream trash and generally did not note surface water scums with the exception of an orange scum believed to be a natural bacteria (Appendix B). DWM personnel did not note any water odors and generally did not note any water color (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary and Secondary Contact Recreation Use* standards, therefore both recreation uses are supported. With the exception of localized trash, the *Aesthetics Use* is assessed as support given the general lack of objectionable conditions.

### Wellington Brook (MA42-11) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

\*Alert Status Issues identified- see details in use assessment section

### RECOMMENDATIONS

Conduct fish population sampling upstream of Chimney Pond.

Conduct inspection of brook during summer to determine the extent and duration of low flows.

### **Unnamed Tributary (MA42-20)**

Location: Unnamed tributary to South Fork locally known as 'Potters Brook', from outlet of Old Mill Pond Dam (MA01833), Charlton to the confluence with South Fork, Charlton.

Segment Length: 0.9 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

This brook is known locally as "Potters Brook" and begins in South Charlton Reservoir and then flows in an easterly direction then flows for about 1.2 miles before joining the South Fork Little River. Potters Brook is a small first order stream but has a large watershed area due to the drainages of South Charlton Reservoir and associated waterbodies (i.e., Baker and Shepherd ponds and their receiving waters). The total drainage area above the DWM station (W1179) is 13.89 square miles and is largely protected US ACOE owned land, undeveloped forest and wetlands.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Charlton (MAR041100)

#### **USE ASSESSMENT SUMMARY:**

##### **AQUATIC LIFE**

##### **Habitat and Flow**

DWM performed habitat assessments in Potters Brook downstream from Potter Village Road in Charlton (Station W1179) in 2004 as part of macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 166/200 (Maietta 2007). DWM fishery biologists scored the majority of habitat parameters in the "optimal" category (Maietta 2007). Channel flow status, bank stability and riparian vegetative zone all scored in the suboptimal category.

The benthic macroinvertebrate sampling site (Station W1179) in Potters Brook received a total habitat assessment score of 185/200 during RBP III macroinvertebrate sampling. DWM biologists scored all habitat parameters in the "optimal" category with the exception of both channel flow status and bank stability, which were rated as "suboptimal" (Fiorentino 2007). For DWM benthic macroinvertebrate personnel, this station was the highest rated habitat in the French River watershed.

##### **Biology**

DWM conducted fish population sampling in Potters Brook downstream from Potter Village Road in Charlton (Station W1179) on 16 September 2004. DWM fishery biologists collected twenty yellow bullhead, ten blacknose dace, nine fallfish, four pumpkinseed, four largemouth bass and three bluegills (Maietta 2007). Maietta (2007) notes that the fish community was dominated by macrohabitat generalists including yellow bullhead that likely are present due to the close proximity of South Charlton Reservoir and Pierpoint Meadow Pond. Although identified by MA DFG as a "Cold Water Fishery Resource", no coldwater fish species were collected by DWM in Potter Brook.

DWM conducted RBP III benthic macroinvertebrate sampling in Potters Brook downstream from Potter Village Road in Charlton (Station W1197) on 26 August 2004. The benthic community when compared to Brown Brook (BR01), the regional reference station, was slightly impacted (Fiorentino 2007). The macroinvertebrate community was more comparable when compared to the LB01 reference station. Fiorentino (2007) notes that although filter feeding taxa were over-represented at this station, a good number of EPT taxa and only slightly elevated Biotic Index indicates that "organic enrichment is not excessive". DWM biologists also estimated canopy cover (15% open) at this site (Beskenis 2009a).

##### **Chemistry**

DWM conducted monthly *in-situ* water quality monitoring in Potters Brook downstream from Potter Village Road in Charlton (Station W1179) between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 3:30 and 5am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions.






The *Aquatic Life Use* is assessed as support based in Potters Brook based on the RBPIII analysis of the benthic community, good habitat quality and limited water quality data indicative of good conditions. This use is identified with an “Alert Status” however because the fish community was dominated by macrohabitat generalists and no cold water species were collected although MA DFG identifies this waterbody as a “Cold Water Fishery Resource”.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in in Potter Brook downstream from Potter Village Road in Charlton (Station W1179) on five occasions between May and September 2004. The geometric mean of *E. coli* counts is 23 cfu/100 mL (Appendix B). DWM field crews made observations during the 2004 sampling season. No objectionable deposits or conditions were noted by DWM personnel with the exception of limited amounts of trash on the banks.

The geometric mean of *E. coli* counts meets both the *Primary and Secondary Contact Recreation Use* standards, therefore both recreation uses are supported. The *Aesthetics Use* is assessed as support given the general lack of objectionable conditions.

Unnamed Tributary locally known as “Potters Brook” (MA42-20) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

\* Alert Status issues identified, see details in use assessment

#### **RECOMMENDATIONS**

Conduct further fish population sampling to search for coldwater fish species.

### **Little River (Segment MA42-13)**

Location: Headwaters, outlet Pikes Pond, Charlton to inlet Buffumville Lake, Charlton (formerly part of segment MA42-09).

Segment Length: 3.5 miles.

Classification: Class B.

This is a new segment but was formerly part of MA42-09 which was listed in the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Metals).

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Charlton (MAR041100)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM personnel made field observations of the Little River at the Turner Road crossing in Charlton (Station LR01) as part of water quality sampling (Appendix B). They noted water levels three feet below the annual high water mark in July and water levels continued to be below the annual high water mark through the September sampling date (Appendix B).

DWM performed habitat assessments in the Little River at the Turner Road crossing in Charlton (Station LR01) as part of macroinvertebrate and fish population surveys. DWM fishery biologists conducted their survey downstream of Turner Road on 16 September 2004. DWM fishery biologists gave the site a final habitat score of 183/200 (Maietta 2007). DWM fishery biologists scored all habitat parameters in the "optimal" category with the exception of riparian vegetative zone width which scored in the "suboptimal" category (Maietta 2007).

RBP III macroinvertebrate sampling was conducted approximately 20 meters upstream from Turner Road, Charlton. DWM biologists gave their sampling reach a total habitat score of 167/200. Most habitat parameters were categorized as "optimal" although channel flow status was considered "marginal" and riparian vegetative zone width was considered "suboptimal" (Fiorentino 2007). Beaver activity was noted upstream from the sampling location.

##### Biology

MA DFG seasonally stocks the Little River with trout (MA DFG 2007). MA DFG conducted fish population sampling in the Little River at the Route 20 road crossing (Station 1024) in Charlton on 8 August 2004 using backpack electroshocking equipment. A total of fifty-four fish were collected including fourteen chain pickerel, eleven blacknose dace, nine yellow bullhead, eight pumpkinseed, four fallfish, four white sucker, two largemouth bass, one brook trout and one brown trout (Richards 2006). MA DFG biologists note that the two trout collected were stocked (Richards 2006). The sample was dominated by macrohabitat generalists. With the exception of the stocked trout all fish collected are classified as moderately tolerant or tolerant of pollution.

DWM conducted fish population sampling in the Little River downstream of the Turners Road crossing in Charlton (Station LR01) on 16 September 2004. DWM fishery biologists collected forty- three blacknose dace, nine fallfish, four yellow bullhead, three eastern brook trout (all stocked fish), two brown bullhead, and two pumpkinseed (Maietta 2007). Maietta (2007) notes that *"it is impossible to comment on total fish numbers and assemblage due to poor sampling efficiency due to high flows and highly colored water"*, however, *"the dominance by blacknose dace and fallfish (both fluvial dependant species) was indicative of a stable flow regime"*.

DWM conducted RBP III benthic macroinvertebrate sampling in the Little River approximately 20 meters upstream from Turner Road in Charlton (Station LR01) on 30 August 2004. The benthic community when compared to Brown Brook (BR01), the regional reference station, was "moderately impacted" (Fiorentino 2007). When compared to the LB01 reference station, the benthic community was also considered "moderately impacted". A hyperdominance of filter feeders, low densities of EPT taxa and low numbers of algal scrapers characterized the benthic assemblage at this station. The low numbers of algal scrapers



may indicate an oxygen stressed community (Fiorentino 2007). In the opinion of the DWM biologists water quality degradation related to organic enrichment appears to limit biological integrity in this portion of the Little River (Fiorentino 2007).

#### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Little River at the Turner Road crossing in Charlton (Station LR01) between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 4 and 5am, n=3) were low (4.1 to 5.1 mg/L) with saturations ranging from 43 to 57%. One of the three DO measurements did not meet standards. pH measurements were slightly low but are likely associated with natural conditions considering the wetland area just upstream from the sampling location.






The *Aquatic Life Use* is assessed as impaired based primarily on the RBP III analysis of the benthic community and the limited water quality data indicating low dissolved oxygen concentrations. It is best professional judgement that these conditions are likely a combination of natural conditions (beaver activity and/or extensive wetland areas contributing to organic inputs and low DO) and other anthropogenic perturbations (agricultural areas and enriched impoundments in the upper watershed).

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Little River at the Turner Road crossing in Charlton (Station LR01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts is 60 cfu/100 mL (Appendix B). DWM personnel made field observations during the 2004 sampling season. Water color was described as light yellow/tan on all occasions (likely from upstream wetland). A natural foam was often noted but no objectionable deposits, water odors or conditions were noted by field crews (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary and Secondary Contact Recreation Use* standards, therefore both recreational uses are assessed as support. The *Aesthetics Use* is assessed as support given the general lack of objectionable conditions.

### Little River (MA42-13) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Aquatic macroinvertebrate bioassessment, low dissolved oxygen Source: Unknown Suspected: organic inputs from farms, upstream sources
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

### RECOMMENDATIONS

Deploy water quality multiprobes to determine the extent/duration of low DO concentrations in the Little River.

A stream walk to determine summertime water levels and potential sources of pollution should be conducted.

Reassess the fish population in Little River downstream of the Turners Road crossing in Charlton (Station LR01) under lower flow conditions to better evaluate the total fish numbers and assemblage.

### **Little River (Segment MA42-14)**

Location: Outlet Buffum Pond, Oxford to confluence with French River, Oxford (formerly part of segment MA42-09).

Segment Length: 1.3 miles.

Classification: Class B.

This is a new segment but was formerly part of MA42-09 which was listed in the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Metals).

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Oxford (MAR041147)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

As described by Barker (2007):

*"Within this segment of the Little River watershed, the US ACOE's New England District maintains Buffumville Lake, which is part of a system of six US ACOE flood-control projects in the Thames River Basin. It was constructed in response to the 1936 flood to provide protection to downstream communities on the French, Quinebaug and Thames Rivers. Its reservoir and flood encroachment area encompass approximately 1.8 miles of the Little River, and include 488 acres owned in fee with flowage easements on another 273 acres. These lands are mostly within the town of Charlton, but parts are also in Dudley and Oxford. Project features include a 3255-ft long earth-fill dam with a maximum height of 66 feet above the streambed. Under normal conditions the project maintains a 200-acre recreation pool at a stage of 11 feet by means of a weir, which allows releases to approximate run-of-river conditions. At the spillway crest stage of 42.5 feet, the project impounds 11,300 acre-feet, equivalent to 8 inches of runoff from the drainage area of 26.5 square miles. Since it began operation in April of 1958, the highest recorded pool was at 58 percent full in April 1987. In addition to its primary purpose of flood control, the project is also operated for recreation including swimming, boating, picnicking, fishing, and hunting; and fish and wildlife habitat." For the assessment of Buffumville Lake see the French River Subbasin – Lake Assessment section of this report.*

Stream gaging data for the Little River are available, but no longer published, from the USGS gage 01124500 located 1.1 mile downstream from the Buffumville Dam. The drainage area at this gage is 27.4 mi<sup>2</sup> and flow is regulated by Buffumville Lake since 1958 and by other reservoirs upstream (USGS 2007b). Discharge ranges from 21.2 to 92.7 cfs between 1940 and 1990 (period of published data) (USGS 2007b).

##### Biology

MA DFG seasonally stocks the Little River with trout (MA DFG 2007).

##### Chemistry






The French River Connection (FRC) conducted water quality monitoring in the Little River north of the Dudley Road crossing and near the confluence of the Little River with the French River in Oxford between May 17<sup>th</sup> and November 17<sup>th</sup>, 2007 and between March 22<sup>nd</sup> and November 15<sup>th</sup> 2008. Parameters measured include dissolved oxygen, temperature, pH, conductivity and turbidity. Dissolved oxygen and temperature met state standards while pH was near or met standards on all occasions (FRC 2008a, FRC 2008b). Turbidity was generally low (FRC 2008a, FRC 2008b).

Although the water quality data collected by FRC were indicative of good conditions, these data do not represent worse case (pre-dawn) conditions so the *Aquatic Life Use* is not assessed.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

No recent quality-assured bacteria data are available for this segment of the Little River. FRC crews did not note objectionable odors or turbidity but did note objectionable deposits of trash/debris including tires, cinder blocks and a washing machine at their sampling location in 2007 and 2008 (FRC 2008a and 2008b). Whether or not these conditions are similar throughout the segment are unknown at this time.

The *Primary and Secondary Contact Recreational* and *Aesthetics* uses are not assessed but are identified with an “Alert Status” given the trash/debris near the mouth of the river.

Little River (MA42-14) Use Summary				
Aquatic Life	Fish Consumption	Primary Contact*	Secondary Contact*	Aesthetics*
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment

## RECOMMENDATIONS

Although the Little River appears to have good water quality conditions, efforts to collect data representative of worse-case (pre-dawn) conditions should be conducted to evaluate the status of the *Aquatic Life Use*.

A stream walk should be conducted to determine extent of the river segment affected by illegal dumping of trash/debris. Efforts to prevent illegal dumping and to clean up trash from this segment should be conducted.

A stream walk to determine water levels in the summer months should be conducted both below and above the Buffumville Lake and Buffumville Pond system to better evaluate flow conditions in the Little River.

### **Unnamed Tributary (MA42-19)**

Location: Unnamed tributary to the French River on the 1982 USGS quad as 'Lowes Brook', from the outlet of Lowes Pond, Oxford to the confluence with the French River, Oxford.

Segment Length: 1.3 miles.

Classification: Class B.

This is a new segment so it does not appear in the 2008 Integrated List of Waters. This unnamed tributary is locally known as Lowes Brook and is referred to below as such.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):**

Town of Oxford (MAR041147)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Biology

MA DFG conducted fish population sampling in Lowes Brook at the Huguenot Road crossing downstream of Lowes Pond (Station 1381) in Oxford on 14 September 2005 using backpack electroshocking equipment. A total of ninety-one fish were collected including twenty-two fallfish, twenty-three redbreast sunfish, eighteen largemouth bass, eight common shiner, seven yellow bullhead, six bluegill, four white sucker, one chain pickerel, one pumpkinseed, one goldfish (Richards 2006). Macrohabitat generalist species comprised 63% of the sample which is not surprising considering the sampling location just downstream from the pond. All fish collected are classified as moderately tolerant or tolerant to pollution.

##### Chemistry

The French River Connection (FRC) conducted water quality monitoring usually between 9:30 and noon at the State Street crossing in Oxford between May 17<sup>th</sup> and November 17<sup>th</sup>, 2007 and between March 22<sup>nd</sup> and November 15<sup>th</sup> 2008. Parameters measured include dissolved oxygen, temperature, pH, conductivity and turbidity. Dissolved oxygen, pH and temperature met state standards on all occasions (FRC 2008a, FRC 2008b). Turbidity was generally low (FRC 2008a and 2008b).

DWM conducted monthly *in-situ* water quality monitoring in Lowes Brook at the Main Street (Route 12) road crossing in Oxford (Station LO01) between July and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 2:15 and 3:00am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions.






The *Aquatic Life Use* is assessed as support based primarily on the limited water quality data that were indicative of good water quality conditions. This use is identified with an "Alert Status" however because of the high dominance by macrohabitat generalist fish species.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

FRC noted some objectionable conditions at the State Street site during monitoring in 2007 and 2008 including small amounts of trash and tires, dark murky water and turbidity (FRC 2008a, FRC 2008b). DWM collected fecal coliform and *E. coli* bacteria samples in Lowes Brook at the Main Street (Route 12) road crossing in Oxford (Station LO01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 99 cfu/100 mL (Appendix B). DWM personnel also made field observations during the 2004 sampling season. They generally noted clear water without color, odors, scums, or objectionable conditions (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary and Secondary Contact Recreation Use* standards, therefore both recreational uses are supported. The *Aesthetics Use* is assessed as support but with an "Alert Status" due to the minor trash/debris, impounding, and water appearance/turbidity conditions noted at the State Street site.

### Unnamed Tributary "Lowes Brook" (MA42-19) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		SUPPORT*

\* Alert Status issues identified see details in use assessment

### RECOMMENDATIONS

Additional biological monitoring including both benthic macroinvertebrate and fish population sampling should be conducted at a location further downstream (away from the influence of Lowes Pond Dam) to better evaluate the *Aquatic Life Use*.

Future water quality monitoring should include sampling for nutrients in order to more thoroughly assess the *Aquatic Life Use*.

### **Mine Brook (MA42-16)**

Location: Headwaters, Webster to inlet Club Pond, Webster.

Segment Length: 1.4 miles.

Classification: Class B.

This is a new segment so it is not on the 2008 Integrated List.

Mine Brook is a small second order stream that has its headwaters in Douglas Woods. The stream flows in a generally southwesterly direction through vast tracts of undisturbed forest before crossing Mine Brook Road and entering Webster Lake near Sucker Brook Cove.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):**

Town of Webster (MAR041170)

### **USE ASSESSMENT**

#### ***AQUATIC LIFE***

##### Habitat and Flow

DWM performed habitat assessments in Mine Brook downstream from Mine Brook Road in Webster (Station MI01) in 2004 as part of macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 167/200 (Maietta 2007). DWM fishery biologists scored the majority of habitat parameters in the “optimal” category with the exception being velocity depth combinations and channel flow status, which were scored in the “suboptimal” and “marginal” categories, respectively (Maietta 2007). DWM fishery biologists also noted localized sediment deposition “*substrate appeared to be lightly covered with fine silt*” (Maietta 2007). DWM water quality sampling crews also made note of a gray floc covering substrates at Station MI01 (Appendix B).

DWM benthic biologists gave their sampling reach approximately 140 m downstream from Mine Brook Road (Station MI01) a total habitat score of 147/200 during RBP III macroinvertebrate sampling. They noted that low baseflow, localized fine sediment deposition and channel flow status all limited habitat potential (Fiorentino 2007). Sediment deposition was not noted upstream from Mine Brook Road (MassDEP 2004c).

The French River Connection (FRC) conducted water quality monitoring in Mine Brook near the Mine Brook Road crossing between May 17<sup>th</sup> and November 15<sup>th</sup> 2007. The stream was observed to be dry during their visits in August, September and October (FRC 2008a).

##### Biology

DWM conducted fish population sampling in Mine Brook downstream from Mine Brook Road in Webster (Station MI01) on 13 September 2004. DWM fishery biologists did not collect or observe any fish in their sampling reach (Maietta 2007). DFG biologists also conducted backpack electroshocking in Mine Brook upstream from Mine Brook Road on 27 June 2006 however their sampling effort did not result in the capture of any fish (Richards 2008).

DWM conducted RBP III benthic macroinvertebrate sampling in Mine Brook approximately 140 m downstream from Mine Brook Road (Station MI01) on 27 August 2004. The benthic community was “moderately impacted” when compared to the regional reference station (Fiorentino 2007). It was the opinion of DWM biologists, however, that the assemblage appeared to be more sensitive to habitat constraints associated with natural low flow regime conditions rather than organic pollution (Fiorentino 2007). DWM biologists also estimated canopy cover (0% open) at this site although upstream from Mine Brook Road, canopy cover was more open (40% at MI01A) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Mine Brook in a large pool downstream from Mine Brook Road (Station MI01) in Webster during July, August, and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). During the July survey dissolved oxygen concentrations were found to be very low (< 2 mg/L) at this site so additional sampling both upstream and downstream was conducted. No



other sites sampled had such low DO, temperature, or pH conditions so the DWM sampling site for Mine Brook was moved to approximately 30 feet upstream from Mine Brook Road (Station MI01C) for the rest of the field season (Appendix B). With the exception of Station MI01 in July all other Mine Brook station's dissolved oxygen and temperature measurements met state standards (Appendix B). It should be noted that pH was low at all stations sampled in Mine Brook, ranging from 5.3 to 6.1 SU (Appendix B).

The French River Connection (FRC) conducted water quality monitoring in Mine Brook near the Mine Brook Road crossing between May 17<sup>th</sup> and November 15<sup>th</sup> 2007. Generally, dissolved oxygen measurements met standards and pH was low (ranging from 5.52 to 6.03) at their station (FRC 2008a). Given the low flows encountered in 2007, few conclusions can be generated from this data. The French River Connection (FRC) also deployed a temperature logger in Mine Brook near Mine Brook Road in the summer and fall of 2007 and 2008. When the brook was not dry the baseflow in the river was less than 20°C (FRC 2008a, FRC 2008b).






The *Aquatic Life Use* is assessed as support based on best professional judgement of the RBP III analysis, and the limited water quality data which was generally indicative of good water quality conditions. Although considered "moderately impacted" the benthic assemblage appears to be a community shaped most by apparent naturally occurring low flow conditions and the presence of pollution intolerant species was also indicative of good water quality conditions. It should be noted that low flow conditions are likely natural given the small drainage area of Mine Brook (watershed area upstream station MI01 = 1.03 square miles). This use is identified with an "Alert Status" however given the lack of fish, the low pH, and the evidence of fine silt deposition downstream from Mine Brook Road which may or may not be naturally occurring.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Mine Brook in a large pool downstream from Mine Brook Road (Station MI01) in Webster during May, June and July. In July this location was found to be not representative of stream conditions and sampling for the August and September sampling dates was moved to approximately 30 feet upstream from Mine Brook Road (Station MI01C). Since two stations were sampled a geometric mean of *E. coli* counts will not be calculated but *E. coli* counts were all very low (<20 cfu/100mL). DWM personnel also made field observations during the 2004 sampling season. During the sampling season DWM personnel did not note any odors, scums, or objectionable deposits with the exception of a gray floc present on one occasion and limited erosion (Appendix B). The French River Connection monitored Mine Brook at the Mine Brook Road crossing in Webster in 2006 and 2007 and did not note any objectionable conditions with the exception of gray silt on instream rocks due to road resurfacing (FRC 2006, FRC 2008a).

Given the low *E. coli* counts and largely forested and undeveloped nature of Mine Brook, both the *Primary and Secondary Contact Recreation Uses* are supported. The *Aesthetics Use* is assessed as support given the general lack of objectionable conditions.

Mine Brook (MA42-16) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

\*Alert Status issues identified, see details in use assessment

### **Sucker Brook (MA42-15)**

Location: Headwaters, outlet Nipmuck Pond, Webster to inlet Club Pond, Webster.

Segment Length: 1.7 miles.

Classification: Class B.

This is a new segment so it is not on the 2008 Integrated List.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Webster (MAR041170)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM performed habitat assessments in Sucker Brook downstream from Kingsbury Road in Webster (Station SU01) in 2004 as part of macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 144/200 (Maietta 2007). DWM fishery biologists scored the majority of habitat parameters in the “suboptimal” category with riparian vegetative zone width being considered “poor” (Maietta 2007). Sedimentation issues were also noted (Maietta 2007). DWM benthic biologists gave their sampling reach in Sucker Brook approximately 100 m downstream from Kingsbury Road (Station SU01) a total habitat score of 131/200 during RBP III macroinvertebrate sampling. This was the lowest habitat score of all the stations sampled during the 2004 biomonitoring survey. Habitat was noted to be most impacted by low baseflow and limited riparian vegetative zone due to adjacent lawns (Fiorentino 2007). DWM biologists noted riparian disruptions and lawn and leaf piles minimally buffered from the stream as source of pollution (Fiorentino 2007).

DWM conducted water quality sampling in Sucker Brook at the Sutton Road crossing just upstream from Mine Brook Road (SU01) in 2004. In August 2004 DWM personnel noted that the stream level was very low, 95% of the substrates were exposed and the brook appeared to be more like isolated pools than a flowing system (Appendix B).

##### Biology

MA DFG conducted fish population sampling in Sucker Brook at a Sutton Road crossing just downstream from Nipmuck Pond (Station 1048) in Webster on 30 July 2004 using backpack electroshocking equipment. MA DFG biologists did not collect any fish during their sampling and noted that they sampled two pools with a reach length of approximately 50 meters (Richards 2006).

DWM conducted fish population sampling in Sucker Brook downstream from Kingsbury Road in Webster (Station SU01) on 13 September 2004. DWM fisheries biologists collected three chain pickerel and one pumpkinseed during sampling and observed a number of pumpkinseeds that were not collected (Maietta 2007). Both species collected are macrohabitat generalist species, tolerant or moderately tolerant of pollution. Maietta (2007) indicates that the absence of fluvial specialists/dependent species suggest “possible episodic low flow or no flow events”.

DWM conducted RBP III benthic macroinvertebrate sampling in Sucker Brook approximately 100 m downstream from Kingsbury Road (Station SU01) on 27 August 2004. The benthic community when compared to the regional reference station was “moderately impacted” (Fiorentino 2007). Filter feeders dominated (90% of sample) the macroinvertebrate assemblage at this station (Fiorentino 2007). Canopy cover was estimated (25% open). A cyanobacterial mat composed primarily of *Oscillatoria* sp. at this sampling location was documented (Beskenis 2009a). DWM biologists suggested organic pollution may be the main stressor in the segment (Fiorentino 2007). The relative magnitude and importance of low flow effects and organic pollution stress on the observed benthic assemblage at this station is uncertain. It is important to note that a small impoundment is located upstream of the macroinvertebrate sampling station. Elevated *E. coli* counts indicative of organic enrichment were also noted during DWM water quality sampling (see below).

### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Sucker Brook at the Sutton Road crossing just upstream from Mine Brook Road (SU01) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 2:40 and 3:30am, n=3) ranged from 1.9 to 7.5 mg/L. It should be noted that the very low DO measurement was taken during the August survey and 95% of the streambed was exposed and these data are qualified. The pH measurements were also low, ranging from 6.2 to 6.4 SU (Appendix B).

The French River Connection (FRC) conducted water quality monitoring in Sucker Brook at two different locations near the Mine Brook Road crossing between May 17<sup>th</sup> and November 15<sup>th</sup> 2007. Generally dissolved oxygen measurements met standards and pH was generally low (ranging from 6.04 to 6.47) at their station (FRC 2008a).

The French River Connection (FRC) also deployed a temperature logger in Sucker Brook near Mine Brook Road in the summer and fall of 2007. Although the brook did not go dry, temperatures were not indicative of a cold water fishery (FRC 2008a).






The *Aquatic Life Use* is assessed as impaired based on the RBP III analysis indicating moderate impacts to the benthic community and habitat degradation. The relative magnitude and importance of low flow effects and organic pollution stress on the observed benthic assemblage at this station is uncertain. It is important to note the paucity of fish collected during sampling by both DWM and MA DFG and the low pH documented by DWM sampling. Potential pollution sources for Sucker Brook include road runoff and lawns.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Sucker Brook at the Sutton Road crossing just upstream from Mine Brook Road (SU01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 149 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. DWM personnel did not note any odors, scums, or objectionable deposits with the exception of a sheen/scum present on one occasion and an orange bacterial scum noted in August and September (Appendix B). In 2006 and 2007 the French River Connection monitored Sucker Brook at the Mine Brook road crossing and did not note any objectionable conditions with the exception of gray silt on instream rocks (FRC 2006, FRC 2008a).

The *Primary Contact Recreation Use* is assessed as impaired because the geometric mean of *E. coli* bacteria counts exceeded the standard. The *Secondary Contact Recreation Use* is assessed as support. Given the general lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is assessed as support.

### Sucker Brook (MA42-15) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Aquatic Macroinvertebrate Bioassessments Suspected cause: nutrient/eutrophication biological indicators, low flow alterations Source: Unknown Suspected Sources: Dam or impoundment, loss of riparian habitat , yard maintenance
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Elevated E. coli Source: Unknown
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

### RECOMMENDATIONS

Monitoring should be conducted to evaluate streamflow conditions in Sucker Brook and to determine whether or not the outlet control practices at Nipmuck Pond and other impoundments are detrimentally affecting habitat quality in Sucker Brook.

Educate homeowners regarding need for protecting riparian zone along brook and to relocate lawn/grass clippings and leaves away from banks.

### **Mill Brook (Segment MA42-10)**

Location: Headwaters, outlet Webster Lake, Webster to confluence with French River, Webster.

Segment Length: 1.2 miles.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 2 - Attaining Some Uses (Aquatic Life); Others Not Assessed.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Webster (MAR041170)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

The French River Connection (FRC) has monitored Mill Brook at two sampling locations (Rte. 12-Webster Nursery and Bigelow Road) on many occasions (n=27) between 2006 and 2008 (FRC 2006, 2008a, and 2008b). Sand deposition to the brook near the Webster Nursery was noted (FRC 2006 and 2008b).

##### Toxicity

##### Ambient

Water was collected from Mill Brook (at Bigelow Road in Webster) for use as dilution water for the Webster WWTP whole effluent modified acute and chronic toxicity tests. Between June 2001 and September 2008 survival of *C. dubia* exposed (7 days) to river water was good ( $\geq 80\%$ , n=32) for all tests with the exception of one test event (14 August 2007) when survival was 0%. It should be noted that no problems were detected in the retest conducted on 17 August when survival was 100%.

##### Water Chemistry

FRC volunteers conducted water quality monitoring in Mill Brook at two different locations Webster Nursery and Bigelow Road) on many occasions (n=27) between 2006 and 2008 (FRC 2006, 2008a, and 2008b). All FRC sampling events were typically conducted between 9 and 10am. At their Mill Brook at Webster Nursery site dissolved oxygen measurements and pH met standards and turbidity was low (FRC 2008a, FRC 2008b). Dissolved oxygen did not meet the criterion on one occasion and pH was a little low (ranging from 6.39 to 6.62) at their Bigelow Road site in 2007 (FRC 2008a). Dissolved oxygen and temperature at FRC's Mill Brook Bigelow Road site met the criterion in 2008 while pH was generally at or near the criterion (FRC 2008b).

FRC crews noted the presence of milfoil speices at their Bigelow Road site in 2005 (FRC 2005).

Filamentous aglae was also noted during both their 2006 and 2007 sampling seasons at this site (FRC 2006, FRC 2008a) while an algal bloom was noted in 2008 (FRC 2008b). Algae was also found at their Rte 12 site in 2006, 2007 and 2008 (FRC 2006, FRC 2008a b, FRC 2008b).

The *Aquatic Life Use* for Mill Brook is assessed as support given the generally good survival of test organisms exposed to the river water and water quality measurements indicative of good water quality. This use is identified with an "Alert Status" due to concerns with habitat degradation from sand deposition, and occasional suspect water quality conditions (e.g., slightly low DO, pH) as well as potential infestation of a non-native aquatic macrophyte (milfoil).






### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

FRC volunteer monitoring has been conducted on many occasions (n=27) at two locations on Mill Brook (Webster Nursery and Bigelow Road) in 2006, 2007, and 2008. In general FRC volunteers did not note many objectionable conditions over the course of three sampling seasons. A few exceptions noted include an oily sheen on the brook on two occasions, a sewer smell on one occasion, and occasional mention of some trash on the banks (FRC 2006, 2008a, and 2008b). Stream cleanups were conducted (FRC 2008b).

No recent quality assured bacteria data have been collected so the *Primary* and *Secondary Contact Recreation Uses* are not assessed. Given the general lack of instream objectionable deposits and

conditions documented by FRC volunteers, the *Aesthetics Use* is assessed as support. All of these uses, however, are identified with an “Alert Status” based on some observations of turbidity, trash/debris, sheens and odors.

Mill Brook (MA42-10) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED*
Secondary Contact		NOT ASSESSED*
Aesthetics		SUPPORT*

\*Alert Status issues identified, see details in use assessment

## RECOMMENDATIONS

Efforts should be taken to minimize sand road runoff into Mill Brook.

Continue to support FRC volunteer monitoring and stream cleanup efforts.

Multiprobes with pH instrumentation should be deployed in Mill Brook to determine the spatial variation in pH along the Brook and its possible relationship to commercial property uses and Webster Lake.

### **French River (Segment MA42-05)**

Location: Dam at North Village, Webster/Dudley to Webster WWTP outfall, Webster/Dudley.

Segment Length: 2.4 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO, (Other habitat alterations\*), Pathogens, Taste, odor and color, (Objectionable deposits\*)). \* denotes a non-pollutant.

The Webster Lens Company/Shield Packaging hazardous waste site, currently a Tier IB Site (#2-12746) in Phase IV (Final Inspection Report and remediation completed), is located along the French River in this segment, north of Tracy Court. The lens grinding activities at this site resulted in the disposal of rouge byproducts on the banks, causing runoff of this material into the river. Rouge, which was used to polish high quality lenses, contains heavy metals (arsenic, cadmium and lead) in quantities sufficient to be toxic to aquatic organisms. Rouge can also pose a threat to organisms that bioaccumulate these heavy metals and to humans through dermal contact and incidental ingestion. Between September 2000 and May 2001 three phases of cleanup work was completed. Phase I resulted in the excavation and removal of 1800 tons of material (including impacted soil, grinding compound, associated glass, pitch and impacted fill) (Rizzo Associates 2006). In Phase II, 375 tons of grinding compound and impacted soil near the French River were removed (Rizzo Associates 2006). Phase III work included the removal of approximately 1200 tons of material (grinding compound and soil) from the property just downstream of the Tracy Court bridge (Rizzo Associates 2006). 1073 tons of grinding compound and impact soils and sediment were removed from the bank and bed of the French River affected by the Webster Lens Company's rouge in Phase IV during August and September 2005 (Rizzo Associates 2006). In order to evaluate human health risk, a Method I risk characterization was conducted and the cleanup site conditions received a determination of "No Significant Risk" (Rizzo Associates 2006). A stage I Ecological Risk Characterization was also conducted which concluded a "Condition of No Significant Risk relative to conditions in the French River" (Rizzo Associates 2006).

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108), Town of Webster (MAR041170)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

Stream gaging data for the French River are available, but no longer published, from the USGS gage 01125000 located 50 ft upstream of the Pleasant Street Bridge in Webster. Average annual discharge ranged from 65.5 cfs to 230.9 cfs during the period of data publication from 1950 to 1981 (USGS 2007c). The drainage area at this gage is 86 mi<sup>2</sup> and flow is regulated by mills, by Webster Lake (Chaubunagungamaug), by Buffumville Lake and Hodges Village Reservoir, and by smaller reservoirs upstream (USGS 2007c). Flow fluctuations due to the North Village Hydropower project were identified as a cause of concern (MassDEP 2002b). An examination of stream gage information between June 1, 2007 and September 30, 2007 indicates that this segment of the French River continues to experience flow fluctuations due to upstream hydropower operation. One example during this period is evidenced by a streamflow increase between August 29, 2007 (8.3 cfs) and August 31, 2007 (74 cfs) and subsequent decrease in streamflow to 4.1 cfs on September 6, 2007 with no concurrent rainfall to explain the large flow fluctuation. The flow level on September 6, 2007 was below the minimum flow of 12 cfs required from the dam required per the FERC license (MassDEP 2002b and USGS2007e). It should also be noted that the owners of the North Village Hydropower Project installed new flow monitoring equipment in 2008 to better manage their operations. The new system is not yet functioning properly so flow fluctuations are still problematic (Grader 2009).

Menzie-Cura and Associates personnel recorded in their site visit field notes the presence of "lots of brick and slag", a bank with slag deposits and upstream trash deposits (tires, metal, etc.) at SED-106 (Menzie-Cura and Associates 2006). Slag on the bank and instream debris was also noted at SED-104 while at SED-105 instream debris (metal scrap, etc.) was also noted (Menzie-Cura and Associates 2006).



Menzie-Cura and Associates (2006) personnel also noted limited deposits of rouge in the French River and on the banks near the Webster Lens remediation area.

#### Sediment Chemistry

As part of the Ecological Risk Characterization, sediment sampling was conducted in the French River in areas considered outside the boundary and influence of the Webster Lens site and considered local conditions by Menzie-Cura and Associates, Inc (Menzie-Cura and Associates 2006). Sediment samples were collected at three locations (SED-104, SED-105, SED-106) from the French River upstream from remediation areas at the former Webster Lens property and below the Garden City Rd/Peter St. bridge in Dudley/Webster, MA (Menzie-Cura and Associates 2006). A duplicate sediment sample was taken at one site (SED-104) (Menzie-Cura and Associates 2006). Sediment sampling site SED-104 was sampled on 14 March 2006 while sediment sampling sites SED-105 and SED-106 were sampled on 4 April 2006. The average sediment concentration at site SED-104 for arsenic (14 PPM), cadmium (0.8 PPM), total chromium (76 PPM) and lead (180 PPM) all exceeded the L-EL guidelines (Persaud *et al.* 1993). Sediment samples were also analyzed for a number of polycyclic aromatic hydrocarbons (PAHs), the majority of which exceed the L-EL although determination of whether these constituents exceeded their respective S-ELs is not possible due to the lack of organic carbon data (Menzie-Cura and Associates 2006 and Persaud *et al.* 1993).

#### Chemistry

There is a MassDEP Central Regional Office (CERO) Strategic Monitoring and Assessment for River Basin Teams (SMART) station (Station FR11) at Oxford Avenue/Pleasant Street on the Dudley/Webster town line near the USGS flow gauging station #01125000 in this segment of the French River. CERO crews conducted *in-situ* water quality monitoring one day every two months between January and October 2002, one day every two months between February and October 2003 and one day during six selected months in 2004 (MassDEP 2002, MassDEP 2003, and MassDEP 2004). Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity. Grab samples were also collected and analyzed for TSS, turbidity, chloride, alkalinity, hardness, and nutrients. None of the CERO monitoring was done during pre-dawn (worst-case) conditions. CERO water quality sampling data for 2002 through 2004 are summarized below.

Parameter	CERO 2002 (n=6)	CERO 2003 (n=5)	CERO 2004 (n=6)
DO (mg/L)	6.7-12.9	7.9-13.3	8.4-15.6
Percent Saturation (%)	70-98	92-102	95-118
pH (SU)	6.5-6.9	6.2-6.8	6.9-7.1
Temperature (°C)	3.0-23.3	0.4-22.5	0.52-21.7
Conductivity (µS/cm at 25°C)	167-346	161-285	160-343
Total Kjendal Nitrogen (mg/L)	0.30-0.47	0.28-0.41	--
Total Nitrogen (mg/L)	--	--	0.49-0.86
Total phosphorus (mg/L)	0.019-0.031	0.019-0.038	0.019-0.043
Ammonia- nitrogen (mg/L)	<0.02-0.09	<0.02 (n=2)	<0.04-0.09
Nitrate-nitrite-nitrogen (mg/L)	0.07-0.44	0.08-0.43 (n=4)	0.08-0.52
Alkalinity (mg/L)	8-28	8-17	12-16
Hardness (mg/L)	23-48	22-38	25-30
Total suspended solids (mg/L)	<1-2.8	<1-3.3	3.3-4.7 (n=2)

The French River Connection (FRC) conducted water quality monitoring in the French River near the Brandon Road crossing between May 19<sup>th</sup> and November 17<sup>th</sup> 2007 and between March 22<sup>nd</sup> and November 15<sup>th</sup> 2008. Daytime dissolved oxygen measurements and pH met the criterion and turbidity was low (FRC2008a and 2008b).

The *Aquatic Life Use* is assessed impaired due to the frequent flow fluctuations from the North Village Hydroelectric Project. Low flows (<12 cfs) resulting from hydropower project operations are also noted as a concern.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**






Menzie-Cura and Associates noted the presence of "lots of brick and slag", a bank with slag deposits and upstream trash deposits (tires, metal, etc.) at their sampling sites in this segment of the French River

(Menzie-Cura and Associates 2006). Limited deposits of rouge in the French River and on the banks near the Webster Lens remediation area were also noted (Menzie-Cura and Associates 2006).

No objectionable odors were noted by SMART sampling crews at the French River at Oxford Avenue/Pleasant Street, Dudley/Webster except for two sampling events when an organic and a septic odor were present. The water column was usually described as clear or slightly turbid but was highly turbid on four of 22 sampling events (observations related to visual turbidity noted since 2003). The most objectionable conditions encountered at this sampling location was the consistent problem associated with trash and debris in the river – tires, shopping carts, floating debris, trash (n=31 site visits conducted between August 2001 and November 2006) (MassDEP 2001b, 2002, 2003, 2004, 2005b, 2006c). FRC crews did not note any objectionable conditions in the French River at Brandon Road (e.g., odors, turbidity) during their sampling in 2007 or 2008 (FRC2008a and 2008b).

Aesthetic degradation due to the persistent problem of anthropogenic trash and debris plague this segment of the French River. Because of this the *Primary* and *Secondary Contact Recreational* and *Aesthetics* uses are assessed as impaired.

French River (MA42-05) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Other flow regime alterations Source: Impacts from Hydrostructure Flow Regulation/modification
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Debris/Floatables/Trash Source: Illegal dumping, inappropriate waste disposal Suspected source: Unspecified Urban Stormwater
Secondary Contact		
Aesthetics		

## RECOMMENDATIONS

Conduct water quality sampling and macroinvertebrate sampling in this segment to assess the *Aquatic Life Use* and as an upstream reference station to attempt an evaluation of the effects of the Webster WWTP discharge on the French River. Determine if macroinvertebrate sampling to evaluate the effects of hydropower peaking is applicable.

Deploy mutliprobes in this segment to assess *the Aquatic Life Use* and water quality in this segment.

Mininum flows to protect aquatic life downstream of the North Village Hydropower plant should be maintained.

Conduct bacteria sampling at the commerce parking lot storm drain.

### **French River (Segment MA42-06)**

Location: Webster WWTP outfall, Webster/Dudley to state line, Dudley, MA/Thompson, CT.

Segment Length: 1 mile.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Nutrients, Organic enrichment/Low DO, (Other habitat alterations\*), Pathogens, Taste, odor and color, Turbidity, (Objectionable deposits\*)). \* denotes a non-pollutant.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLES F2 AND F3)**

Webster Sewer Department (MA0100439)

Town of Dudley (MAR041108), Town of Webster (MAR041170)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

It should be noted that the owners of the North Village Hydropower Project upstream from this segment of the French River installed new flow monitoring equipment in 2008 to better manage their operations. The new system is not yet functioning properly so flow fluctuations caused by this facility are still problematic (Grader 2009).

##### Toxicity

##### Effluent

The Town of Webster Sewer Department discharges treated effluent to this segment of the French River. Between June 2001 and February 2008 modified acute and chronic whole effluent toxicity tests were conducted on the treated effluent using *C. dubia* (n=32). Only two tests (June 2001 and June 2006) exhibited acute whole effluent toxicity (LC<sub>50</sub>s 70.7 and 52.5% effluent, respectively). Of the 29 valid chronic test results, the CNOEC's ranged from 12.5 and 100% effluent. Four tests (June and September 2001, June 2002, and June 2006) exhibited chronic toxicity at levels not meeting the 37% effluent permit limit (12.5, 25, 25, and 12.5% effluent, respectively).

##### Chemistry-sediment

Sediment sampling and sediment thickness mapping in the Perryville Impoundment was conducted by the USGS (Zimmerman and Breault 2003). Nine core samples from the impoundment were collected and analyzed (top, middle and bottom of each core when possible) for particle size, elemental metals, organics, total PCBs, and total PAH's (Zimmerman and Breault 2003). Zimmerman and Breault (2003) calculated that 71,000 cubic yards of sediment are located behind the Perryville Impoundment. Elevated levels of PAH's (204 ->5,000ug/kg), PCBs (540-760 ug/kg), Chlordane (20->600ug/kg), copper (3-336 mg/kg), lead (5-528 mg/kg), zinc (12.2-897 mg/kg), and arsenic (<3-59 mg/kg) (Zimmerman and Breault 2003) were found in the sediment (summary includes all sediment horizons). The report states that *"Perryville samples showed the widespread presence of petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and chlordane, polychlorinated biphenyls were detected in five samples from four locations...samples from throughout Perryville Pond contained a number of metals at potentially toxic concentrations. These metals include arsenic, cadmium, copper, lead, nickel, and zinc. In general, most of the concentrations of organic compounds and metals detected in Perryville Pond exceeded standards for benthic organisms, but only rarely exceeded standards for human contact...The most highly contaminated samples were collected from sites at the upstream and downstream ends of Perryville Pond...when consensus-based sediment-toxicity calculations were applied to estimate potential toxicity of the sediment samples to invertebrates on the basis of their concentrations, the results of the calculations based on the guidelines highlighted the locations of potentially toxic contaminant "hot spots" in Perryville Pond."* (Zimmerman and Breault 2003).

The river flowed through leaks in both the spillway and the earthen walls of the abandoned Perryville Dam for many years. The State of Connecticut expressed concern about the potential failure of the dam and the resultant transportation of contaminated sediments to that state, less than 100 yards downstream. In August 2001, a declaration of dam safety emergency was issued for the Perryville Pond Dam (Webber 2001), and in September 2001, emergency repairs made to eliminate leakage through the dam wall were

successful, although the water continues to leak through the face of the granite block spillway (Beaudoin 2009).

The French River Connection (FRC) conducted water quality monitoring in the French River usually between 8 and 9 am near the State Line between May 19<sup>th</sup> and November 17<sup>th</sup> 2007 and between March 22<sup>nd</sup> and November 15<sup>th</sup> 2008. Dissolved oxygen and pH measurements met standards and turbidity was low (FRC 2008a and FRC 2008b).






The *Aquatic Life Use* is assessed impaired based primarily on the sediment contamination data for Perryville Pond which exceeds sediment screening values and pose a potentially toxic threat to biota in the pond. Flow fluctuations associated with the hydropower project operations upstream from this segment of the French River are also a concern.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

The French River Connection monitored the French River in 2006 near the state line and no objectionable conditions were noted (FRC 2006). FRC crews generally did not note objectionable conditions during their sampling in 2007 and 2008 (FRC 2008a, FRC 2008b). A French River cleanup in 2004 in the Perryville area of the river yielded an estimated two tons of trash (Dignam 2004).

Due to a lack of recent quality-assured bacteria and other data, the *Primary* and *Secondary Contact Recreational* uses are not assessed. The Aesthetics Use is assessed as support based on the lack of objectionable conditions noted by the FRC. These uses are identified with an “Alert Status” however because of the historical problems associated with illegal dumping of trash and debris.

French River (MA42-06) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Sediment contamination (sediment screening values exceeded) Source: Contaminated sediments
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED*
Secondary Contact		
Aesthetics		SUPPORT*

\* Alert Status issues identified, see details in use assessments

#### **RECOMMENDATIONS**

Conduct water quality sampling and macroinvertebrate sampling in this segment to assess the *Aquatic Life Use* and to attempt an evaluation of the effects of the Webster WWTP discharge on the French River. FRC monitoring has documented elevated phosphate concentrations at their State Line site (FRC 2008a, FRC 2008b). Any water quality sampling should test for total phosphate and should bracket the Webster Wastewater Treatment Plant. Lake sampling should be conducted in the Perryville Impoundment.

Deploy mutliprobes in this segment to assess the *Aquatic Life Use* and water quality in this segment.

Any plans to remove the Perryville Impoundment should include sediment removal as many contaminants are present in concentrations higher than DEP stage I screening values.

Given historical indications of impacted aquatic life, fish toxics sampling in the French River near the Perryville Impoundment should be conducted.

## FRENCH RIVER WATERSHED - LAKE ASSESSMENTS

A total of 68 lakes, ponds or impoundments (the term "lakes" will hereafter be used to include all) have been identified and assigned PALIS code numbers in the French River Basin (Ackerman 1989 and MA DEP 2001a). The total surface area of the French River Basin lakes is 3,556 acres. They range in size from one to 1,181 acres; 56 lakes are less than 50 acres, 8 are greater than 100 acres and, of these, 2 are greater than 200 acres. This report presents information on 43 of the French River Watershed lakes (Figure 10). The remaining 22 named lakes are unassessed and are not currently included as segments in the WBS database.

The 43 lakes assessed in this report represent 3,420 of the 3,556 acres, or 97% of the surface area, in the French River Basin. They lie wholly or partly within six of the basin's 10 communities (Figure 10). Thirty-four of the lakes assessed are less than 50 acres in total surface area. Baseline lake surveys were conducted during TMDL sampling on a select few lakes in the summer of 1999 (MassDEP 2002c).

A number of French River Watershed lakes have no updated information (TMDL completion, etc) or new information to make an assessment of designated uses. Information on these waterbodies is summarized below. All the following waterbodies are not assessed for all uses.

Segment	Name	Size (acres)	Class	Description	2008 Integrated List Details
MA42008	Carbuncle Pond <sup>1</sup>	11.0	B	Oxford	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42017	Easterbrook Pond	5.0	B	Dudley	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42025	Henshaw Pond	37.0	A\PWS\ORW	Leicester	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42032	Little Nugget Lake <sup>2</sup>	13.0	B	Charlton	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42039	Nipmuck Pond	20.0	B	Webster	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42046	Putnam Pond <sup>3</sup>	20.0	B	Charlton	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42053	Slaters Pond	105.0	B	Oxford	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42054	Snow Pond	1.0	B	Charlton	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42063	Watson Millpond	2.0	B	Spencer	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42065	Wee Laddie Pond	6.0	B	Charlton	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed
MA42072	Hultered Pond**	4	B	Charlton	This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

<sup>1</sup> Carbuncle Pond public beach, <sup>2</sup> Little Nugget public beach, <sup>3</sup> Camp Joslin public beach \*\*Note: NPDES permittee MAG910003 (formerly MA0036757) in upper watershed.

# French River Watershed Lake Segments

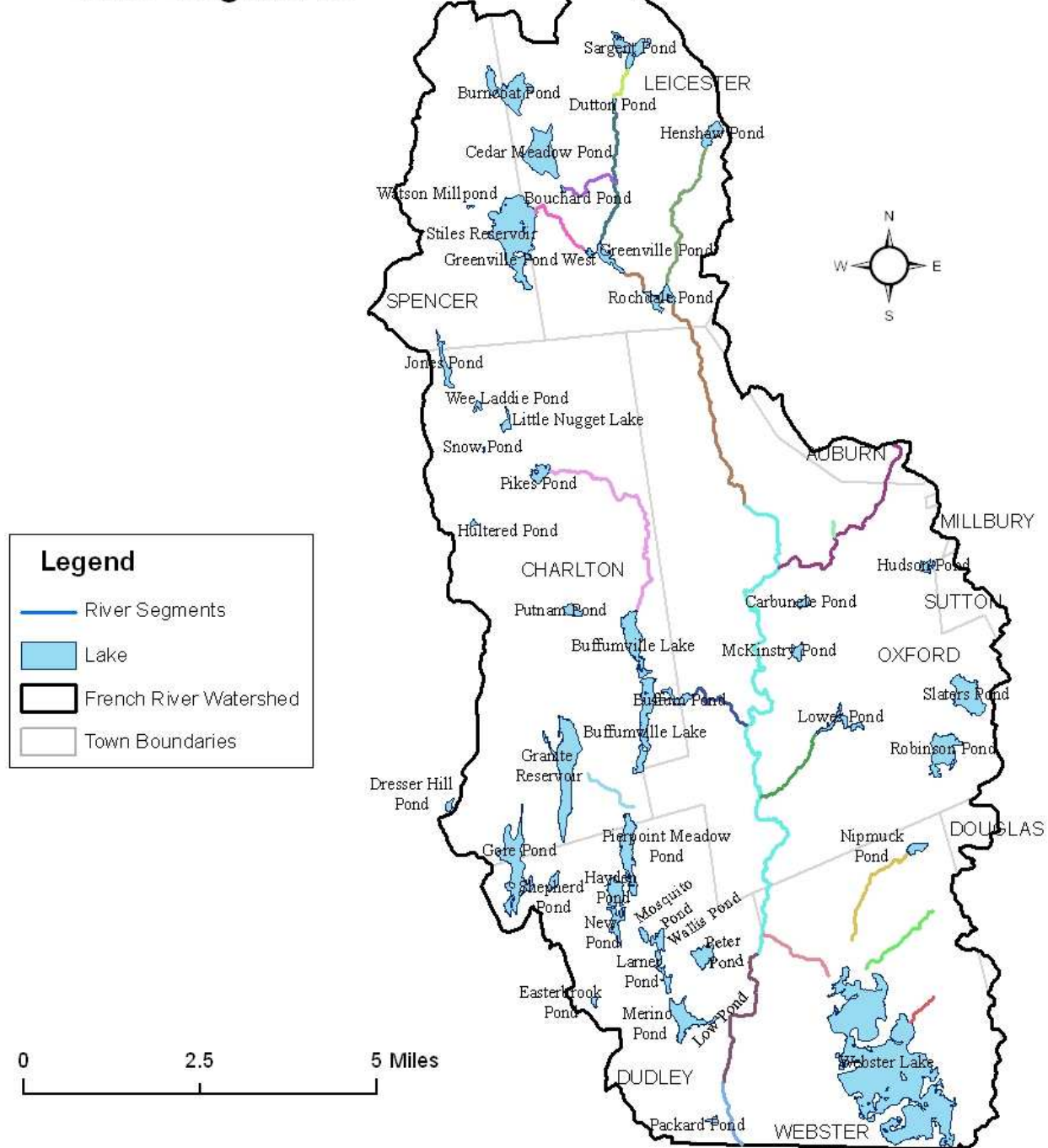


Figure 10: French River Watershed Lake Segments

**Bouchard Pond (MA42003)**

Location: Leicester.

Size: 2.0 acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant (Exotic species\*). \* denotes a non-pollutant.

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**





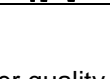
Town of Leicester (MAR041202)

**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum heterophyllum* is indicated in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired because of the presence of a non-native macrophyte species. No other recent quality assured data are available.

Bouchard Pond (MA42003) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Conduct macrophytes mapping and water quality sampling of Bouchard Pond to determine macrophyte community composition and current trophic status.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent the spread of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).



**Buffum Pond (MA42004)**

Location: Charlton/Oxford.

Size: 23 acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant (Exotic species\*). \* denotes a non-pollutant.

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLES F1 AND F3)**

American Polymers, Oxford (MA0029050)

Town of Charlton (MAR041100), Town of Oxford (MAR041147)

**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum heterophyllum* in Buffum Pond was documented in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

ToxicityAmbient






Water was collected near the northwest end of Buffum Pond and used as dilution water in the American Polymers, Inc. (API) company's modified acute and chronic whole effluent toxicity tests. Between March 2003 and March 2008 survival of *C. dubia* exposed (7-day) to pond water was good (n=6). Survival of *P. promelas* exposed (7-day) to pond water ranged from 73 to 100% (n=7) although survival was <75% in only one test event (April 2005).

Effluent

No acute whole effluent toxicity was detected in the API's effluent discharge. The effluent did exhibit occasional chronic whole effluent toxicity in two test events (March 2005 CNOEC = 12.5% effluent to *C. dubia* and March 2008 CNOEC = 50% to *P. promelas*).

Given the historic presence of a non-native plant species the *Aquatic Life Use* is assessed as impaired.

Buffum Pond (MA42004) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Conduct macrophytes mapping and water quality sampling of the Buffum Pond to determine the extent of non-native infestation and current trophic status.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

## **Buffumville Lake (MA42005)**

Location: Charlton/Oxford.

Size: 199 acres.

Classification: Class B.

Buffumville Lake (MA42005) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4c, “Impairment not Caused by a pollutant”. Impairment Causes -Metals {Hg-CN176.0}, Noxious aquatic plants [7/12/2002-CN110.0], (Exotic species\*) (MassDEP 2002c).

The TMDL of Phosphorous for Buffumville Lake is to be reduced from the current estimated loading of 1253 kg/year to a target load of 862 kg/year and the selected target phosphorus concentration is 15 µg/L (MassDEP 2002c).

The Northeast Regional Mercury Total Maximum Daily Load (TMDL) was prepared by the New England Interstate Water Pollution Control Commission (NEIWPCC) in cooperation with the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The TMDL covers waterbodies that are impaired primarily due to atmospheric deposition of mercury (Northeast States 2007). The TMDL target for Massachusetts is 0.3 ppm or less of mercury in fish tissue. The plan calls for a 75% reduction of in-region and out of region atmospheric sources by 2010 and a 90% or greater reduction in the future (NEIWPCC 2007). The TMDL will be reassessed in 2010 based on an evaluation of new on-going monitoring and air deposition data. Final targets will be determined at that time.

As described by Barker (2007): “*Within this segment of the Little River watershed, the US ACOE's New England District maintains Buffumville Lake, which is part of a system of six US ACOE flood-control projects in the Thames River Basin. It was constructed in response to the 1936 flood to provide protection to downstream communities on the French, Quinebaug and Thames Rivers. Its reservoir and flood encroachment area encompass approximately 1.8 miles of the Little River, and include 488 acres owned in fee with flowage easements on another 273 acres. These lands are mostly within the town of Charlton, but parts are also in Dudley and Oxford. Project features include a 3255-ft long earth-fill dam with a maximum height of 66 feet above the streambed. Under normal conditions the project maintains a 200-acre recreation pool at a stage of 11 feet by means of a weir, which allows releases to approximate run-of-river conditions. At the spillway crest stage of 42.5 feet, the project impounds 11,300 acre-feet, equivalent to 8 inches of runoff from the drainage area of 26.5 square miles. Since it began operation in April of 1958, the highest recorded pool was at 58 percent full in April 1987. In addition to its primary purpose of flood control, the project is also operated for recreation including swimming, boating, picnicking, fishing, and hunting; and fish and wildlife habitat.*”

## **USE ASSESSMENT**

### **AQUATIC LIFE**

#### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b). The US ACOE confirms that noxious and non-native plants continue to be a problem but that no active management program has been recently undertaken (US ACOE 2007). In 2008, the Corps conducted an examination of Buffumville Pond to assess ongoing issues of sedimentation, proliferation of aquatic plants, recurring algal blooms, and fish kills (Barker 2008). Barker noted: “*Small deltas are forming at reservoir inflows due to sediment accumulation. Buffumville Lake has long had a heavy growth of water milfoil (Myriophyllum) over all but the deepest parts of the lake, but in 2007 the weed growth increased and during the summer of 2008 project rangers often on Monday morning had to remove a cubic yard or more of weeds that washed up on the boat ramp over the weekend. In late summer and the fall of 2007 there were extensive cyanobacteria blooms at the lake, which reappeared briefly and less extensively in the spring 2008. There was a fish kill in 2007 involving mostly smaller fish and again in May 2008. The water is also colored and somewhat turbid, especially the south pool.*” Recommendations to address these concerns include the release of bottom water to reduce some of the nutrient load; increase flushing of the swimming area; spot herbicide treatments in critical areas e.g., the boat ramp; and sediment coring to determine rate and composition of lake fill material.

The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native macrophyte and due to algal blooms..

### **FISH CONSUMPTION**

In 1999 fish were collected from Buffumville Lake, French River Watershed, and edible fillets were analyzed for select metals, PCBs, and organochlorine pesticides (Appendix B in MassDEP 2002b). Due to the presence of mercury, MA DPH issued the following advisory (MA DPH 2008) recommending:

*“Children under 12 years of age, pregnant women, nursing mothers, and women of childbearing age who may become pregnant should refrain from consuming fish from Buffumville Lake” and “The general public should limit consumption of all fish from this Lake to two meals per month”.*






Because of the site-specific fish consumption advisory for Buffumville Lake due to mercury contamination, the *Fish Consumption Use* is assessed as impaired.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There is one beach on the shoreline of Buffumville Lake (Buffumville Lake Beach). US ACOE collects weekly *E. coli* samples between May and September. The beach at Buffumville Lake was closed for 2 days in 2003 but was not closed for any days during 2004, 2005 and 2006 swimming seasons (US ACOE 2006 and 2007) and ongoing beach monitoring indicated that levels of *E. coli* were within the acceptable range through mid-July 2009. A bloom of cyanobacteria (i.e., blue green algae) forced the closure of the project from mid-August to the end of the bathing season in 2007, and for two weeks in early June, 2008; no closures were necessary through mid-July 2009 (Russell 2009).

The *Primary and Secondary Contact Recreational and Aesthetics Uses* are assessed as impaired based on the dense infestation of the non-native aquatic macrophyte as well as the blue-green algal blooms which resulted in beach closures in 2007 and 2008.

Buffumville Lake (Segment MA42005) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native aquatic plants , Excess Algal Growth (algal blooms) Source: Introduction of non-native organisms
Fish Consumption		IMPAIRED Cause: Mercury in fish tissue Source: Atmospheric deposition – toxics
Primary Contact		IMPAIRED Cause: Non-native aquatic plants Excess Algal Growth (algal blooms) Source: Introduction of non-native organisms , Unknown
Secondary Contact		
Aesthetics		

### **RECOMMENDATIONS**

Conduct macrophytes mapping and water quality sampling of the Buffumville Lake to determine the extent of non-native infestation and current trophic status.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be

consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings and implementation.

Continue to conduct fish toxics monitoring for Hg to evaluate changes and success of TMDL.

**Burncoat Pond (MA42007)**

Location: Leicester/Spencer.

Size: 115 acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**






Town of Leicester (MAR041202), Town of Spencer (MAR041162)

**USE ASSESSMENT****AQUATIC LIFE**Biology

The possible presence of *Myriophyllum sp.* in Burncoat Pond is indicated in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b). Confirmation of the presence of a non-native *Myriophyllum sp.* by DWM personnel is needed.

The *Aquatic Life Use* is not assessed for Burncoat Pond. However, this use is identified with an "Alert Status" because of the potential infestation of non-native form of *Myriophyllum*. Due to a lack of recent quality assured data all uses are not assessed.

Burncoat Pond (Segment MA42007) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

**RECOMMENDATIONS**

Conduct macrophytes mapping and water quality sampling of the Burncoat Pond to ascertain the current macrophytes composition and current trophic status.

### Cedar Meadow Pond (MA42009)

Location: Leicester.

Size: 140 Acres.

Classification: Class B.

Cedar Meadow Pond (MA42009) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4c, “Impairment not Caused by a pollutant”. Impairment Causes - Noxious aquatic plants [7/12/2002-CN110.0], (Exotic species\*) (MassDEP 2002c).

The TMDL of Phosphorous for Cedar Meadow Pond is to be reduced from the current estimated loading of 244 kg/year to a target load of 193 kg/year/ and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Leicester (MAR041202)

### USE ASSESSMENT






#### AQUATIC LIFE

##### Biology

The presence *Cabomba caroliniana* and *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b). Given the historic presence of non-native plant species the *Aquatic Life Use* is assessed as impaired.

The US ACOE measured Secchi disk transparency in July between 1998 and 2000 and the average Secchi depth was 2.4 meters (MassDEP 2002c). No other recent quality assured data are available therefore all other uses are not assessed.

Cedar Meadow Pond (MA42009) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used

for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).



**Dresser Hill Pond (MA42014)**

Location: Charlton.

Size: 8 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4a-TMDL is Completed (Turbidity [7/12/2002, CN110.0]).

The TMDL of Phosphorous for Dresser Hill Pond is to be reduced from the current estimated loading of 93.5 kg/year to a target load of 14 kg/year and the selected target total phosphorus concentration is 0.035 mg/L (MassDEP 2002c).






Dresser Hill Pond is located on the top of the watershed divide between the French and Quinebaug River Valleys. Originally, the pond drained to the north to a wetland system, and thus to Dresser Brook and the Quinebaug River. However, management activities at the pond have directed the flow to the south, which reaches Gore Pond (Baker Pond) via an unnamed stream (Pelto 2001).

**USE ASSESSMENT**

Historical water quality data indicate degraded water quality conditions in this waterbody (MassDEP 2002c and MassDEP 2002b). It should be noted however that the dairy farm, which was present during the 1999 DWM sampling effort, is no longer in business and a nursery owns the property so nutrient loading to this pond is expected to have decreased.

No recent quality assured data are available so all uses are not assessed.

Dresser Hill Pond (MA42014) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Water quality monitoring in Dresser Hill Pond should be conducted to evaluate current conditions given changes in the land use in the watershed area.

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings and implementation. Best management practices to limit nutrient loading to Dresser Hill Pond should be supported.

## **Dutton Pond (MA42015)**

Location: Leicester.

Size: 6 Acres.

Classification: Class B.

Dutton Pond (MA42015) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutants addressed are Nutrients [7/12/2002-CN110.0], Noxious aquatic plants [7/12/2002-CN110.0]

The TMDL of Phosphorous for Dutton Pond is to be reduced from the current estimated loading of 452 kg/year to a target load of 248 kg/year and the selected target total phosphorus concentration is 0.035 mg/L (MassDEP 2002c).

## **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLES F2)**

Leicester Water Supply District (MA0101796)

The Leicester Water Supply District currently discharges to Dutton Pond. The Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) details target load allocations with both the current discharge location and a location bypassing Dutton Pond.

## **USE ASSESSMENT**

### **AQUATIC LIFE**

#### Biology

Sparse amounts of green filamentous algae were noted around the perimeter of the pond (MassDEP 2004b).

#### Toxicity

##### Effluent

Between November 2001 and November 2007 acute and/or chronic whole effluent toxicity tests were conducted on Leicester WSD treated effluent using *C. dubia* (n=25 and 13, respectively). No acute whole effluent toxicity was detected (LC<sub>50</sub>'s were all >100% effluent). It should be noted that when chronic whole effluent toxicity was detected (four of the 13 tests with CNOECs ranged from 38 to 62% effluent), the facility was in compliance with their CNOEC limits but the problems were always during the spring (May/June) sampling events.

#### Chemistry

Between 28 and 29 July 2004, a multiprobe was deployed in Dutton Pond by DWM to measure DO and temperature. The minimum DO was 10.3 mg/L (114% saturation) while the maximum was 14.9 mg/L (168% saturation) during the 22.75 hours of deployment. The maximum temperature was 20.8°C (MassDEP 2004b).






The *Aquatic Life Use* is assessed as impaired for Dutton Pond. The large diurnal change in DO and the extremely supersaturated conditions are indicative of the highly enriched conditions of the pond.

## **PRIMARY AND SECONDARY CONTACT RECREATIONAL AND AESTHETIC USES**

The water column was described as being highly turbid when DWM staff deployed the multiprobe in Dutton Pond on 28 July 2004 (MassDEP 2004b). These conditions corroborate earlier trophic status assessments of Dutton Pond as being hypereutrophic (MassDEP 2002b) with algal blooms and related turbidity impairing the recreational and aesthetics uses.

Given the historical assessment of this waterbody as being hypereutrophic, the presence of the discharge into the pond, and the very limited recent data describing the pond as highly turbid, the *Primary* and *Secondary Contact Recreational* and *Aesthetic* uses are assessed as impaired.

### Dutton Pond (MA42015) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Nutrient/Eutrophication Biological Indicators, Total Phosphorus, Dissolved oxygen saturation Sources: Municipal point source discharge
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Turbidity, Nutrient/Eutrophication Biological Indicators Sources: Municipal point source discharge
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings and implementation.

Monitor efforts and strategies of the Leicester Water Supply District to meet their new (2005) discharge permit limits.

**Gore Pond (MA42018)**

Location: Charlton/Dudley.

Size: 169 Acres.

Classification: Class B.

Gore Pond (MA42018) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4c, “Impairment not Caused by a pollutant”. Impairment Causes -Organic enrichment/Low DO [7/12/2002-CN110.0], Noxious aquatic plants [7/12/2002-CN110.0], Turbidity [7/12/2002-CN110.0], (Exotic species\*).

The TMDL of Phosphorous for Gore Pond is to be reduced from the current estimated loading of 160 kg/year to a target load of 106 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Charlton (MAR041100)






**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum heterophyllum* in Gore Pond is noted in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b). Historical data indicate degraded water quality conditions (MassDEP 2002c) however no recent quality assured data are available. A dairy farm in the upper watershed ceased operations since the last water quality monitoring survey conducted in 1999.

Given the historic presence of a non-native plant species in Gore Pond the *Aquatic Life Use* is assessed as impaired.

No other recent quality assured data are available so all other uses are not assessed.

Gore Pond (MA42018) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

Conduct water quality sampling and macrophyte mapping to better assess the *Aquatic Life Use* and determine current water quality conditions given changes in land use in the watershed area.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined

and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

## Granite Reservoir (MA42019)

Location: Charlton.

Size: 207 Acres.

Classification: Class B.

Granite Reservoir (MA42019) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4c, “Impairment not Caused by a pollutant”. Impairment Causes - Noxious aquatic plants [7/12/2002-CN110.0], (Exotic species\*).

The TMDL of Phosphorous for Granite Reservoir is to be reduced from the current estimated loading of 440 kg/year to a target load of 369 kg/year and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).

## NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Charlton (MAR041100)

## USE ASSESSMENT

### AQUATIC LIFE

#### Biology






The presence of *Myriophyllum heterophyllum* in Granite Reservoir is indicated in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired because of the presence of a non-native macrophyte species. No other recent quality assured data are available.

### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

There is one beach on the shoreline of Granite Reservoir (Camp Foskett Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

Granite Reservoir (MA42019) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

## RECOMMENDATIONS

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in

unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Support improvement of freshwater Beaches Bill data quality and reporting.

### Greenville Pond (West Basin) (MA42022)

Location: Leicester.

Size: 6 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Leicester (MAR041202)

### USE ASSESSMENT






#### AQUATIC LIFE

##### Biology

The presence of *Myriophyllum* sp. was noted in Greenville Pond (MassDEP 2002b). Field identification of *Myriophyllum* sp. is needed.

The *Aquatic Life Use* is given an "Alert Status" due to the possible presence of a non-native macrophytes species. No other recent quality assured data are available. All uses are not assessed.

Greenville Pond (West Basin) (MA42022) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Conduct macrophytes mapping of Greenville Pond to ascertain the current macrophyte composition and determine whether or not the *Myriophyllum* sp. is non-native when flowering heads are present.



### Greenville Pond (MA42023)

Location: Leicester.

Size: 31 Acres.

Classification: Class B.

Greenville Pond (MA42023) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) addressed by TMDL or Other Pollution Control”. Pollutant addressed is Turbidity [7/12/2002-CN110.0].

The TMDL of Phosphorous for Greenville Pond (MA42023) is to be reduced from the current estimated loading of 929 kg/year to a target load of 737 kg/year and the selected target total phosphorus concentration is 0.025 mg/L (MassDEP 2002c).






### USE ASSESSMENT

#### AQUATIC LIFE

##### Biology

The US ACOE took Secchi disc readings in July between 1998 and 2000 and the average Secchi depth was 1.9 meters (MassDEP 2002c). No other recent quality assured data are available. Too limited data are available so all uses are not assessed.

Greenville Pond (MA42023) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

### RECOMMENDATIONS

Review Leicester WSD's progress on meeting their new NPDES permit limits (permit issued in 2005).

Conduct macrophyte mapping and water quality sampling of the Greenville Pond to ascertain the current macrophytes composition and determine current trophic status.

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

## Hayden Pond (MA42024)

Location: Dudley.

Size: 44 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed.

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

Herbicide file applications from 2005 and 2006 indicate the presence of *Myriophyllum heterophyllum*. Confirmation of *Myriophyllum sp.* identification by DWM personnel is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophytes species.

No other recent quality assured data are available so all other uses are not assessed.

Hayden Pond (MA42024) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Conduct macrophytes mapping of Hayden Pond to ascertain the current macrophytes composition.

**Hudson Pond (MA42029)**

Location: Oxford.

Size: 15 Acres.

Classification: Class B.






Hudson Pond (MA42029) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0] (MassDEP 2002c).

The TMDL of Phosphorous for Hudson Pond (MA42029) is to be reduced from the current estimated loading of 42 kg/year to a target load of 24 kg/year and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).

**USE ASSESSMENT**

No recent quality assured data are available so all uses are not assessed.

Hudson Pond (MA42029) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

**Jones Pond (MA42030)**

Location: Charlton/Spencer.

Size: 30 Acres.

Classification: Class B.

Jones Pond (MA42030) is on the Massachusetts Year 2008- Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0] (MassDEP 2002c).

The TMDL of Phosphorous for Jones Pond (MA42030) is to be reduced from the current estimated loading of 80 kg/year to a target load of 64 kg/year and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).






**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Charlton (MAR041100)

**USE ASSESSMENT**

No recent quality assured data are available so all uses are not assessed.

Jones Pond (MA42030) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

**Larner Pond (MA42068)**

Location: Dudley.

Size: 27 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant (Noxious aquatic plants [7/12/2002, CN110.0], (Exotic species\*)). \* denotes a non-pollutant.

The TMDL of Phosphorous for Larner Pond is to be reduced from the current estimated loading of 260 kg/year to a target load of 108 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108)






**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum heterophyllum* in Larner Pond is noted in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b). Historical data indicate degraded water quality conditions (MassDEP 2002c) however no recent quality assured data are available.

Given the historic presence of a non-native plant species in Larner Pond the *Aquatic Life Use* is assessed as impaired.

No other recent quality assured data are available so all other uses are not assessed.

Larner Pond (MA42068) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism  NOT ASSESSED
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Consider macrophytes mapping and water quality sampling of the Larner Pond to ascertain the current macrophytes composition and determine current trophic status.

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and

alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

### Low Pond (MA42033)

Location: Dudley.

Size: 4 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Dudley (MAR041108)

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

The presence of *Myriophyllum heterophyllum* in Low Pond is noted in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

Given the presence of a non-native aquatic macrophyte the *Aquatic Life Use* is assessed as impaired.

No other recent quality assured data are available so all other uses are not assessed.

Low Pond (MA42033) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

**Lowes Pond (MA42034)**

Location: Oxford.

Size: 33 Acres.

Classification: Class B.

Lowes Pond (MA42034) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0] (MassDEP 2002c).

The TMDL of Phosphorous for Lowes Pond is to be reduced from the current estimated loading of 460 kg/year to a target load of 212 kg/year and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).

**NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):**






Town of Oxford (MAR041147)

Note: This pond is bisected by /395 therefore highway runoff is a major contributor of stormwater runoff to this pond. In addition, upstream development activities in March 2004 resulted in severe erosion near Huguenot Road, Oxford; the runoff carried sediment into Lowes Pond (Dulmaine, G. and Nadeau, P. 2004-2006).

**USE ASSESSMENT**

No recent quality assured data are available. All uses are not assessed.

Lowes Pond (MA42034) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.



### McKinstry Pond (MA42035)

Location: Oxford.

Size: 16 Acres.

Classification: Class B.

McKinstry Pond is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0] (MassDEP 2002c).

The TMDL of Phosphorous for McKinstry Pond is to be reduced from the current estimated loading of 83 kg/year to a target load of 15 kg/year and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).

### NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):

Town of Oxford (MAR041147)

### USE ASSESSMENT






#### AQUATIC LIFE

##### Biology

The presence of *Myriophyllum sp.* has been noted in McKinstry Pond (MA DCR 2006). Field identification of *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophytes species. No other recent quality assured data are available. All uses are not assessed.

McKinstry Pond (MA42035) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Conduct macrophyte mapping of McKinstry Pond to ascertain the current composition and determine whether or not the *Myriophyllum sp.* is a non-native.

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

**Merino Pond (MA42036)**

Location: Dudley.

Size: 75 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108)

**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum sp.* has been noted in Merino Pond (MA DCR 2006, MassDEP 2002b). Field identification of *Myriophyllum sp.* is needed.






The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophyte species.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There is one beach on the southwest shoreline of Merino Pond (Merino Pond Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

No other quality assured data are available for this waterbody so all uses are not assessed.

Merino Pond (MA42036) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

**RECOMMENDATIONS**

Conduct macrophytes mapping of Merino Pond to ascertain the current macrophytes composition.

Support improvement of freshwater Beaches Bill data quality and reporting.

### New Pond (MA42037)

Location: Dudley.

Size: 33 Acres.

Classification: Class B.

New Pond (MA42037) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0].

The TMDL of Phosphorous for New Pond is to be reduced from the current estimated loading of 183 kg/year to a target load of 74 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Dudley (MAR041108)

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

The possible presence of *Myriophyllum sp.* was noted in New Pond (MassDEP 2002b). Field identification of *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophytes species.

No other recent quality assured data are available so all other uses are not assessed.

New Pond (MA42037) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Conduct macrophytes mapping of New Pond to ascertain the current macrophytes composition.

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

## Packard Pond (MA42040)

Location: Dudley.

Size: 6 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

## USE ASSESSMENT

### AQUATIC LIFE






#### Biology

The presence of *Myriophyllum heterophyllum* in Packard Pond is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

Given the historic presence of a non-native plant species the *Aquatic Life Use* is assessed as impaired.

No other recent quality assured data are available so all other uses are not assessed.

Packard Pond (MA42040) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

## RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

**Peter Pond (MA42042)**

Location: Dudley.

Size: 42 Acres.

Classification: Class B.






Peter Pond (MA42042) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutants addressed are Nutrients [7/12/2002-CN110.0], Organic enrichment/Low DO [7/12/2002-CN110.0].

The TMDL of Phosphorous for Peter Pond indicates that the current estimated loading of 27 kg/year is equal to the target load and the selected target total phosphorus concentration is 0.010 mg/L (MassDEP 2002c).

**USE ASSESSMENT**

No recent quality assured data are available so all uses are not assessed.

Peter Pond (MA42042) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Conduct water quality monitoring to evaluate status of designated uses.

**Pierpoint Meadow Pond (MA42043)**

Location: Charlton/Dudley.

Size: 95 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant (Noxious aquatic plants [7/12/2002, CN110.0], (Exotic species\*)). \* denotes a non-pollutant.

The TMDL of Phosphorous for Pierpoint Pond is to be reduced from the current estimated loading of 142 kg/year to a target load of 93 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Charlton (MAR041100), Town of Dudley (MAR041108)

**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum heterophyllum* in Pierpoint Meadow Pond is noted in the French and Quinebaug 2001 Water Quality Assessment Report and in herbicide file applications (MassDEP 2002b and MassDEP 2006b). On 8 July 2003 a depth profile in the deep hole of Pierpoint Meadow Pond was conducted. *In-situ* water quality monitoring that included measurements of temperature, pH, conductivity, TDS, depth and dissolved oxygen was conducted. Dissolved oxygen was greater than 7.0 mg/L from 0.3 meters depth to a depth of 3.0 meters (MassDEP 2007a). All other measured parameters were within water quality standards.






Given the presence of a non-native aquatic macrophyte the *Aquatic Life Use* is assessed as impaired.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

The Secchi disc depth measured by DWM was 3.6m on 8 July 2003. No objectionable odors, scums, deposits or other conditions were noted.

Too limited recent quality assured data are available so these uses are not assessed.

Pierpont Meadow Pond (MA42043) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: :Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A

key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

**Pikes Pond (MA42044)**

Location: Charlton.

Size: 28 Acres.

Classification: Class B.






Pikes Pond (MA42044) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Turbidity [7/12/2002-CN110.0].

The TMDL of Phosphorous for Pikes Pond is to be reduced from the current estimated loading of 366 kg/year to a target load of 217 kg/year and the selected target total phosphorus concentration is 0.015 mg/L (MassDEP 2002c).

**USE ASSESSMENT**

No recent quality assured data are available. All uses are not assessed.

Pikes Pond (MA42044) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.



**Robinson Pond (MA42047)**

Location: Oxford.

Size: 99 Acres.

Classification: Class B.

Robinson Pond (MA42047) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0].

The TMDL of Phosphorous for Robinson Pond is to be reduced from the current estimated loading of 64 kg/year to a target load of 56 kg/year and the selected target total phosphorus concentration is 0.012 mg/L (MassDEP 2002c).

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**






Town of Oxford (MAR041147)

**USE ASSESSMENT**

The FRC began monitoring at the outlet of Robinson Pond in 2006 (FRC 2006). They reported that the area around the pond is under development pressure, from which runoff may negatively impact water quality in the pond. In 2006, monitoring concluded in August at which time there was no flow from the outlet. Observations included a consistently clear water column, no odors, with moderate plant growth (water lilies) and minor trash (FRC 2006, Beaudoin 2006).

Based on the available information, the Aquatic Life, Fish Consumption, and Primary and Secondary Contact Recreation Uses are not assessed. The Aesthetics Use is assessed as support, with an “Alert Status” due to the recent development pressure near the pond.

Robinson Pond (MA42047) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		SUPPORT*

\*Alert Status issues identified, see details in use assessment

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

### Rochdale Pond (MA42048)

Location: Leicester.

Size: 43 Acres.

Classification: Class B.






Rochdale Pond (MA42048) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutants addressed are Nutrients [7/12/2002-CN110.0], Organic enrichment/Low DO [7/12/2002-CN110.0], Noxious aquatic plants [7/12/2002-CN110.0].

The TMDL of Phosphorous for Rochdale Pond is to be reduced from the current estimated loading of 1155kg/year to a target load of 993 kg/year/ and the selected target total phosphorus concentration is 0.025 mg/LMassDEP 2002c).

### USE ASSESSMENT

No recent water quality data are available so all uses are not assessed. However, it should be noted that due to the possible presence of a non-native macrophyte (*Myriophyllum sp.*), the *Aquatic Life Use* is identified with an “Alert Status”.

Rochdale Pond (MA42048) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

## Sargent Pond (MA42049)

Location: Leicester.

Size: 65 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

## USE ASSESSMENT






### AQUATIC LIFE

#### Biology

The presence of *Myriophyllum heterophyllum* is indicated in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native macrophytes species. No other recent quality assured data are available. All uses are not assessed.

Sargent Pond (MA42049) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

## RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

### Shepherd Pond (MA42051)

Location: Dudley.

Size: 16 Acres.

Classification: Class B.

Shepherd Pond (MA42051) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0].

The TMDL of Phosphorous for Shepherd Pond is to be reduced from the current estimated loading of 158 kg/year to a target load of 70 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

A herbicide file application from 2004 indicates the presence of *Myriophyllum heterophyllum* (MassDEP 2006b). Confirmation of *Myriophyllum sp.* identification by DWM personnel is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophytes species.

No other recent quality assured data are available so all other uses are not assessed.

Sheperd Pond (MA42051) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED*				

\*Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

**Stiles Reservoir (MA42055)**

Location: Spencer/Leicester.

Size: 309 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Leicester (MAR041202), Town of Spencer (MAR041162)

**USE ASSESSMENT****AQUATIC LIFE**Biology






The presence of *Myriophyllum sp.* has been noted in Stiles Reservoir (MA DCR 2006). Field identification of *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophytes species. No other recent quality assured data are available. All uses are not assessed.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There is a beach on Stiles Reservoir (Camp Laurelwood). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

Stiles Pond (MA42055) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

**RECOMMENDATIONS**

Conduct macrophytes mapping of Stiles Pond to ascertain the current macrophytes composition.

Support improvement of freshwater Beaches Bill data quality and reporting.

**Mosquito Pond (MA42060)**

Location: Dudley.

Size: 11 Acres.

Classification: Class B.

Mosquito Pond (MA42060) (also known as Tobins Pond) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutant addressed is Noxious aquatic plants [7/12/2002-CN110.0].

The TMDL of Phosphorous for Mosquito Pond (referred to as Tobins Pond in the TMDL) is to be reduced from the current estimated loading of 196 kg/year to a target load of 69 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).






**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108)

**USE ASSESSMENT**

No recent quality assured data are available so all uses are not assessed.

Mosquito Pond (MA42060) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

**Wallis Pond (MA42062)**

Location: Dudley.

Size: 24 Acres.

Classification: Class B.

Wallis Pond (MA42062) is on the Massachusetts Year 2008 Integrated List of Waters – Category 4a, “Pollutant (s) Addressed by TMDL or Other Pollution Control”. Pollutants addressed are Organic enrichment/Low DO [7/12/2002-CN110.0], Noxious aquatic plants [7/12/2002-CN110.0].

The TMDL of Phosphorous for Wallis Pond is to be reduced from the current estimated loading of 224 kg/year to a target load of 96 kg/year and the selected target total phosphorus concentration is 0.014 mg/L (MassDEP 2002c).

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108)






**USE ASSESSMENT****AQUATIC LIFE**

The possible presence of a non-native species of *Myriophyllum* was noted in Wallis Pond (MassDEP 2002b). Field identification of *Myriophyllum* sp. is needed.

The *Aquatic Life Use* is not assessed but is given an “Alert Status” due to the possible presence of a non-native macrophytes species.

No other recent quality assured data are available so all other uses are not assessed.

Wallis Pond (MA42062) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED*				

\*Alert Status issues identified, see details in use assessment section

**RECOMMENDATIONS**

Consult Total Maximum Daily Loads for Phosphorus for Selected French Basin Lakes (MassDEP 2002c) for recommended target phosphorus loadings, loading allocations and implementation.

Conduct macrophytes mapping of Wallis Pond to ascertain the current macrophytes composition.

## **Webster Lake (MA42064)**

Location: Webster.

Size: 1275 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

## **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Webster (MAR041170)

It should be noted here that water quality and biological monitoring was conducted by DWM in Browns Brook, an intermittent tributary to Webster Lake, in 2004. These data are available in the technical memoranda appended to this report (Fiorentino 2007, Maietta 2007, O'Brien-Clayton undated, and Beskenis 2009a).

## **USE ASSESSMENT**

### **AQUATIC LIFE**

#### Biology

The presence of *Myriophyllum heterophyllum*, *Myriophyllum spicatum* and *Cabomba Carolinia* has been documented in Webster Lake (MassDEP 2002b, MassDEP 2006b, Geosyntec Consultants 2003). The non-native Asian Clam (*Corbicula sp.*) has also been documented in Webster Lake and has been characterized as extensive as well as especially noticeable near the town boat ramp area (MA DCR 2006, Robinson 2007).

Geosyntec Consultants (2003) conducted an aquatic vegetation survey on 3 July and 8 July 2003 in Webster Lake. Macrophyte species composition, density and biovolume was estimated at 84 sampling stations in the lake. The dominant plants (dominant at one or more stations) in terms of the number of stations at which they were dominant were bladderwort (*Utricularia sp.*), variable milfoil (*Myriophyllum heterophyllum*), white water lily (*Nymphaea odorata*), Robin's pondweed (*Potamogeton robbinsii*), big-leaf pondweed (*Potamogeton amplifolius*), bushy pondweed (*Najas Flexillis*), watershield (*Brasenia schreberi*), yellow water lily (*Nuphar variegatum*), stonewort (*Nitella sp.*), waterweed (*Elodea nutalli*), and Eurasian milfoil (*Myriophyllum spicatum*).

Overall plant growth was considered sparse or moderate density at 75% of the stations sampled and was considered to be dense or very dense at 25% of sampled station (GeoSyntec Consultants 2003). Biovolume of macrophytes was characterized as high or very high at approximately 20% of stations sampled while it was characterized as low or moderate at the remaining 80% of stations (GeoSyntec Consultants 2003). Plant growth was greatest in the North Pond and especially dense in the cove areas of the North Pond (GeoSyntec Consultants 2003). Generally, cove locations in Webster Lake were more likely to be characterized by abundant plant growth.

The non-native variable milfoil (*Myriophyllum heterophyllum*) was found throughout the lake and was most prevalent in the North Pond (found at 68% of stations) (GeoSyntec 2003). It was also found at 53% of the stations in the Middle Pond and 33% of the stations in the South Pond (GeoSyntec Consultants 2003). Eurasian Milfoil (*Myriophyllum spicatum*) was found at 19% of all sampling stations and generally found in the Middle Pond and only found in one station in the North and South Ponds respectively (GeoSyntec Consultants 2003). Fanwort (*Carolinia Cabomba*) was only found at a few stations and was not dominant at any of them (GeoSyntec Consultants 2003).

Aquatic macrophytes have been managed in Webster Lake with the use of mechanical harvesting and herbicide applications. Geosyntec Consultants has produced reports in 2004 and 2006 detailing the aquatic macrophytes composition and abundance at select sites after herbicide treatment or mechanical harvesting (Geosyntec Consultants 2004 and 2006).



The *Aquatic Life Use* is assessed as impaired due to the presence of non-native aquatic macrophytes and a non-native clam. Low dissolved oxygen in the hypolimnetic area is also identified as a concern however data validation is necessary prior to identifying it as a cause of impairment.

#### **FISH CONSUMPTION**

In 1999 fish were collected from Webster Lake, French River Watershed, and edible fillets were analyzed for select metals, PCBs, and organochlorine pesticides (Appendix B in MassDEP 2002b). No DPH site-specific advisory has been issued for Webster Lake.

Since no site-specific fish consumption advisory was issued by the MA DPH, the *Fish Consumption Use* is not assessed.






#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There are 12 beaches on Webster Lake (Beacon Park, Birch Island, Colonial Park, Indian Ranch, Kildeer Island, Lakeside, Memorial Beach #1, Memorial Beach #2, Point Breeze, South Point, Treasure Island, Nipmuc Cove Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

All Secchi depth measurements reported by the Webster Lake Association taken between June and September 2005 (n=6 measurements in all three basins) and between May and October 2006 (n=11 measurements in all three basins) met than the recreation criteria (Benoit 2007). Webster Lake Association samplers generally did not note any objectionable conditions (odors, scums, deposits) (Benoit 2007). No objectionable odors, scums, deposits, or other conditions were noted during the survey conducted in the north basin of Webster Lake by DWM staff on 7 September 2005 (MassDEP 2005a).

The *Primary* and *Secondary Contact Recreation Uses* are not assessed due to the lack of quality assured bacteria data. The *Aesthetics Use* is assessed as support given the lack of objectionable conditions and good Secchi depth measurements.

### Webster Lake (MA42064) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native aquatic plants , Eurasian water milfoil, Non-native aquatic species Source: Introduction of Non-native organisms
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		SUPPORT

### RECOMMENDATIONS

Efforts to minimize pollution and sedimentation from road runoff should be pursued.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Support improvement of freshwater Beaches Bill data quality and reporting.

There are a total of twenty two freshwater rivers in the Quinebaug River Watershed assessed in this report (Figure 11). These rivers represent approximately 100% of the estimated 82.7 SARIS named river miles in the Quinebaug River Watershed in the state of Massachusetts. Using the 1:24,000 National Hydrography Dataset there are approximately 209.9 river miles in the Quinebaug River Watershed (Meek 2008).



91

Page Intentionally Left Blank

**Hollow Brook (MA41-24)**

Location: Headwaters, west of Hollow Road, Wales to confluence with Mill Brook, Brimfield.

Segment Length: 2.7 miles.

Classification: Class B.

This a new segment so it is not on the 2008 Integrated List.






**USE ASSESSMENT****AQUATIC LIFE**Biology

MA DFG biologists conducted fish population sampling in Hollow Brook at Hollow Road (Station 1222) in Wales on 22 August 2005 using backpack electroshocking equipment. A total of fifty-five fish were collected including fifty-two eastern brook trout and three golden shiner (Richards 2006). MA DFG biologists note that the brook was heavily colored by tannins and the substrate consisted of cobble with moderate amounts of sedimentation (Richards 2006). Multiple age classes of wild brook trout were collected and are considered pollution intolerant. It is quite common to find only brook trout in small first order tributary streams (Maietta 2007). This stream is also listed as a Coldwater Fishery Resource by MA DFG (Richards 2006).

The presence of multiple age classes of wild brook trout is indicative of excellent water and habitat quality as well as a stable flow regime so the *Aquatic Life Use* is assessed as support.

No other recent quality assured data are available so all other uses are not assessed.

Hollow Brook (MA41-24) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Although not designated as a cold water fishery this stream should be protected as a cold water fishery resource through antidegradation provisions. Additional water quality monitoring should be to evaluate instream DO and temperature regimes.

### **Mountain Brook (MA41-18)**

Location: Headwaters, east of Steerage Rock Road (excluding intermittent portion), Brimfield to the confluence with Mill Brook, Brimfield.

Segment Length: 1.9 miles.

Classification: Class B.

This a new segment so it is not on the 2008 Integrated List.

## **USE ASSESSMENT**

### **AQUATIC LIFE**

#### Habitat and Flow

DWM conducted habitat assessments of Mountain Brook approximately 100 m downstream from Rt. 20 in a wooded area (Station MO01) in 2004 during benthic macroinvertebrate and fish population surveys.

DWM fishery biologists gave the site a final habitat score of 155/200 (Maietta 2007). Riparian vegetative zone width and velocity depth combinations scored in the marginal category (Maietta 2007). The presence of a beaver dam upstream from the sampling site was noted (Maietta 2007).

DWM biologists gave their sampling reach in Mountain Brook (Station MO01) a total habitat score of 156/200 during the RBP III macroinvertebrate sampling. The habitat score was reduced due to low baseflow and flow-related habitat constraints, which appeared to be naturally occurring (Fiorentino 2007).

DWM conducted water quality sampling in Mountain Brook downstream from Rt. 20 in Brimfield (Station MO01) in 2004. During the sampling season DWM personnel noted that the stream level ranged from normal to one foot below the observed high water mark (Appendix B).

#### Biology

DWM conducted fish population sampling in Mountain Brook downstream from Rt. 20 in Brimfield (Station MO01) on 31 August 2004. DWM biologists collected five yellow bullhead, three white sucker, three golden shiner and one chain pickerel (Maietta 2007). Maietta (2007) notes that fish density was low and that many of the fish collected were young of the year. Only one fluvial species (white sucker) was present. The paucity of fluvial species and the presence of a beaver dam suggest an altered flow regime.

DWM conducted a benthic macroinvertebrate survey approximately 100 m downstream from Rt. 20 in Mountain Brook (Station MO01 (B0546)) in August 2004. The RBP III analysis indicated Mountain Brook was "slightly impacted" when compared to the regional reference station on Browns Brook (BR01) (Appendix C). DWM biologists noted a low scoring EPT Index at this site, which may be caused by low flow conditions believed to be naturally occurring (Fiorentino 2007). DWM biologists also estimated canopy cover (5% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

#### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Mountain Brook downstream from Rt. 20 in Brimfield (Station MO01) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 2:30 and 3am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions. The water temperature was less than 20 degrees C, the coldwater fishery standard, on all three occasions (Appendix B).

The *Aquatic Life Use* is assessed as support based on RBP III analysis and water quality data indicative of good water quality. It should be noted that seasonal low flows (likely natural given small watershed size) are likely a strong determinant of the benthic macroinvertebrate and fish communities sampled in Mountain Brook.






### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Mountain Brook downstream from Rt. 20 in Brimfield (Station MO01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 79 cfu/100 mL. DWM water quality and biological monitoring personnel also made

field observations during the 2004 sampling season but no odors, scums, or objectionable deposits were noted (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the general lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is also assessed as support.

Mountain Brook (MA41-18) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

### **West Brook (MA41-17)**

Location: Headwaters, west of the Dix Hill Road/Route 19 intersection (excluding intermittent portion), Brimfield to the confluence with Mill Brook, Brimfield.

Segment Length: 1.8 miles.

Classification: Class B.

This is a new segment so it is not on the 2008 Integrated List.

MA DFG conducted fish population sampling in West Brook off of the Route 19/Warren Road crossing (Station 2343) in Brimfield on September 12, 2007 using backpack electroshocking equipment. They sampled upstream of this segment in the intermittent section of West Brook. A total of 33 eastern brook trout, representing multiple age classes, was collected (MassWildlife 2008).

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted habitat assessments of West Brook approximately 140 m upstream from its mouth in Brimfield (Station WS01) during benthic macroinvertebrate and fish population surveys in 2004.

DWM fishery biologists gave the site a final habitat score of 156/200 (Maietta 2007). DWM fishery biologists scored sediment deposition, channel flow status, and velocity depth combinations in the “suboptimal” category while epifaunal substrate scored in the “marginal” category (Maietta 2007).

DWM biologists gave their sampling reach in West Brook (Station WS01) a total habitat score of 125/200 during the RBP III macroinvertebrate sampling. This site was evaluated to have the poorest habitat of all stations sampled during the 2004 French and Quinebaug watershed survey. Habitat was considered poor due to low flow (low channel flow status), and instream sediment deposition with moderate sand deposition affecting half of the reach (Fiorentino 2007).

##### Biology

DWM conducted fish population sampling in West Brook approximately 140 m upstream from its mouth in Brimfield (Station WS01) on 31 August 2004. DWM biologists collected a total of forty-two fish including thirteen fallfish, ten yellow bullhead, seven central mudminnow, six largemouth bass, two tessellated darter, one blacknose dace, one white sucker, one brown bullhead, and one chain pickerel (Maietta 2007). Maietta (2007) notes that central mudminnow have been previously undocumented in the Quinebaug watershed. The sample was dominated by fluvial specialists/dependant species. All the fish collected are considered moderately tolerant or tolerant of pollution and the central mudminnow is known to very tolerant of low dissolved oxygen concentrations.

DWM conducted a benthic macroinvertebrate survey of West Brook approximately 140 m upstream from its mouth (Station WS01) on 25 August 2004. The RBP III analysis indicated that West Brook was “slightly impacted” when compared to the reference station. DWM biologists noted the hyperdominance of a single taxa, the net-spinning philopotamid caddisfly, *Chimarra* sp., whose food source is suspended forms of fine organic particulates (Fiorentino 2007). DWM biologists noted that a series of impoundments upstream of their sampling reach was likely the source of suspended FPOM (Fiorentino 2007). DWM biologists noted that while the filter feeders at this location indicate some organic enrichment, water quality was generally good and habitat quality was most likely the limiting agent for the benthic community at station WS01 (Fiorentino 2007). DWM biologists also estimated canopy cover (30% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in West Brook at the Rt. 20 in Brimfield (Station WS01) during July and approximately 160 feet downstream of Route 20 in Brimfield (Station WS01A) in August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). All pre-dawn (between 2:45 and 3:30 am, n=3) measurements were indicative of good water quality (Appendix B).








The *Aquatic Life Use* is assessed as support based on the RBP III analysis and water quality data indicative of good water quality. It should be noted that habitat limitations and upstream impoundments are likely a strong determinant of the benthic macroinvertebrate and fish communities sampled in West Brook.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in West Brook Brook at Rt. 20 in Brimfield (Station WS01) in July, August, and September and in West Brook approximately 160 feet downstream of Route 20 in Brimfield (Station WS01A) in May and June. The geometric mean of *E. coli* counts for samples collected from both stations was 83 cfu/100 mL. DWM personnel did not note any odors, scums, or objectionable deposits at either sampling station (Appendix B). Potential pollution sources in the vicinity of DWM sampling stations include lawns, parking areas and livestock holding areas of nearby fairgrounds, agricultural areas as well as road runoff (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the general lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is assessed as support.

West Brook (Segment MA41-17) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

### **Unnamed Tributary (MA41-16)**

Location: Unnamed tributary to Mill Brook, headwaters, outlet Sherman Pond, Brimfield to confluence with Mill Brook, Brimfield.

Segment Length: 1.2 miles.

Classification: Class B.

This is a new segment and so it is not on the 2008 Integrated List. This brook is locally known as East Brook and is referred to below as such.

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

As part of the 2004 benthic macroinvertebrate and fish population surveys DWM conducted habitat assessments along East Brook between about 5 m upstream from Rt. 20 and a small wooden footbridge near the center of Brimfield (Station W1183). DWM fishery biologists gave the site a final habitat score of 149/200 (Maietta 2007). DWM fishery biologists scored the majority of habitat parameters in the “suboptimal” or “marginal” category (Maietta 2007).

DWM biologists gave their sampling reach in East Brook between 5m upstream from Rt. 20 and a small wooden footbridge near the center of Brimfield (Station W1183) a total habitat score of 137/200 during the RBP III macroinvertebrate sampling. Instream deposition, the filling in of pools and substrate embeddedness and a reduced riparian buffer most negatively impacted habitat (Fiorentino 2007). DWM biologists noted both inorganic and organic deposition problems but it was not clear where the sediment inputs originated (Fiorentino 2007).

##### Biology

MA DFG conducted fish population sampling south of East Hill Road, upstream of Route 20 (Site 120) in Brimfield on 5 July 2000 using backpack electroshocking equipment. A total of thirty-eight fish were collected including nineteen fallfish, eight common shiner, six chain pickerel, two golden shiner, one pumpkinseed, one yellow bullhead and one tessellated darter (Richards 2006). Fluvial specialists/dependants dominated the sample. All fish collected are classified as tolerant or moderately tolerant to pollution (Richards 2006). MA DFG biologists noted that upstream beaver ponds appeared to be affecting water quality (Richards 2006).

DWM conducted fish population sampling in East Brook upstream from Route 20 in Brimfield (Station W1183) on 31 August 2004. DWM biologists collected a total of seventy fish including twenty-eight central mudminnow, ten common shiner, eight tessellated darter, seven chain pickerel, five white sucker, five fallfish, four yellow bullhead, two creek chubsucker, and one golden shiner (Maietta 2007). Fluvial species dominated the fish sample. All the fish collected are considered moderately tolerant or tolerant of pollution and the central mudminnow is known to very tolerant of low dissolved oxygen concentrations.

DWM conducted a benthic macroinvertebrate survey of East Brook in August 2004 (Station 1183) (Fiorentino 2007). RBP III analysis indicated that East Brook was “moderately impacted” when compared to the reference station. DWM biologists noted a low EPT index, an elevated Hilsenhoff Biotic Index (HBI) and a benthic community dominated by the net-spinning caddisfly *Hydropsychidae*, all indicative of organic enrichment (Fiorentino 2007). DWM biologists also estimated canopy cover (100% open) as well as micro and macroalgal cover at this site (10 and 2%, respectively in the riffle habitat and 0% for both in the run habitat) (Beskenis 2009a). DWM biologists suggest that NPS pollution and the effects of Sherman Pond along with sediment deposition are potential sources of the impaired biota observed at this site (Fiorentino 2007).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in East Brook at the Rt. 20 crossing in Brimfield (Station W1183) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Dissolved oxygen concentrations measured between 3 and 4 am (n=3) (worst case scenario) were low and ranged from 3.6 to 4.4 mg/L (Appendix B). pH was 6.3 SU on each occasion (Appendix B).






The *Aquatic Life Use* is assessed as impaired based on the RBP III analysis which indicated a degraded benthic macroinvertebrate community, evidence of habitat degradation and water quality data indicative of poor water quality (i.e., low dissolved oxygen). The influence of upstream wetlands, beaver impoundments, Sherman Pond and NPS pollution all influence the water quality in East Brook although the exact magnitude of each stressors' influence on water quality is unknown.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in East Brook at the Rt. 20 crossing in Brimfield (Station W1183) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 971 cfu/100 mL. The highest *E. coli* count was 2800 cfu/100 mL that occurred on the 11 August 2004 sampling event, which is considered dry weather sampling. DWM personnel did not note any odors, scums, or objectionable deposits during the 2004 field season (Appendix B). Potential pollution sources noted by DWM crews include road runoff, lawns and horse farms (Appendix B).

The geometric mean of *E. coli* counts does not meet the *Primary* and *Secondary Contact Recreation Use* criteria, so these uses are assessed as impaired. Counts were elevated during both dry and wet weather sampling conditions. The *Aesthetics Use* is assessed as support given the lack of any objectionable deposits or other conditions.

Unnamed Tributary "East Brook" (Segment MA41-16) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Aquatic macroinvertebrate bioassessment, low dissolved oxygen, sedimentation/siltation Source: Unknown Suspected Source: Dam or Impoundment, habitat modification associated with sedimentation, agriculture, livestock (grazing or feeding operations)
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Elevated <i>E. coli</i> Source: Nonpoint source
Secondary Contact		Suspected sources: agriculture, livestock (grazing or feeding operations)
Aesthetics		SUPPORT

#### **RECOMMENDATIONS**

Conduct bacteria source tracking in East Brook to better evaluate source(s) contributing to elevated bacteria would during both dry and wet weather sampling conditions. Evaluate whether or not this is a good candidate for a human marker study.

Conduct additional water quality monitoring (physicochemical sampling) in East Brook to better evaluate the *Aquatic Life Use* and to determine whether or not organic enrichment and/or habitat alterations associated with sedimentation/siltation are associated with inputs from agricultural lands in the upper watershed. Sampling should also be conducted upstream from Sherman Pond.

**Wales Brook (MA41-08)**

Location: Outlet Lake George, Wales to confluence with Mill Brook, Brimfield.

Segment Length: 5.2 miles.






Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 2 – “Attaining Some Uses (Aquatic Life, Aesthetics); Others Not Assessed”.

**USE ASSESSMENT**

No recent quality assured data are available. All uses are not assessed.

Wales Brook (MA41-08) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

**Unnamed Tributary (MA41-27)**

Location: Unnamed tributary to Mill Brook headwaters south of East Hill Road, Brimfield to confluence with Mill Brook, Brimfield.

Segment Length: 1.7 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.






**USE ASSESSMENT****AQUATIC LIFE**Biology

MA DFG conducted fish population sampling in this unnamed tributary upstream of Route 20 near the Boy Scout camp (Site 1209) in Brimfield on 23 August 2005 using backpack electroshocking equipment. A total of ninety-four fish were collected including seventy-one blacknose dace, ten brook trout, five common shiner, five white sucker, two golden shiner, and one bluegill (Richards 2006). Age classes of brook trout indicative of a naturally reproducing population were collected. The sample was dominated by fluvial specialist species. This water body is identified by MA DFG as a Coldwater Fishery Resource (MA DFG 2007b).

The *Aquatic Life Use* is assessed as support based on the presence of multiple age classes of brook trout, a pollution intolerant species.

No other recent quality assured data are available so all other uses are not assessed.

Unnamed Tributary (MA41-27) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

### Mill Brook (Segment MA41-07)

Location: From inlet of Mill Road Pond (formerly pond segment MA41032), Brimfield to confluence with Quinebaug River, Brimfield.

Segment Length: 4.7 miles.

Classification: Class B.

Mill Road Pond (MA41032) will no longer be reported since the retention time of this waterbody was estimated at 3 days and therefore will be considered a run of river impoundment.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Pathogens).

### USE ASSESSMENT

#### AQUATIC LIFE





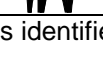
##### Biology

The presence of *Myriophyllum heterophyllum* in the Mill Road Pond impoundment was documented by DWM in 1999 (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired in the 0.6 mile reach of Mill Brook through the Mill Road Pond impoundment due to the infestation of a non-native aquatic macrophyte species. The use is not assessed in the lower 4.1 mile reach of the brook but is identified with an "Alert Status" because it may be or has already been infested.

No other recent quality assured data are available so all other uses are not assessed.

Mill Brook (MA41-07) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED upper 0.6 mile reach Cause: Non-native aquatic plants Source: Introduction of non-native organisms NOT ASSESSED* lower 4.1 mile reach
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

\* Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Conduct an aquatic macrophyte survey and determine whether or not the lower 4.1 mile reach is infested with *M. heterophyllum*.

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown,

herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

### **Browns Brook (MA41-20)**

Location: From the state line Holland, MA/Union, CT to the inlet of Hamilton Reservoir, Holland.

Segment Length: 0.8 miles.

Classification: Class B.

This is a new segment so it is not on the 2008 Integrated List.

### **USE ASSESSMENT**

#### ***AQUATIC LIFE***

##### Habitat and Flow

DWM conducted habitat assessments of Browns Brook upstream from May Brook Road in Holland during benthic macroinvertebrate (Station BR01) and fish population surveys (Station BW01) in 2004. DWM fishery biologists gave their site BW01, adjacent to the intersection of May Brook Road and Stagecoach Road in Holland, a final habitat score of 171/200 (Maietta 2007). DWM fishery biologists scored all of the primary habitat parameters in the optimal category (Maietta 2007).

DWM conducted habitat assessment of Browns Brook approximately 230 m upstream from May Brook Road near the inlet to Hamilton Reservoir (Station BR01 (B0539) as part of the 2004 benthic macroinvertebrate and fish population surveys. The benthic survey reach, sampled in August 2004, received a habitat score of 173 out of 200. This site was designated a watershed reference station for all 2004 biomonitoring stations. The habitat score was reduced due to a reduced riparian buffer along the north bank, with the steepness of this bank resulting in very limited areas of erosion (Fiorentino 2007).

##### Biology

MA DFG conducted fish population sampling in the Browns Brook off Maybrook Road (Site 123) in Holland on 26 June 2000 using backpack electroshocking equipment. A total of fifty-four fish were collected including forty-seven blacknose dace, six brown trout and one white sucker (Richards 2006). MA DFG biologists noted that the brown trout collected were stocked and also noted the presence of upstream beaver activity (Richards 2006). This waterbody is identified by MA DFG as a Coldwater Fishery Resource (MA DFG 2007b).

DWM conducted fish population sampling in Browns Brook adjacent to the intersection of May Brook Road and Stagecoach Road in Holland (Station BW01) on 1 September 2004. DWM fisheries biologists collected a total of eighty fish were collected including thirty-three white sucker, thirteen blacknose dace, ten largemouth bass, six yellow perch, four common shiner and two golden shiner (Maietta 2007). Fluvial species dominated the fish sample. All the fish collected are considered moderately tolerant or tolerant of pollution. Maietta (2007) noted that "overall fish numbers were low given the amount and quality of habitat present".

DWM conducted a benthic macroinvertebrate survey of Browns Brook approximately 230 m upstream from May Brook Road near the inlet to Hamilton Reservoir (Station BR01) (Fiorentino 2007). This site was used as the reference station for all 2004 biomonitoring stations in the Quinebaug River Watershed. The RBP III metric values were indicative of a healthy benthic community representative of a "least impacted" stream, including EPT and Taxa Richness as well as a low Percent Dominant Taxon metric (Fiorentino 2007). DWM biologists estimated canopy cover at BR01 (10% open) as well as micro and macroalgal cover at this site (0% for both) in the riffle habitat (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Browns Brook approximately 850 feet upstream/west of the May Brook Road crossing, Holland (Station BR01) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 1:30 and 2:30am, n=3) and other water quality physico-chemical monitoring data were indicative of excellent water quality conditions. The water temperature was less than 20°C, the coldwater fishery standard, on all three occasions (Appendix B).








The *Aquatic Life Use* is assessed as support based on the benthic macroinvertebrate community and good water quality conditions.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Browns Brook at Station BR01 on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 48 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. DWM personnel did not note any odors, scums, or objectionable deposits (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the general lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is assessed as support.

Browns Brook (Segment MA41-20) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

### **Stevens Brook (MA41-19)**

Location: From the state line Wales, MA/Stafford, CT to the inlet of Hamilton Reservoir, Holland.

Segment Length: 4.7 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted habitat assessment of Stevens Brook approximately 200 m upstream from its mouth at Mashapaug Road in Holland (Station ST01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 156/200 (Maietta 2007). All habitat parameters scored in the optimal category with the exception of sedimentation and channel flow status, which were considered suboptimal (Maietta 2007).

The benthic sampling reach, sampled in August 2004, received a habitat score of 184 out of 200, the highest score. All parameters were considered optimal except channel flow status due to minimal amounts of exposed substrates (Fiorentino 2007).

##### Biology

MA DFG conducted fish population sampling in Stevens Brook near the intersection of Union Street and Stafford Street (Site 1980) in Brimfield on 27 July 2006 using backpack electroshocking equipment. A total of one hundred and twenty-two fish were collected including fifty-eight blacknose dace, forty-four brook trout, and twenty brown bullhead (MassWildlife 2008). The sample was dominated by fluvial specialist species and multiple age classes of brook trout were present.

DWM conducted fish population sampling upstream from Mashapaug Road in Holland on 1 September 2004. DWM biologists collected a total of thirty-six fish including seventeen yellow perch, six yellow bullhead, five blacknose dace, three pickerel, three largemouth bass, one white sucker and one brown trout (Maietta 2007). All the fish collected are considered moderately tolerant or tolerant of pollution. This site is close to Hamilton Reservoir and the fish community structure likely reflects this fact.

DWM conducted a benthic macroinvertebrate survey of Stevens Brook approximately 200 m upstream from its mouth and Mashapoag Road in Holland (Station ST01) (Fiorentino 2007). RBP III analysis indicated that Stevens Brook was “non-impacted” when compared to the reference station (Fiorentino 2007). DWM biologists noted that several metrics outscored the reference station and all other stations sampled in 2004 (Fiorentino 2007). This indicated a healthy and diverse macroinvertebrate community with an abundance of highly sensitive taxa. DWM biologists also estimated canopy cover (10% open) as well as micro and macroalgal cover at this site (10 and 2%, respectively in the run habitat) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Stevens Brook upstream of the Mashapaug Road crossing in Holland (Station ST01) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 2 and 3am, n=3) and other water quality physico-chemical monitoring data were indicative of excellent water quality conditions (Appendix B). The water temperature was less than 20°C, the coldwater fishery standard, on all three occasions (Appendix B).

The *Aquatic Life Use* is assessed as support based on RBIII analysis, evidence of reproducing brook trout and good water quality conditions.


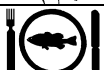



#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Stevens Brook at Station ST01 on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 73 cfu/100 mL.

DWM personnel also made field observations during the 2004 sampling season. DWM personnel did not note any odors, scums, or objectionable deposits (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the general lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is assessed as support.

Stevens Brook (Segment MA41-19) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

### **Quinebaug River (Segment MA41-01)**

Location: Outlet Hamilton Reservoir, Holland, to Sturbridge WWTP outfall, Sturbridge (excluding Holland Pond segment MA41022 and East Brimfield Reservoir segment MA41014).

Segment Length: 8.2 miles.

Classification: Class B, Cold Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Metals, Pathogens).

The beginning of the Quinebaug River varies between Goodall's Pond (aka Little Massapoag Pond, which is fed by Leadmine Brook), and the northern outlet of Mashapaug Lake in Union, Connecticut. Releases from Mashapaug Lake occur both from the northwest outlet, and thus to the Quinebaug River, and to the south, via Bigelow Brook to the Shetucket River Watershed. Under a 100-year storm condition, CT DEP found flow from the pond exited through both the north and south outlets. The spillways are both set at the same elevation and flow out of the north and south outlets are roughly in equal proportions (Thomas 2001). Connecticut has classified Mashapaug Lake as oligotrophic, or of exceptionally high water quality (CT DEP and USDA NRCS 1998). The CT DEP has authorized winter drawdowns in Mashapaug Lake via the manual sluice gates to permit maintenance of privately owned property. When the lake level is being lowered it is drained northward into Goodall's Pond and into the Quinebaug River system. Additionally, the outlet to Bigelow Brook lacks flow during these low water level conditions (including winter drawdowns) when all flow goes toward Hamilton Reservoir in Holland, MA (Thomas 2001). Drawdowns have been conducted as often as annually; in 2001, CT DEP authorized drawdowns to occur once every three years in the future.

The ACOE New England District maintains a flood control project, East Brimfield Reservoir (Lake) in the towns of Holland, Brimfield and Sturbridge within this segment of the Quinebaug River. East Brimfield Reservoir (Lake) is part of a system of six US ACOE flood control dams in the Thames River Basin. The East Brimfield Dam is a 520' long, 55' high earth and rock fill dam. Peak storage capacity of the Lake is 9.7 billion gallons (flood control pool can rise 19' above the normal 13' recreation pool) (US ACOE 2001). The project was placed in operation in 1960 in response to the floods of 1955 to provide flood storage along the Quinebaug and Thames rivers. The 2,717-acre Army Corps property encompasses approximately 5.4 miles of the Quinebaug River. The reservoir offers recreational opportunities that include swimming, canoeing, boating, picnicking, fishing, and hunting. Additionally, the US ACOE Westville Lake Flood Control Project (described in more detail in segment MA41-02) encompasses the lower 1.6 miles of this segment of the Quinebaug River.

The use assessments for Leadmine Pond (MA41027), Hamilton Reservoir (MA41019), Holland Pond (MA41022), East Brimfield Reservoir (MA41014), Little Alum Pond (MA41029), Alum Pond (MA41001), Cedar Pond (MA41008), and New Boston Road Pond (MA41035) are provided in the Quinebaug River Subbasin – Lake Assessment section of this report.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Sturbridge (MAR041240)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

The USGS maintains a gage on the Quinebaug River 750 ft. downstream from the East Brimfield Dam (Gage 01123360). The drainage area at this site is 62.6 mi<sup>2</sup>. Since September 1973, the average annual discharge was 131 cfs (period of record water years October 1972 to September 1990, October 2002 to current year) while the minimum daily mean discharge was 2.2 cfs (10 September 1983) and the maximum daily mean discharge was 997 cfs (17 March 1977) (USGS 2007d). Flows are regulated by East Brimfield Reservoir (USGS 2007d). The gate operation of the East Brimfield Reservoir results in pulses of water down the Quinebaug River although it is typically run-of-river (Fennessey 2004).

### Biology

Two sections of the river were sampled for fish during a river restoration study (for complete details see Parasiewicz 2004). Site 1, a 620 meter stretch that started 300 meters downstream of the East Brimfield Dam and ended just downstream from the Holland Road Bridge, was sampled between June 25 and August 17, 2000. Site 1a, 326 meter long reach, located just downstream from the Fiskdale Mill Dam, was sampled between June 25 and August 17, 2000. At Site 1 two hundred and forty-five fish including thirteen different species were collected using a grid shocking technique (Parasiewicz 2007). One hundred and fifty-two bluegill, thirty-two fallfish, twenty-six redbreasted sunfish, eight common shiner, seven white sucker, six largemouth bass, five spottail shiner, four longnose dace, one blacknose dace, one pumpkinseed, one smallmouth bass, one yellow bullhead and one yellow perch were collected (Parasiewicz 2007). The species composition of the fish collected was 79% macrohabitat generalist, 15% fluvial specialists, and 6% fluvial dependents.

At site 1a, twenty-one fish including five different species, were collected using a grid shocking technique (Parasiewicz 2007). Eighteen bluegill, one largemouth bass, one redbreasted sunfish, and one yellow bullhead were collected. All of the fish collected were macrohabitat generalists.

MA DFG also conducted fish population sampling in the Quinebaug River off Route 20 below the Fiskdale Mill Dam and approximately 0.2 miles east of Route 148 (Site 1027) in Sturbridge on 17 September 2004 using two backpack electroshockers. A total of one hundred and twenty-nine fish were collected including twenty-nine bluegill, twenty-six fallfish, twenty largemouth bass, eight redbreasted sunfish, thirteen yellow bullhead, ten common shiner, four brown bullhead, two black crappie, two pumpkinseed, two white sucker, one golden shiner, one smallmouth bass, and one tessellated darter (Richards 2006). The collected fish composition was 70% macrohabitat generalists, 21% fluvial specialists and 9% fluvial dependents. There were no notes regarding efficiency problems.

### Chemistry

There is a MassDEP Central Environmental Regional Office (CERO) Strategic Monitoring and Assessment for River Basin Teams (SMART) station on this segment of the Quinebaug River at the Holland Road bridge crossing in Sturbridge (Station QR00). CERO SMART crews conducted water monitoring at this location between 2002 and 2004. CERO crews conducted *in-situ* water quality monitoring one day every two months between January and October 2002, one day every two months between February and October 2003 and one day during six selected months in 2004 (MassDEP 2002, MassDEP 2003, and MassDEP 2004). None of the CERO monitoring was done during pre-dawn (worst-case) conditions. Grab samples were collected and analyzed for nutrients, alkalinity, hardness, turbidity, chloride, and total suspended solids. *In-situ* measurements for DO, pH and temperature were also made.

Dissolved oxygen and pH met criteria at this station while temperature was greater than 20°C on four of the 19 sampling dates (24 July 2002, 25 June and 27 August 2003, and 28 July 2004). Ammonia-nitrogen concentrations were low, total nitrogen ranged from 0.25 to 0.37mg/L, and total phosphorus ranged from 0.01 to 0.03 mg/L.

### Toxicity

#### Ambient

Water from the Quinebaug River was collected upstream from the Sturbridge WPCF discharge for use as dilution water in their whole effluent toxicity tests. Between June 2001 and November 2006 survival of *C. dubia* exposed (7 days) to river water was good ( $\geq 80\%$  survival) for all tests ( $n=26$ ). Between June 2001 and May 2008 survival of *P. promelas* exposed (7 days) ranged from 25 to 100% ( $n=32$ ). Survival was  $<75\%$  on six occasions (December 2001, January and June 2002, November 2004, May and November 2005, May 2006, and May 2007) representing 25% of the 32 tests conducted.

No recent data are available so the *Aquatic Life Use* is not assessed for the upper 4.7 mile reaches of this segment of the Quinebaug River (upstream from the East Brimfield Reservoir). Downstream from East Brimfield Reservoir the *Aquatic Life Use* is assessed as impaired (lower 3.5 mile reach) due to the absence of cold water fish species in addition to the low numbers of fluvial fish and the presence of

instream toxicity to *P. promelas*. Flow alteration associated with hydromodification and elevated measured water temperatures are also of concern.

### **FISH CONSUMPTION**

In September 1998 fish toxics monitoring was conducted by DWM in this segment of the Quinebaug River. Based on these data, the MA DPH issued a fish consumption advisory due to mercury contamination for the Quinebaug River (Holland/Brimfield including Holland Pond and East Brimfield Reservoir):

1. "Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this water body."
2. "The general public should limit consumption of all fish from this water body to two meals per month."






Because of the site-specific MA DPH fish consumption advisory the upper 4.7 mile reaches of this segment of the Quinebaug River is assessed as impaired for the *Fish Consumption Use* due to mercury contamination. It should also be noted that the statewide fish consumption advisory is also in effect.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

No objectionable odors were noted by SMART sampling crews at their Quinebaug River sampling location at the Holland Road bridge crossing in Sturbridge (Station QR00). The water column was almost always described as clear or slightly turbid (observations related to visual turbidity noted since 2003). The most objectionable conditions encountered at this sampling location were notes about very small amounts of trash and broken glass (n=33 site visits conducted between April 2001 and November 2006) (MassDEP 2001b, 2002, 2003, 2004, 2005b, 2006c). Much of this segment of the river is undeveloped and protected from development due to the presence of an extensive wetland system and the US Army Corps of Engineers East Brimfield Reservoir Flood Control Project.

No recent quality assured data are available to assess either the *Primary* or *Secondary Contact Recreational Uses*. The *Aesthetics Use* is assessed as support based on BPJ (large portion of river and watershed area protected by the flood control project) and the lack of objectionable odors, scums, deposits and other conditions noted by SMART sampling crews.

Quinebaug River (MA41-01) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED upper 4.7 miles IMPAIRED lower 3.5 miles Cause: Lack of cold water assemblage, ambient chronic toxicity, fishes bioassessment Suspected cause: Elevated water temperature Source: Dam or Impoundment, unknown
Fish Consumption		IMPAIRED upper 4.7 miles Cause: Mercury in fish tissue Source: Atmospheric Deposition – Toxics NOT ASSESSED lower 3.5 miles
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		SUPPORT

\* Alert Status issues identified, see details in use assessment section

### **RECOMMENDATIONS**

Conduct additional monitoring (physicochemical and biological) to better evaluate the *Aquatic Life Use*.

Continue to monitor instream toxicity testing results of *P. promelas* exposed to Quinebaug River water and develop a monitoring strategy to identify cause(s) and source(s) of instream toxicity.

Conduct bacteria monitoring to evaluate status of *Primary* and *Secondary Contact Recreational* uses.

**Hamant Brook (MA41-15)**

Location: Headwaters, outlet unnamed pond, Sturbridge to the confluence with the Quinebaug River, Sturbridge.

Segment Length: 3.1 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

**USE ASSESSMENT****AQUATIC LIFE**Habitat and Flow

DWM conducted habitat assessment of Hamant Brook approximately 100m downstream from an access road just off Shattuck Road in Sturbridge (Station HA01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 182/200 (Maietta 2007). All habitat parameters scored in the optimal category with the exception of bank stability, which was considered suboptimal (Maietta 2007). DWM biologists did note that the water column on the day of the survey (1 September 2004) was slightly turbid and milky looking (Maietta 2007).

During RBP III macroinvertebrate sampling in Hamant Brook approximately 100m downstream from an access road just off Shattuck Road in Sturbridge (Station HA01), DWM biologists gave their sampling reach a total habitat score of 174/200 (Fiorentino 2007). All habitat parameters scored in the optimal category with the exception of bank stability, which was scored in the marginal category (Fiorentino 2007). DWM biologists noted the presence of moderate turbidity attributed to suspended “whitish” particulates (Fiorentino 2007). DWM biologists noted the station’s close proximity to I-84 and numerous sand and gravel pits may be the source of particulate loads (Fiorentino 2007).

Biology

DWM conducted a benthic macroinvertebrate survey in Hamant Brook approximately 100 m downstream from an access road just off Shattuck Road in Sturbridge (Station HA01) on 24 August 2004 (Appendix C). The RBP III analysis indicated that Hamant Brook was “slightly-impacted” when compared to the reference station primarily due to reduced EPT taxa and virtual absence of scraping taxa (Fiorentino 2007). Fiorentino (2007) noted in particular the absence of scrapers may be indicative of either the shaded nature of the stream and/or instream turbidity which may suppress periphyton growth. DWM biologists also estimated canopy cover (5% open) as well as micro and macroalgal cover at this site (100 and 0%, respectively for the riffle habitat) (Beskenis 2009a).

DWM conducted fish population monitoring in Hamant Brook approximately 100m downstream from an access road just off Shattuck Road in Sturbridge (Station HA01) on 1 September 2004. A total of one hundred and nine fish were collected including sixty-nine blacknose dace, twenty-two eastern brook trout, fifteen white sucker, and two largemouth bass (Maietta 2007). The eastern brook trout collected were representative of a reproducing population (Maietta 2007). MA DFG biologists also sampled the brook in this area (Site 2219) in October 2007. They collected eighty-nine fish representing four species including seventy-four blacknose dace, thirteen brook trout (multiple age classes present), and one each of largemouth bass and chain pickerel (MassWildlife 2008). MA DFG identifies this waterbody as a Coldwater Fishery Resource (MA DFG 2007b).

Further downstream from an impounded section of the brook MA DFG biologists conducted backpack electrofishing in Hamant Brook in two reaches upstream from the south gate into Old Sturbridge Village on 3 October 2007 (Sites 2218 and 2217). Both samples were dominated by fallfish and blacknose dace, both fluvial specialist species (MassWildlife 2008). MA DFG also conducted fish population sampling near the mouth of Hamant Brook near Shattuck Road (Old Sturbridge Village) (Site 84) in Sturbridge on 5 October 1999 using backpack electroshocking equipment. A total of eighty-five fish were collected including sixty-two blacknose dace, twenty-five fallfish, nine white sucker, two largemouth bass, one chain pickerel and one pumpkinseed (Richards 2006).



### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Hamant Brook (Station HA01) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning (between 0:53 and 1:30am, n=3) water quality measurements were all indicative of good water quality although it should be noted that conductivity was elevated (Appendix B). DWM field crews identified the following potential pollution sources: storm water runoff from I-84 and Shattuck Road, sand and gravel operations, sediment from eroding footpaths, septic systems, and agricultural inputs associated with boarding horses (Appendix B).






The *Aquatic Life Use* is assessed as support based on the RBIII analysis, the presence of a reproducing population of eastern brook trout, and the generally good water quality conditions. This use is identified with an "Alert Status", however, due to concerns with turbidity/suspended whitish particulate matter (both the shaded nature of the stream and its instream turbidity may be limiting periphyton and associated scrapers/grazers).

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Hamant Brook (Station HA01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 22 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. They did not note any odors, scums, or objectionable deposits (Appendix B). Water quality field sampling crews generally described the water column as slightly or moderately turbid during the survey season. DWM biologists noted the presence of moderate turbidity attributed to suspended "whitish" particulates on 24 August 2004 (Fiorentino 2007) and again on 1 September 2004 when it was described as slightly turbid and milky looking (Maietta 2007).

The *Primary* and *Secondary Contact Recreational* and *Aesthetics* uses are assessed as support based on the low bacteria counts and the general lack of any objectionable deposits and odors. However, these uses are given an "Alert Status" due to the comments regarding instream turbidity and the milky/whitish particulate matter in the water column.

Hamant Brook (MA41-15) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT*
Secondary Contact		
Aesthetics		

\*Alert Status issues identified, see details in use assessment section

### **RECOMMENDATIONS**

Conduct benthic macroinvertebrate sampling to assess the *Aquatic Life Use*.

Deploy a temperature probe to determine whether Hamant Brook is a coldwater stream and given the presence of a coldwater fishery should be classified as a coldwater fishery in Mass DEP standards.

Conduct further fish population sampling to further document eastern brook trout presence.

Conduct a stream walk to investigate potential runoff from sand and gravel operations.

### **Hatchet Brook (MA41-14)**

Location: From the outlet of No. 3 Reservoir, Southbridge to the confluence with the Quinebaug River, Southbridge.

Segment Length: 1.3 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Southbridge (MAR041161)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted a habitat assessment of Hatchet Brook upstream from South Street in Southbridge (Station HC01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 169/200 (Maietta 2007). The majority of the primary habitat parameters scored in the optimal category with the exception of channel flow status and velocity-depth combinations (Maietta 2007).

During RBP III macroinvertebrate sampling in Hatchet Brook approximately 100 m upstream from South Street in Southbridge (Station HC01), DWM biologists gave their sampling reach a total habitat score of 166/200 (Fiorentino 2007). DWM biologists noted that habitat quality was most negatively impacted by low baseflow.

##### Biology

MA DFG conducted fish population sampling in Hatchet Brook at the Dennison Crossroad crossing (Site 1031) in Southbridge on 25 August 2004 using backpack electroshocking equipment. A total of seventy-five fish were collected including forty-eight blacknose dace, twenty-six brook trout and one white sucker (Richards 2006). Multiple age classes of brook trout were present (Richards 2006).

MA DFG conducted fish population sampling in Hatchet Brook upstream of the Dennison road extension bridge (Site 82) in Southbridge on 5 October 1999 using backpack electroshocking equipment. A total of sixty-seven fish were collected including forty-four blacknose dace, eighteen white sucker and five brook trout (Richards 2006).

DWM conducted fish population sampling in Hatchet Brook upstream from South Street in Southbridge (Station HC01) on 2 September 2004. A total of one hundred and sixty-five fish were collected including one hundred twenty-one blacknose dace and forty-four eastern brook trout (Maietta 2007). The eastern brook trout collected were representative of a reproducing population (Maietta 2007). MA DFG identifies this waterbody as a Coldwater Fishery Resource (MA DFG 2007b).

DWM conducted a benthic macroinvertebrate survey in Hatchet Brook approximately 100 m upstream from South Street in Southbridge (Station HC01) on 25 August 2004 (Fiorentino 2007). The RBP III analysis indicated that Hatchet Brook was “non-impacted” when compared to the reference station (Fiorentino 2007). Fiorentino (2007) characterizes the community as “well balanced and dominated by intolerant organisms”. DWM biologists also estimated canopy cover (10% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Hatchet Brook (Station HA0C) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning (between 0:54 and 1:40am, n=3) water quality measurements were all indicative of excellent water quality (Appendix B).






The *Aquatic Life Use* is assessed as support given the excellent water quality as indicated by RBP III analysis, fish community composition and water chemistry.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Hatchet Brook (Statoin HA0C) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 138 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season and did not note any odors, scums, or objectionable deposits (Appendix B).

The geometric mean of *E. coli* counts does not meet the criterion for *Primary Contact Recreational Use*, so the use is assessed as impaired. The source of elevated *E. coli* bacteria counts is unknown and it should be noted that the highest *E. coli* count was measured on a dry weather sampling date. This stream is downstream of a public water supply reservoir and the watershed is largely undeveloped. DWM field crews also did not note any potential pollution sources (Appendix B). The geometric mean meets the criterion for *Secondary Contact Recreational Contact Use* so this use is assessed as support. Given the general lack of noted instream objectionable deposits and conditions, the *Aesthetics Use* is also assessed as support.

Hatchet Brook (Segment MA41-14) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Elevated <i>E. coli</i> Source: Unknown
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

#### **RECOMMENDATIONS**

Reservoir management operations should maintain year rounds flows in Hatchet Brook in order to sustain the coldwater trout fishery and excellent water quality conditions.

Deploy a temperature probe to determine whether Hatchet Brook is a coldwater stream and given the presence of a coldwater fishery should be classified as a coldwater fishery in Mass DEP standards.

Additional bacteria monitoring should be conducted to identify any source(s) contributing to elevated counts.

### **McKinstry Brook (MA41-13)**

Location: Headwaters, east of Brookfield Road, Charlton (excluding intermittent portion) to the confluence with the Quinebaug River, Southbridge.

Segment Length: 7.3 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted habitat assessment of McKinstry Brook upstream from Pleasant Street in Southbridge (Station MK01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 152/200 (Maietta 2007). The majority of the habitat parameters scored in the suboptimal category (Maietta 2007).

During the RBP III benthic macroinvertebrate sampling in McKinstry Brook approximately 140 m upstream from Pleasant Street in Southbridge (Station MK01), DWM biologists gave their sampling reach a total habitat score of 150/200 (Fiorentino 2007). DWM biologists noted that habitat quality was most negatively impacted by the severely channelized nature of this reach (Fiorentino 2007).

##### Biology

MA DFG conducted fish population sampling in McKinstry Brook upstream from the Hill Road bridge in Charlton on 1 October 1999 (Site 80) using backpack electroshocking equipment. A total of twenty-nine fish were collected including ten white sucker, seven blacknose dace, five chain pickerel, three brook trout, two fallfish and two pumpkinseed (Richards 2006). MA DFG biologists noted that the water color was very dark and visibility was poor (Richards 2006).

MA DFG conducted fish population sampling in McKinstry Brook near the Berry Corner Road crossing in Charlton on 1 October 1999 (Site 81) using backpack electroshocking equipment. A total of one hundred and ten fish were collected including fifty-four blacknose dace, forty white sucker, eight brook trout, seven golden shiner and one yellow perch (Richards 2006). MA DFG biologists noted poor water visibility (Richards 2006).

MA DFG conducted fish population sampling in McKinstry Brook near Pympton Road downstream of the municipal airport (Site 79) on 1 October 1999. A total of one hundred and thirty-two fish were collected including seventy white sucker, forty-three fallfish, ten blacknose dace, three chain pickerel, three brook trout, two pumpkinseed and one tessellated darter (Richards 2006). The sample was dominated by fluvial specialist/dependant species.

DWM conducted fish population in McKinstry Brook upstream from Pleasant Street in Southbridge (Station MK01) on 7 September 2004. A total of two hundred and eleven fish were collected including eighty-four fallfish, sixty blacknose dace, twenty-eight white sucker, twelve common shiner, eleven long nose dace, ten tessellated darter, three golden shiner, one brown trout, one largemouth bass and one pumpkinseed. The high numbers of fish and the community composition (sample was dominated by fluvial specialist/dependant species) is indicative of a stable flow regime (Maietta 2007). It should be noted that with the exception of one brown trout (believed to be stocked) all fish collected were moderately tolerant or tolerant to pollution. MA DFG identifies this waterbody as a Coldwater Fishery Resource (MA DFG 2007b).

DWM conducted a benthic macroinvertebrate survey in McKinstry Brook approximately 140 m upstream from Pleasant Street in Southbridge (Station MK01) on 25 August 2004 (Appendix C). The RBP III analysis indicated that McKinstry Brook was "slightly-impacted" when compared to the reference station (Fiorentino 2007). The benthic invertebrate community was hyperdominated by the net-spinning caddisfly *Chimarra obscura*, a filter feeding taxa (Fiorentino 2007). Organic enrichment appears to be affecting the invertebrate community and Fiorentino (2007) notes that upstream wetlands and beaver activity immediately upstream from Station MK01 are likely sources of nutrient enrichment. DWM biologists also estimated

canopy cover (100% open) as well as micro and macroalgal cover at this site (100 and 0%, respectively for the riffle habitat) (Beskenis 2009a).

#### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in McKinstry Brook at the Pleasant Street crossing (MK01) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning (between 1:22 and 2:12 am, n=3) water quality measurements were indicative of good water quality with the exception of slightly elevated conductivity (Appendix B).

The *Aquatic Life Use* is assessed as support based on the RBP III analysis, fish abundance and dominance by fluvial specialist/dependent species and generally good physicochemical water quality data. This use is given an "Alert Status" given the hyperdominance of filter feeders. The influence of upstream wetlands, beaver impoundments, local (adjacent lawns and roads) and/or upstream (golf course, I-90, municipal airport, Southbridge landfill) NPS pollution may influence water quality in McKinstry Brook. The lower reach of the brook is also severely channelized.






#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in McKinstry Brook (Station MK01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 492 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. They did not note any odors or scum but did note trash in limited areas of the stream during water quality sampling (Appendix B). DWM fishery biologists noted during sampling at Station MK01 that their sampling reach was full of trash and waste debris (Maietta 2007). (It is best professional judgement that the sampling location is not representative of the entire length of the river but rather the lower 0.4 mile reach which is more developed).

A trail runs near McKinstry Brook from the end of Plimpton Street to the Airport, Southbridge. Local river advocates noted the absence of objectionable conditions in this upper segment of the brook (Benoit 2009). Problems with trash and debris occur in the lower 0.3 mile reach of the segment near the houses and businesses (Benoit 2009 and Pelto 2009).

The *Primary Contact Recreational Use* is not assessed in the upper 7.0 mile reach of this segment but is assessed as impaired in the lower 0.3 mile reach of segment. The assessment decision was based on elevated *E. coli* bacteria counts and aesthetically objectionable conditions associated with trash and debris which are likely associated with the densely developed reach of the river. The *Secondary Contact Recreational* and *Aesthetic* uses are assessed as support in the upper 7.0 mile reach of the segment but are assessed as impaired in the lower 0.3 mile reach based on the aesthetically objectionable amounts of trash and debris.

### McKinstry Brook (Segment MA41-13) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED upper 7.0 miles IMPAIRED lower 0.3 miles Cause: <i>E. coli</i> , trash and debris Source: Unknown, inappropriate waste disposal
Secondary Contact		SUPPORT upper 7.0 miles IMPAIRED lower 0.3 miles Cause: Trash and debris Source: Inappropriate Waste Disposal
Aesthetics		

\* Alert Status issues identified, see details in use assessment section

### RECOMMENDATIONS

Conduct bacterial source tracking to determine the source of high *E. coli* counts in the lower reach of McKinstry Brook.

Conduct a stream cleanup to improve aesthetics of McKinstry Brook.

### **Quinebaug River (Segment MA41-02)**

Location: Sturbridge WWTP outfall, Sturbridge to confluence with Cady Brook, Southbridge.

Segment Length: 6.5 miles.

Classification: Class B, Cold Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 2 - Attaining Some Uses (Aquatic Life); Others Not Assessed.

Much of this segment of the Quinebaug River is protected and undeveloped because it is within the boundary of the US Army Corps of Engineers Westville Dam Flood Control Project, located in the towns of Sturbridge and Southbridge. Westville Lake is part of a system of six US ACOE flood control dams in the Thames River Basin. The Westville Dam is a 560' long, 78' high earth and rock fill dam. Peak storage capacity of the Lake is 3.61 billion gallons. The normal recreational lake area is 23 acres (US ACOE 1997). This project was placed in operation in 1962 in response to the floods of 1955 and 1936 to provide flood storage along the Quinebaug and Thames rivers. The 1,082-acre Army Corps property encompasses approximately 5.8 miles of the Quinebaug River (the upper 4.2 miles of this segment). Westville Lake offers recreational opportunities that include picnicking, hiking, boating, and fishing; however there is no public beach for swimming within the project.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F2):**

Sturbridge Wastewater Treatment Plant (MA0100421)

Town of Sturbridge (MAR041240)

Town of Southbridge (MAR041161)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

The USGS maintains a gage on the Quinebaug River on the right bank, 200 ft. downstream from the Westville Dam (gage 01123600). The drainage area at this site is 94.4 mi<sup>2</sup>. Since October 1962, the average annual discharge was 177 cfs (period of record water years October 1962 to September 1990, October 2002 to current year) while the minimum daily mean discharge was 7.3 cfs (21 November 1964) and the maximum daily mean discharge was 1,620 cfs (24 October 1989) (USGS 2007d). Flow is regulated by dam operations at the Westville and East Brimfield Army Corps projects, the hydropower project at Old Sturbridge Village and by other reservoirs upstream. According to Hanacek (2004), the East Brimfield Lake is typically operated in a run-of-river mode, with occasional releases for periodic gate operation inspections (every five years), industrial use per contractual agreement with the American Optical Company in Southbridge, and the annual Sturbridge Lions Club canoe race held in late April. Approximately 350 cfs from the East Brimfield project, ramped over a two-day period, is often released to support the race. Westville Dam is also operated in a run-of-river mode with periodic inspections of dam regulation (every five years) (Hanacek 2004).

##### Biology

MA DFG conducted fish population sampling in the Quinebaug River downstream from Farquhar Road in Sturbridge on 13 July 2000 (Site 97) using boat shocking equipment. A total of two hundred and eighty-seven fish were collected including fifty-six yellow perch, fifty spottail shiner, forty common shiner, thirty-four pumpkinseed, thirty bluegill, thirty white sucker, sixteen yellow bullhead, eight fallfish, seven creek chubbsucker, six largemouth bass, four redbreasted sunfish, three white perch, one chain pickerel, one golden shiner and one smallmouth bass (Richards 2006). The fish sample was comprised of 70% macrohabitat generalists, 24% fluvial dependents and 5% fluvial species. Thousands of cyprinids were noted to be in the vegetation areas at the upper end of the reach sampled (Richards 2006).

MA DFG conducted fish population sampling in the Quinebaug River south of Wallace Road/Shepard Road in the Westville recreation area in Sturbridge on 17 September 2004 (Site 1026) using barge shocking equipment. A total of one hundred and twenty-nine fish were collected including fifty-six fallfish, thirty-nine red breasted sunfish, nineteen smallmouth bass, four tessellated darter, three bluegill, two chain pickerel, two common shiner, two pumpkinseed, and two yellow bullhead (Richards 2006). The fish



sample was comprised of 52% macrohabitat generalist, 47% fluvial specialists, and 2% fluvial dependents.

Two sections of the river were sampled for fish during a river restoration study (for complete details see Parasiewicz 2004). Site 4, a 738 meter stretch that started 260 meters downstream of the Westville Dam and ended about 220 meters upstream from Main St. in Southbridge was sampled between June 25 and August 17, 2000 and also between July 2 and July 9, 2001. Site 5, 383 meter long reach, located on either side of the Central Street bridge in Southbridge, was sampled between June 25 and August 17, 2000. At site 4, one hundred and sixty-one fish including ten different species were collected using a grid shocking technique (Parasiewicz 2007). Sixty-two common shiner, sixty-two fallfish, sixteen spottail shiner, four blacknose dace, four bluegill, four longnose dace, four white sucker, three redbreasted sunfish and two tessellated darter were collected (Parasiewicz 2007). The species composition of the fish collected was 45% fluvial specialist, 41% fluvial dependent and 14% macrohabitat generalist. At site 5, one thousand and thirty-six fish including eleven different species were collected using a grid shocking technique (Parasiewicz 2007). Four hundred and fifty-seven fallfish, two hundred and ninety-six common shiner, seventy-five longnose dace, sixty-nine blacknose dace, thirty-nine bluegill, thirty-white sucker, twenty redbreasted sunfish, twenty-six spottail shiner, sixteen bridge shiner and one golden shiner were collected (Parasiewicz 2007). The species composition of the fish collected was 58% fluvial specialists, 31% fluvial dependents and 11% macrohabitat generalists.






#### Toxicity Effluent

Between June 2001 and May 2008 modified acute and chronic whole effluent toxicity tests were conducted on the Sturbridge WPCF treated effluent using *C. dubia* (n=26 through November 2006) and *P. promelas* (n= 32). No acute whole effluent toxicity was detected by either test organism (LC<sub>50</sub>'s were all >100% effluent). The CNOEC results ranged from 6.25 to 100% effluent and did not meet the 15% effluent limit in three of the 32 tests conducted with *P. promelas* (CNOECs = 6.25% in July 2001 and August 2004, and 12.5% effluent in August 2006). CNOECs met the limit in all but one *C. dubia* test (6.25% effluent in November 2006).

Too limited water quality data are available so the *Aquatic Life Use* is not assessed. This use is identified with an "Alert Status" however because of evidence of instream toxicity to *P. promelas* in the river upstream from the Sturbridge WWTP discharge which is of concern and merits further investigation.

No other recent quality assured data are available so all other uses are not assessed.

Quinebaug River (MA41-02) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment

#### **RECOMMENDATIONS**

Continue to monitor instream toxicity testing results of *P. promelas* exposed to Quinebaug River water and develop a monitoring strategy to identify cause(s) and source(s) of instream toxicity.

Monitoring should be conducted to evaluate status of designated uses.

**Cady Brook (Segment MA41-05)**

Location: Headwaters, outlet of Glen Echo Lake, Charlton to Charlton City WWTP outfall, Charlton.

Segment Length: 1.5 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL ((Flow alteration\*), Pathogens). \* denotes a non-pollutant.

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Charlton (MAR041100)






**USE ASSESSMENT****AQUATIC LIFE**ToxicityAmbient

Water is collected from Cady Brook approximately 200 feet upstream from the Charlton WWTP outfall for use as dilution water in the Charlton WWTP whole effluent toxicity tests. Between May 2001 and February 2009 survival of *C. dubia* exposed (7-days) to river water ranged from 60 to 100% (n=33). Survival was <75% in three test events (May 2001 - 60%, January 2003 – 70%, and July 2003 – 70%). Between May 2001 and November 2002 survival of *P. promelas* exposed (7 days) to Cady Brook water ranged from 38 to 95% and was <75% in five of the 10 test events (February, April, May, August, and November 2002 with survivals of 48, 65, 65, 38, and 70%, respectively). Testing with *P. promelas*, however, was no longer required when the facility was issued their permit in November 2002 therefore more recent data are not available for this test organism.

The *Aquatic Life Use* is assessed as impaired based on the poor survival of *P. promelas* exposed to water from Cady Brook. The source of ambient toxicity is unknown.

No other recent quality assured data are available so all other uses are not assessed.

Cady Brook (MA41-05) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Ambient chronic toxicity Source: Unknown  NOT ASSESSED
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

**RECOMMENDATIONS**

Conduct biological monitoring to better evaluate the *Aquatic Life Use*.

Develop a monitoring strategy to identify cause(s) and source(s) of instream toxicity.

Conduct bacteria monitoring to evaluate status of *Primary* and *Secondary Contact Recreational* uses.

### **Cady Brook (Segment MA41-06)**

Location: Charlton City WWTP outfall, Charlton to confluence with Quinebaug River, Southbridge.

Segment Length: 5.1 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Nutrients, Organic enrichment/Low DO, (Flow alteration\*), Taste, odor and color). \* denotes a non-pollutant.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLES F2 AND F3):**

Charlton WWTP (MA0101141)

Town of Charlton (MAR041100)

Town of Southbridge (MAR041161)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Biology

MA DFG conducted fish population sampling in Cady Brook near the Route 169 crossing in Charlton on 20 August 2004 (Site 1033) using backpack electroshocking equipment. A total of one hundred and one fish were collected including fifty-seven blacknose dace, twenty-three longnose dace, sixteen white sucker, three largemouth bass, one brown bullhead and one common shiner (Richards 2006). The sample was dominated by fluvial specialist/dependant species. All fish collected were moderately tolerant or tolerant of pollution.

##### Toxicity

##### Effluent

Between May 2001 and February 2009 modified acute and chronic whole effluent toxicity tests were conducted on the Charlton WWTP treated effluent using *C. dubia* (n=33) and *P. promelas* (n= 10 through November 2002). With the exception of one test event (February 2008 with an LC<sub>50</sub>=35.2% effluent to *C. dubia*), no acute whole effluent toxicity was detected by either test organism (LC<sub>50</sub>'s were all >100% effluent). The CNOEC results ranged from <6.25 to 100% effluent and did not meet the 93% effluent limit in eight of the 33 tests conducted (August and November 2002, July 2004, July 2005, January, May, and August 2007 and February 2008 with CNOECs ranging from <6.25 to 50% effluent).

The Masonic Home, Inc. in Charlton was completely connected to the Charlton WWTP as of 23 July 2003 (St. George 2009) after which the Charlton WWTP experienced some problems with their chronic whole effluent toxicity tests. The Home's pharmaceutical waste disposal practice (flushing) was ultimately identified as causing the toxicity problems in the Charlton WWTP effluent (Ostrosky 2009). The Masonic Home changed their pharmaceutical waste disposal practices in April 2008 and the facility has subsequently had no problems meeting their whole effluent toxicity limits.

##### Chemistry

There is a MassDEP Central Environmental Regional Office (CERO) Strategic Monitoring and Assessment for River Basin Teams (SMART) station on this segment of Cady Brook at the gas pipeline crossing just upstream from the Route 169 bridge in Charlton (W0615). CERO crews conducted *in-situ* water quality monitoring one day every two months between February and October 2003 and one day during six selected months in 2004 (MassDEP 2003 and MassDEP 2004). Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity. Grab samples were also collected and analyzed for TSS, turbidity, chloride, alkalinity, hardness, and nutrients. None of the SMART monitoring was done during pre-dawn (worst-case) conditions.

Dissolved oxygen, temperature and pH all met criteria at this station (temperature was generally less than 20°C) on the sampling dates (n=11 sampling events). Conductivity was elevated and ranged from 265 to 735 µS/cm. Ammonia-nitrogen concentrations were low, total nitrogen ranged from 0.53 to 1.2 mg/L (n=7), and total phosphorus ranged from 0.023 mg/L to 0.088 mg/L with five of the eleven samples collected greater than 0.050 mg/L.






Too limited data are available to assess the *Aquatic Life Use*. This use is identified with an “Alert Status”, however, because of the presence of instream toxicity to *P. promelas* upstream from this segment of Cady Brook, the whole effluent toxicity in the Charlton WWTP discharge (although this problem appears to have been corrected), and the slightly elevated total phosphorus concentrations.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

No objectionable odors were noted by SMART sampling crews at Cady Brook at the gas pipeline crossing just upstream from the Route 169 bridge in Charlton (W0615) except for three sampling events when septic odors were present (n=22 sampling events). The water column was usually described as clear or slightly turbid but was highly turbid on three of 22 sampling events (observations related to visual turbidity noted since 2003). Occasional observations of trash/debris (bicycle tires, golf balls) in the brook were noted (n=22 site visits conducted between February 2003 and November 2006) (MassDEP 2003, 2004, 2005b, 2006c). Observations of trash and debris in the more densely developed lower 1.0 mile reach of the brook have been noted in the past although no recent observations have been made (Beaudoin 2009).

No recent quality assured data are available to assess either the *Primary* or *Secondary Contact Recreational Uses*. The *Aesthetics Use* is assessed as support based on the lack of objectionable odors, scums, deposits and other conditions noted by SMART sampling crews. The lower 1.0 mile length of this segment (downstream from Vinton Street Bridge, Southbridge) is identified with an “Alert Status” because of historical observations of trash/debris in the brook along its course through the densely developed area of Southbridge.

Cady Brook (MA41-06) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED*
Secondary Contact		NOT ASSESSED*
Aesthetics		SUPPORT*

\* Alert Status issues identified, see details in use assessment section

#### **RECOMMENDATIONS**

Conduct benthic macroinvertebrate and water quality monitoring both in Cady Brook (MA41-05) above the Charlton WWTP and in this segment below the discharge to better assess the *Aquatic Life Use* and to assess the treatment plants impact on the brook.

Deploy a temperature logger and conduct fish population monitoring in Cady Brook to determine if a coldwater fishery exists.

Continue to closely monitor the Charlton WWTPs whole effluent toxicity tests results.

### **Cohasse Brook (MA41-12)**

Location: From the outlet of Cohasse Brook Reservoir, Southbridge through Wells Pond (formerly pond segment MA41053) to the confluence with the Quinebaug River, Southbridge.

Segment Length: 2.7 miles.

Classification: Class B.

Wells Pond (MA41053) will no longer be reported on since the retention time of this waterbody was estimated at 2 days and so it will be considered a run of river impoundment.

This is a new segment so it was not on the 2008 Integrated List.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):**

Town of Southbridge (MAR041161)

### **USE ASSESSMENT**

#### ***AQUATIC LIFE***

##### Habitat and Flow

DWM conducted habitat assessment of Cohasse Brook downstream from a small footbridge in Oak Ridge Cemetery near downtown Southbridge (Station CO01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 142/200 (Maietta 2007). The majority of the habitat parameters scored in the suboptimal or poor category (Maietta 2007).

During RBP III macroinvertebrate sampling in Cohasse Brook approximately 100 m downstream from a small footbridge in Oak Ridge Cemetery near downtown Southbridge (Station CO01), DWM biologists gave their sampling reach a total habitat score of 130/200 (Fiorentino 2007). DWM biologists noted that sediment deposition and its effects along with the poor riparian habitat most negatively affected habitat quality in this reach (Fiorentino 2007).

##### Biology

MA DFG conducted fish population sampling at three locations along Cohasse Brook on 7 October 1999 using backpack electroshocking equipment (Richards 2006). Their data are summarized as follows:

- At the Durfee Road crossing in Southbridge (Site 88) - A total of ninety-three fish were collected including forty-six white sucker, twenty-six common shiner, eleven largemouth bass, five fallfish, two golden shiner, two bluegill and one eastern blacknose dace (Richards 2006). The sample was dominated by fluvial dependant species. MA DFG fishery biologists noted a strong chlorine smell at this site from a town water line discharge onto the road and running into brook (Richards 2006).
- Upstream from the Elm Street bridge in Southbridge (Site 89) - A total of forty-seven fish were collected including thirty-five blacknose dace, nine common shiner, two white sucker and one largemouth bass (Richards 2006).
- Near a small footbridge in Oak Ridge Cemetery Southbridge (Site 89) - A total of four hundred and forty-nine fish were collected including one hundred and seventy-four fallfish, one hundred and twenty blacknose dace, eighty-three white sucker, and seventy-two common shiner (Richards 2006).

DWM conducted fish population in Cohasse Brook downstream from a small footbridge in Oak Ridge Cemetery near downtown Southbridge (Station CO01) 2 September 2004. A total of three hundred and fifty-eight fish were collected including three hundred and sixteen Eastern blacknose dace, twenty-five fallfish, nine white sucker, six common shiner, two longnose dace and one largemouth bass (Maietta 2007). Maietta (2007) notes that numerous young of the year fish were collected with eastern blacknose dace too numerous to count. The dominance by fluvial specialist/dependant species is indicative of a stable flow regime although large numbers and dominance by blacknose dace was indicative of some nutrient enrichment (Maietta 2007).

DWM conducted a benthic macroinvertebrate survey in Cohasse Brook approximately 100 m downstream from a small footbridge in Oak Ridge Cemetery near downtown Southbridge (Station CO01), on 26 August

2004 (Appendix C). The RBP III analysis indicated that Cohasse Brook was “moderately-impacted” when compared to the reference station (Fiorentino 2007). The benthic invertebrate community was hyerdominated by filter feeding caddisflies and appeared to be structured in response to organic enrichment. Fiorentino (2007) noted that a combination of habitat degradation and water quality impairment associated with urban runoff limited biological integrity. DWM biologists also estimated canopy cover (35% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

#### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Cohasse Brook (Station CO01) on three occasions during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 1:44 and 2:37am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions. The water temperature was less than 20 degrees C, the coldwater fishery standard, on all three occasions (Appendix B).

On or slightly before 18 Sept 2003, a sewer main break occurred near the southern end of Coombs Road, Southbridge resulting in the release of raw sewage to Cohasse Brook (Beaudoin 2003). Sewage backed up in the sewer line to a manhole in the adjacent Oak Ridge Cemetery where overland flows reached nearby storm drainage structures and thus Cohasse Brook. It was estimated that, of the approximately 350,000 gallons that were released before interim repairs were in place, about 100,000 gallons entered the brook. The investigation conducted at this time showed that sedimentation (sand and silt) and illegal dumping/trash and debris were prominent anthropogenic issues throughout the reach from the cemetery to Cisco Road, with iron floc and magnesium sheens evident, both upstream and downstream of the sewage release point. Although a sewer odor was noted at this time, it is likely to be limited to this event, and not an ongoing odor. The remains of a beaver dam were located near Cisco Road.






The *Aquatic Life Use* is assessed as impaired based on the benthic macroinvertebrate community (RBP III) analysis which indicates moderate impacts. The benthic community appeared to be structured in response to organic enrichment. Both habitat degradation and water quality impairment associated with urban runoff were identified as potential limits of biological integrity.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Cohasse Brook (Station CO01) upstream from Cisco Street at the Oak Ridge Cemetery in Southbridge on five occasions between May and September 2004 in the urbanized lower reach of Cohasse Brook. The geometric mean of *E. coli* counts was 1517 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. They did not note any odors or scums but did note occasional trash/debris/yard waste such as grass clippings in the stream and/or riparian zone (Appendix B). DWM field crews identified residential development, an upstream golf course and the cemetery as possible pollution sources (Appendix B). DWM field crews also noted the disposal of yard waste in the riparian zone near Station CO01 (Appendix B).

The *Primary and Secondary Contact Recreational* uses are assessed as impaired based on the elevated *E. coli* bacteria counts (geometric mean does not meet criteria) in the lower 1.6 mile reach of this segment (downstream from Wells Pond). Counts were elevated under both wet and dry sampling conditons. It is best professional judgement that the sampling location is not representative of conditions in the less developed upper watershed area (upstream from the Wells Pond dam) so these uses are not assessed in the upper 1.1 mile reach due to a lack of bacteria data. Given the general lack of any instream objectionable odors, turbidity, deposits or other conditions, the *Aesthetics Use* is assessed as support.

### Cohasse Brook (Segment MA41-12) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Aquatic macroinvertebrate bioassessment, sedimentation/siltation Source: Loss of Riparian Habitat, Unspecified Urban Stormwater
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED upper 1.1 miles IMPAIRED lower 1.6 miles Cause: Elevated <i>E. coli</i> bacteria Source: Unknown
Secondary Contact		Suspected sources: Unspecified urban stormwater, discharges from municipal separate storm sewer systems (MS4), illicit connections/hook-ups to storm sewers
Aesthetics		SUPPORT

#### RECOMMENDATIONS

Conduct bacteria source tracking to determine the source of high *E. coli* bacteria counts and remediate as necessary.

Develop plan to protect/restore riparian zone of Cohasse Brook.

Reduce sediment inputs to brook.

### **Lebanon Brook (MA41-11)**

Location: From the state line, Southbridge, MA/Woodstock, CT, to the confluence with the Quinebaug River, Southbridge.

Segment Length: 4.7 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F3):**

Town of Southbridge (MAR041161)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted habitat assessment of Lebanon Brook upstream from Route 131 in Southbridge (Station LB01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 179/200 (Maietta 2007). All habitat parameters scored in the optimal category with the exception of channel flow status, which was scored in the sub-optimal category (Maietta 2007).

During the RBP III macroinvertebrate sampling in Lebanon Brook 550m upstream from Route 131 in Southbridge (Station LB01), DWM biologists gave their sampling reach a total habitat score of 193/200 (Fiorentino 2007). DWM biologists noted excellent habitat quality and this stream was designated a secondary reference station (Fiorentino 2007).

##### Biology

MA DFG conducted fish population sampling at three locations along Lebanon Brook on 6 or 7 October 1999 using backpack electroshocking equipment (Richards 2006). Their data are summarized as follows:

- Upstream from Lebanon Hill Road in Southbridge (Site 85) - A total of one hundred twenty fish were collected including seventy-two fallfish, twenty-six yellow bullhead, twelve pumpkinseed, five white sucker, two common shiner and chain pickerel, and one golden shiner were collected (Richards 2006). The sample was dominated by a fluvial specialist species.
- Downstream from Route 169 near Sawyer's Path in Southbridge (Site 87) - A total of one hundred and six fish were collected including fifty-eight blacknose dace, forty fallfish, six common shiner, two white sucker (Richards 2006). All species collected were fluvial specialist/dependants.
- Near Ashland Avenue in Southbridge (Site 86) - A total of one hundred fish were collected including fortyeight fallfish, twenty-four blacknose dace, seventeen white sucker, eight longnose dace, two brown bullhead, and one golden shiner (Richards 2006). The sample was dominated by a fluvial specialist species.

DWM conducted fish population in Lebanon Brook upstream from Route 131 in Southbridge (Station LB01) on 2 September 2004. A total of seventy-eight fish were collected including thirty-eight fallfish, fourteen white sucker, eight blacknose dace, six common shiner, six pumpkinseed, four yellow bullhead, one golden shiner and one chain pickerel (Maietta 2007). Young of the year fallfish were too numerous to count and young of the year common shiner, blacknose dace and white sucker were also noted but not counted. The sample was dominated by fluvial specialist/dependant species.

DWM conducted a benthic macroinvertebrate survey in Lebanon Brook 550 m upstream from Route 131 in Southbridge (Station LB01) on 26 August 2004 (Appendix C). The RBP III analysis indicated that Lebanon Brook was "slightly -impacted" when compared to the reference station (Fiorentino 2007). Slightly lower richness and reduced abundance of EPT taxa compared to the reference station were found although Fiorentino (2007) notes that the benthic invertebrate community contained members of non-EPT taxa sensitive to organic pollution. DWM biologists also estimated canopy cover (15% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).



### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Lebanon Brook (LB01) on three occasions during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 2:00 and 3:15am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions. The maximum water temperature was 20.3°C (Appendix B).






The *Aquatic Life Use* is assessed as support based on the benthic macroinvertebrate community (RBP III) analysis, the dominance of the fish community with fluvial specialist/dependant species, and the good water quality conditions.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Lebanon Brook (LB01) at Ashland Avenue in Southbridge on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 108 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. They did not note any odors or objectionable deposits although foam, believed to be natural, was noted during all daytime sampling events (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the lack of objectionable conditions, the *Aesthetics Use* is also assessed as support.

Lebanon Brook (Segment MA41-11) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

### **Quinebaug River (Segment MA41-09)**

Location: From confluence with Cady Brook, Southbridge to Southbridge WWTP outfall, Southbridge.

Segment Length: 1.3 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO, (Other habitat alterations\*), Turbidity, (Objectionable deposits\*)). \* denotes a non-pollutant.

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Biology

One section of the river was sampled for fish during a river restoration study (for complete details see Parasiewicz 2004). Site 6, a 644 meter stretch that started just below the Quinebaug Diversion Dam in Southbridge, was sampled between June 25 and August 17, 2000. At site 6, thirty-six fish including ten different species were collected using a grid shocking technique (Parasiewicz 2007). Ten common shiner, ten fallfish, five spottail shiner, four redbreasted sunfish, two white sucker, two yellow bullhead, one bluegill, one golden shiner and one longnose dace were collected (Parasiewicz 2007). The species composition of the fish collected was 31% fluvial specialists, 33% fluvial dependents and 36% macrohabitat generalists.

MA DFG conducted fish population sampling in the Quinebaug River behind the Big Y Plaza on Route 131 in Southbridge on 17 September 2004 (Site 1030) using barge shocking equipment. A total of one hundred and sixty-eight fish were collected including ninety-five fallfish, twenty-five common shiner, twenty-three longnose dace, eleven white sucker, five blacknose dace, two golden shiner, two largemouth bass, one brown bullhead, one redbreasted sunfish, one smallmouth bass, one tessellated darter and one spottail shiner (Richards 2006). The sample was comprised of 74% fluvial specialists, 21% fluvial dependents and 5% macrohabitat generalists.

##### Toxicity






##### Ambient

Water from the Quinebaug River is collected approximately 100 yards upstream from the outfall for use as dilution water in the Southbridge WWTP whole effluent toxicity tests. Between March 2001 and May 2008 survival of *C. dubia* exposed (7 days) to river water was always greater than 90% (n=40). Between March 2001 and June 2008 survival of *P. promelas* exposed (7 days) to the river water ranged from 18 to 100% and was less than 75% in 18 of 42 test events (43%). Survival was less than 50% in six tests (February, March, and May 2002, May and November 2007, and June 2008 test events).

The *Aquatic Life Use* is assessed as impaired due to the frequently poor survival of *P.promelas* exposed to Quinebaug River water. The source of the chronic ambient toxicity is unknown.

No other recent quality assured data are available so all other uses are not assessed.

### Quinebaug River (MA41-09) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Ambient bioassay – chronic aquatic toxicity Source: Unknown
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Conduct additional monitoring (physicochemical and biological) to better evaluate the *Aquatic Life Use*.

Continue to monitor instream toxicity testing results of *P. promelas* exposed to Quinebaug River water and develop a monitoring strategy to identify cause(s) and source(s) of instream toxicity.

Conduct bacteria monitoring to evaluate status of *Primary* and *Secondary Contact Recreational* uses.

### **Unnamed Tributary (MA41-23)**

Location: Unnamed tributary to the Quinebaug River from headwaters at the outlet of an unnamed pond on the Southbridge/Charlton border to the confluence with the Quinebaug River, Southbridge.

Segment Length: 1.9 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List. This waterbody is locally known as Keenan Brook and will be referred to by this name.

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted habitat assessment of Keenan Brook approximately 550 m upstream from its mouth as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fishery biologists gave the site a final habitat score of 161/200 (Maietta 2007). The majority of habitat parameters scored in the optimal category but channel flow status scored in the marginal category (Maietta 2007).

During the RBP III macroinvertebrate sampling in Keenan Brook, approximately 550 m upstream from its mouth in Southbridge (Station LB01), DWM biologists gave their sampling reach a total habitat score of 149/200 (Fiorentino 2007). DWM biologists noted habitat was most negatively impacted by low base flow and its deleterious effects on habitat (Fiorentino 2007).

##### Biology

DWM conducted fish population sampling in Keenan Brook approximately 550 m upstream from its mouth (Station W1186) on 7 September 2004. A total of three hundred and twenty-nine fish were collected including two hundred and forty-five blacknose dace, twenty-three white sucker, twenty-three longnose dace, fifteen brown bullhead, twelve common shiner, four fallfish, three yellow bullhead, two largemouth bass and two tessellated darter (Maietta 2007). All fish collected were moderately tolerant or tolerant to pollution. The sample was dominated by fluvial specialists/dependant species. MA DFG identifies this waterbody as a Coldwater Fishery Resource (MA DFG 2007b).

DWM conducted a benthic macroinvertebrate survey in Keenan Brook (Station W1186) on 26 August 2004 (Appendix C). The RBP III analysis indicated that Keenan Brook was "non-impacted" when compared to the reference station (Fiorentino 2007). Fiorentino (2007) notes that the benthic macroinvertebrate community was well balanced and diverse. DWM biologists also estimated canopy cover (5% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Keenan Brook (W1186) during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 2:30 and 4am, n=3) and other water quality physico-chemical monitoring data were indicative of excellent water quality conditions. The water temperature was less than 20 degrees C, the coldwater fishery standard, on all three occasions (Appendix B).






The *Aquatic Life Use* is assessed as support based on the benthic macroinvertebrate community (RBP III) analysis, the fish sample, and the good water quality conditions.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Keenan Brook (LB01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 32 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. DWM personnel did not note any odors or objectionable deposits although foam, believed to be natural, was noted on one sampling event (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the lack of objectionable conditions, the *Aesthetics Use* is also assessed as support.

Keenan Brook (Segment MA41-23) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

#### RECOMMENDATIONS

Conduct fish population sampling to determine the presence if any of coldwater species in this waterbody.

### **Quinebaug River (Segment MA41-03)**

Location: Southbridge WWTP outfall, Southbridge to dam just upstream of West Dudley Road, Dudley.

Segment Length: 2.2 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Nutrients, Organic enrichment/Low DO, (Other habitat alterations\*), Pathogens, Taste, odor and color, (Objectionable deposits\*)). \* denotes a non-pollutant.

### **NPDES WASTEWATER DISCHARGE SUMMARY (APPENDIX F, TABLE F2):**

Southbridge Wastewater Treatment Plant (MA0100901)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Toxicity

##### Effluent

Between March 2001 and June 2008 modified acute and chronic whole effluent toxicity tests were conducted on the Southbridge WWTP treated effluent using *C. dubia* (n=40 test events) and *P. promelas* (n= 42 test events). Acute whole effluent toxicity was only detected twice by *C. dubia* (LC<sub>50</sub>=100%effluent in May 2001 and 36.7% effluent in April 2005) and once by *P. promelas* (LC<sub>50</sub>=70.7% effluent in the November 2007 test). All other LC<sub>50</sub> results were >100% effluent. The CNOEC results ranged from <6.25 to 100% effluent. Chronic whole effluent toxicity was reported as <32% effluent in four out of 40 *C. dubia* tests (August 2002, February 2003, August 2003 and February 2007 test events with CNOECs = 25, 25, 12.5 and <6.25%, respectively). The CNOEC results for the *P. promelas* tests were <32%effluent in 10 of 42 test events (April, August, and November 2001, February and August 2002, November 2003, November 2004, July 2006, November 2007 and June 2008 with CNOECs of 12.5, <6.25, <6.25, <6.25, 12.5, 25, 12.5, 6.25, 12.5, and 12.5% effluent, respectively). Neither test organism is consistently more sensitive. A total of 15 tests exhibited acute and/or chronic whole effluent toxicity out of the 43 that were conducted between March 2001 and June 2008 (35% of the test events). Prior to this timeframe no acute and only one chronic whole effluent toxicity test failure was documented out of the 22 total test events conducted from February 1996 to February 2001 (<5% of the test events).






Too limited data are available so the *Aquatic Life Use* is not assessed for this segment of the Quinebaug River. This use is identified with an "Alert Status" however, because of the poor survival of *P. promelas* in the river just upstream from the Southbridge WWTP discharge and the whole effluent toxicity in the Southbridge WWTP discharge which is also of concern and merits further investigation.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

This segment of the river exhibits little development adjacent to the shoreline and is described as aesthetically pleasing with the exception of the upper 0.3 mile reach where trash and debris (floatable plastic bags, and fast food packaging) are frequently observed, as well as occasional treated effluent related odors (Beaudoin 2009).

No other recent quality assured data are available so the *Primary* and *Secondary Contact Recreational Uses* are not assessed. The *Aesthetics Use* is assessed as support based on the lack of aesthetically objectionable visual conditions. The *Recreational* and *Aesthetics* uses are identified with an "Alert Status" because of trash and debris and occasional treated effluent odors in the upper 0.3 mile reach of this segment.

### Quinebaug River (MA41-03) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED*
Secondary Contact		NOT ASSESSED*
Aesthetics		SUPPORT*

\*Alert Status issues identified, see details in use assessment

### RECOMMENDATIONS

The Southbridge WWTP should be required to conduct a TIE/TRE to eliminate the whole effluent toxicity problems in their discharge.

River cleanups should be conducted to remove trash and debris in the upper reach of this segment. Better stewardship practices to reduce inputs of trash should be encouraged.

### **Quinebaug River (Segment MA41-04)**

Location: From dam just upstream of West Dudley Road, Dudley to Connecticut state line, Dudley.

Segment Length: 2.2 miles.

Classification: Class B, Warm Water Fishery.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Pathogens).

The state of Connecticut MA DEP has identified a small area in the southwestern portion of Southbridge, MA (encompassing Morse Pond) that drains south into the town of Putnam and then into one of Connecticut's public water supply watersheds (Thomas 2002).

The US ACOE Annual Water Quality Reports for FY 2006 state that West Thompson Lake in Thompson Connecticut continues to experience severe annual algal blooms (US ACOE 2007). Previous reports identified the Southbridge WWTP as the suspected principle source of phosphorus inputs although the US ACOE in cooperation with the USGS is looking at phosphorus dynamics in this lake (US ACOE 2007).

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Biology

Two sections of the river were sampled for fish during a river restoration study (for complete details see Parasiewicz 2004). Site 7 and Site 8 were sampled downstream of the West Dudley Dam and upstream of the USGS gage in Connecticut. A total of seven hundred and seven-five fish including eighteen different species were collected at the two sites (Parasiewicz 2007). One hundred and sixty-seven blacknose dace, one hundred and sixty-two fallfish, one hundred and fifty-nine longnose dace, eighty-two bluegill, seventy-eight common shiner, fifty-two spottail shiner, twenty-one redbreasted sunfish, seventeen golden shiner, thirteen largemouth bass, five white sucker, five yellow bullhead, four yellow perch, three pumpkinseed, three tessellated darter, two largemouth bass, one bridge shiner, and one eastern brook trout were collected (Parasiewicz 2007). The species composition of the fish collected was 63% fluvial specialist, 11% fluvial dependent and 26% macrohabitat generalist.

In addition, SMART program staff consistently noted undercut banks and a highly embedded bottom substrate, reflecting the frequent rapid flow fluctuations known to occur at this location, sometimes associated with operations at an upstream hydropower facility (MassDEP 2002b).

##### Chemistry

There is a MassDEP Central Environmental Regional Office (CERO) Strategic Monitoring and Assessment for River Basin Teams (SMART) station just downstream of this segment of the Quinebaug River at the Route 197 bridge in West Thompson, Connecticut (station QR06). CERO SMART crews conducted water monitoring at this location between 2002 and 2004. CERO crews conducted *in-situ* water quality monitoring one day every two months between January and November 2002, one day every two months between February and October 2003 and one day every two months between March and November 2004 (MassDEP 2002, MassDEP 2003, and MassDEP 2004). None of the CERO monitoring was done during pre-dawn (worst-case) conditions. Grab samples were collected and analyzed for nutrients, alkalinity, hardness, turbidity, chloride, and total suspended solids. *In-situ* measurements for DO, pH and temperature were also made.

Dissolved oxygen, pH, and temperature almost always met criteria at this station although oxygen saturation was high (112%) in the November 2004 sampling event. Ammonia-nitrogen concentrations were low, total nitrogen ranged from 0.32 to 0.73mg/L, and total phosphorus ranged from 0.022 to 0.090 mg/L. Seven of the 16 measurements were >0.05 mg/L.

The *Aquatic Life Use* is not assessed for this segment of the Quinebaug River. Data collected slightly downstream were not collected during worse-case (pre-dawn conditions) and although they were indicative of generally good water quality conditions, there was some evidence of enrichment (oxygen saturation as high as 112% and slightly elevated total phosphorus concentrations).








### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

CERO SMART crews observed foam at this station on all but one sampling event between 2000 through 2004; foam particles collected in large piles in a backwater area downstream of the Rte. 197 bridge. Filamentous algae was noted on bottom rocks on three occasions. Odors were noted rarely (twice described as “slight effluent” and three times as “slightly musty and/or septic”). Turbidity was often observed, ranging from slight to high on 19 of 26 sampling events in this time period, of which 4 were highly turbid. Minor amounts of trash were also recorded in this time period, mostly as floatables and broken glass, often confined to the bank area (MassDEP 2000, 2001b, 2002, 2003, 2004). No objectionable conditions were noted in the river downstream from the West Dudley Impoundment (Beaudoin 2009). There have not been any recent reports of observable turbidity associated with hydropower operations at the West Dudley Project Number 7254 (Saywatt Power) (Beaudoin 2009). No objectionable odors were noted by SMART sampling crews at their Quinebaug River sampling location just downstream of this segment of the Quinebaug River at the Route 197 bridge in West Thompson, Connecticut (station QR06). The water column was almost always described as clear or slightly turbid (observations related to visual turbidity noted since 2003). The most objectionable conditions encountered at this sampling location were notes about very small amounts of trash and broken glass (n=33 site visits conducted between April 2001 and November 2006) (MassDEP 2001b, 2002, 2003, 2004, 2005b, 2006c).

No recent quality assured data are available to assess either the *Primary* or *Secondary Contact Recreational Uses*. The *Aesthetics Use* is assessed as support based on the lack of objectionable odors, scums, deposits and other conditions noted by SMART sampling crews. An “Alert Status” is identified for this use based on occasional high turbidity known to be associated with the hydropower project and the occasional odor and trash/debris. While the foam is likely naturally occurring, the treatment plant’s discharge may contribute to this condition.

Quinebaug River (MA41-04) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		SUPPORT*

\* Alert Status issues identified, see details in use assessment

### RECOMMENDATIONS

Additional monitoring (physicochemical sampling and multiprobe deployments and biological) should be conducted to better evaluate the status of the *Aquatic Life Use*.

Bacteria sampling should be conducted to evaluate the status of the *Primary* and *Secondary Contact Recreational* uses.

### **Tufts Branch (MA41-10)**

Location: Headwaters, north of Dudley-Southbridge Road, Dudley to the state line, Dudley, MA/Thompson, CT.

Segment Length: 2.8 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

### **NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108)

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Habitat and Flow

DWM conducted habitat assessments of Tufts Branch as part of the 2004 benthic macroinvertebrate and fish population surveys. During RBP III macroinvertebrate sampling in Tufts Branch approximately 30m upstream from Route 197 (Station TU01), DWM biologists gave their sampling reach a total habitat score of 148/200 (Fiorentino 2007). DWM biologists noted habitat was most negatively impacted by low base flow and the reduced riparian zone (Fiorentino 2007).

DWM fishery biologists gave their site downstream of Route 197 in Dudley (TU01) a final habitat score of 145/200 (Maietta 2007). The majority of habitat parameters scored in less than optimal categories, largely due to the low flow conditions, the limited riparian zone due to residential development and sedimentation (Maietta 2007). DWM field crews noted a storm drain half filled with sand near the Route 197 bridge (Appendix B).

##### Biology

MA DFG conducted fish population sampling in Tufts Branch at the Southbridge Road crossing (Sportsmen Club) in Southbridge on 27 August 2004 (Site 1035) using backpack electroshocking equipment. A total of sixty-eight fish were collected including fifty-seven white sucker, eight largemouth bass and three pumpkinseed (Richards 2006). MA DFG identifies this waterbody as a Coldwater Fishery Resource (MA DFG 2007b).

DWM conducted fish population sampling in Tufts Branch downstream of Route 197 in Dudley (TU01) on 7 September 2004. A total of fifty-one fish were collected including: twenty-two pumpkinseed, eighteen white sucker, five brook trout, three brown bullhead, one bluegill and one largemouth bass (Maietta 2007). The brook trout collected were wild and considered indicative of good water quality although numbers were low and no young-of-year were collected (Maietta 2007).

DWM conducted a benthic macroinvertebrate survey in Tufts Branch approximately 30m upstream from Route 197 (Station TU01) (Appendix C). The RBP III analysis indicated that Tufts Brook was “non-impacted” when compared to the reference station (Fiorentino 2007). Fiorentino (2007) noted that the benthic macroinvertebrate community was well balanced and contained pollution sensitive EPT taxa. DWM biologists also estimated canopy cover (30% open) at this site (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Tufts Branch (TU01) on three occasions during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 3 and 4:30am, n=3) and other water quality physico-chemical monitoring data were indicative of excellent water quality conditions. The water temperature was less than 20 degrees C, the coldwater fishery standard, on all three occasions (Appendix B).






The *Aquatic Life Use* is assessed as support based on the benthic macroinvertebrate community (RBP III) analysis, the presence of pollution intolerant wild brook trout, and the excellent water quality conditions.

### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Tufts Branch (TU01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 82 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. DWM personnel did not note any odors or objectionable deposits although foam, believed to be natural, was noted on two sampling events (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and is assessed as support. Given the lack of objectionable conditions, the *Aesthetics Use* is also assessed as support.

Tufts Branch (Segment MA41-10) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

### **RECOMMENDATIONS**

Conduct fish population sampling to document the distribution of brook trout in this waterbody.

Deploy a temperature probe to determine whether this waterbody is a coldwater stream. This in conjunction with additional fish population sampling may indicate that this waterbody should be classified a coldwater stream in Surface Water Quality Standards.

Reduce deposition of road sand to the brook.

## Rocky Run (MA41-22)

Location: Headwaters east of Chamberlain Pond (excluding intermittent portion), Douglas to the state line Douglas, MA/Thompson, CT.

Segment Length: 1.9 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

## USE ASSESSMENT

### AQUATIC LIFE

#### Habitat and Flow

Rocky Run was sampled by MA DFG biologists off Main Street in Douglas. They noted that the stream occasionally flowed sub-surface under large flat boulders in the sampling reach (Richards 2006).

DWM conducted a habitat assessment of Rocky Brook downstream from the MidState Trail footpath in Douglas (Station RB01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fisheries biologists gave their site a final habitat score of 188/200 (Maietta 2007). The majority of habitat parameters scored in the optimal category (Maietta 2007). The benthic biologists scored the sampling reach 177/200 (Fiorentino 2007). DWM biologists noted the presence of a large wetland with signs of beaver activity immediately upstream from the sampling station. They also noted that downstream of the sampling station Rocky Brook disappears "beneath a section of heavy cobble and boulders and then re-emerges a short distance downstream" (Maietta 2007).

#### Biology

MA DFG conducted fish population sampling in Rocky Branch off Main Street in Douglas (Site 512) on 7 September 2001 using backpack electroshocking equipment. A total of thirty-five brook trout were collected and represented a wild reproducing population (Richards 2006). MA DFG biologists noted that sampling efficiency was excellent (Richards 2006).

DWM conducted fish population in Rocky Brook downstream from the MidState Trail footpath in Douglas (Station RB01) on 13 September 2004. A total of fifteen fish were collected including thirteen brook trout (appeared to be reproducing population) and two chain pickerel (Maietta 2007). Maietta (2007) notes that the presence of *"the beaver pond upstream and the area of sub-surface flow downstream, may be restricting [trout] migration into and out of this particular reach of Rocky Brook under low flow conditions"*.

DWM conducted a benthic macroinvertebrate survey Rocky Brook downstream from the MidState Trail footpath in Douglas (Station RB01) on 27 August 2004 (Appendix C). The RBP III analysis indicated that Tufts Brook was "moderately-impacted" when compared to the reference station (Fiorentino 2007). Natural conditions were considered to be the factors shaping the benthic community, which was structured in response to organic enrichment (e.g., dominance by filter feeders, lack of scrapers) (Fiorentino 2007). DWM biologists also estimated canopy cover (5% open) as well as micro and macroalgal cover at this site (0% for both) (Beskenis 2009a).

#### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Rocky Brook (Station RB01) on three occasions during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 3:55 and 5am, n=3) were all low (between 4.0 and 4.5 mg/L with saturations between 42 and 48%) as were pH measurements (5.1 to 5.2 SU) (Appendix B). The water temperature was less than 20 degrees C, the coldwater fishery standard, on all three occasions. Conductivities were also very low (Appendix B).

Despite the RBP III analysis which indicated moderate impacts to the benthic macroinvertebrate community and the low DO and pH conditions of the stream, the *Aquatic Life Use* is assessed as support based on the best professional judgement of DWM biologists that these conditions are naturally occurring. Wetlands associated with beaver activity and the influences of groundwater (observations of the stream going sub-surface) were considered to be natural influences on water quality conditions (e.g.,






low DO and pH). Furthermore the presence of multiple age classes of brook trout is indicative of good water quality and habitat conditions.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Rocky Brook (RB01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 19 cfu/100 mL. DWM personnel also made field observations during the 2004 sampling season. They did not note any objectionable odors, turbidity, or deposits although foam, believed to be natural, was noted on a few occasions (Appendix B). Water color was noted to have a reddish/yellow hue likely caused by tannins associated with the upstream wetlands (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the lack of objectionable conditions, the *Aesthetics Use* is assessed as support.

Rocky Run (Segment MA41-22) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

#### **RECOMMENDATIONS**

If possible conduct benthic macroinvertebrate sampling upstream area influenced by wetlands and beaver activity to further assess the *Aquatic Life Use*.

### **Leadmine Brook (MA41-21)**

Location: Headwaters, outlet Leadmine Pond, Sturbridge to the state line, Sturbridge, MA/Union, CT.

Segment Length: 2.5 miles.

Classification: Class B.

This is a new segment so it is not on the 2008 Integrated List.

### **USE ASSESSMENT**

#### ***AQUATIC LIFE***

##### Habitat and Flow

On 14 September 2007 MA DFG biologists encountered a dry stream bed in Leadmine Brook at the Vinton Road crossing in Sturbridge (MassWildlife 2008). Extremely low flow conditions (drought) occurred in 2007.

DWM conducted a habitat assessment of Leadmine Brook approximately 600 m upstream from Interstate 84 (next to an abandoned rest stop) in Sturbridge (Station LE01) as part of the 2004 benthic macroinvertebrate and fish population surveys. DWM fisheries biologists gave their site a final habitat score of 184/200 (Maietta 2007). The majority of habitat parameters scored in the optimal category (Maietta 2007). The benthic sampling reach, sampling in August 2004, received a habitat score of 183 out of 200. All parameters with the exception of velocity-depth combinations were rated as optimal due to a lack of deep riffles (Fiorentino 2007).

##### Biology

DWM conducted fish population sampling in Leadmine Brook approximately 600 m upstream from Interstate 84 in Sturbridge (Station LE01) on 1 September 2004. A total of seventeen fish were collected including eleven largemouth bass (all young-of-year), four chain pickerel, one yellow bullhead and one white sucker (Maietta 2007). With the exception of the white sucker, all of the fish are macrohabitat generalists. Considering the optimal fish habitat available, the fish community indicates a compromised flow regime and Maietta (2007) speculates that beaver dams located upstream of the sampling station influence the fish community. Given the small size of the drainage area and otherwise lack of flow control structures, these conditions appear to be naturally occurring.

DWM conducted a benthic macroinvertebrate survey of Leadmine Brook approximately 600 m upstream from Interstate 84 in Sturbridge (Station LE01) on 24 August 2004 (Appendix C). The RBP III analysis indicated that Leadmine Brook was "slightly impacted" when compared to the reference station (Fiorentino 2007). DWM biologists noted that the dominant taxon, the scraper *Maccaffertium* sp., is a fairly pollution sensitive species. They could not speculate as to the cause of slight impairment given the excellent habitat quality in the brook (Fiorentino 2007). DWM biologists also estimated canopy cover (0% open) as well as micro and macroalgal cover at this site (10 and 5%, respectively for the riffle habitat) (Beskenis 2009a).

##### Chemistry

DWM conducted monthly *in-situ* water quality monitoring in Leadmine Brook (Station LE01) on three occasions during July, August and September 2004. Parameters measured include dissolved oxygen, percent saturation, temperature, pH, total dissolved solids and conductivity (Appendix B). Early morning DO measurements (between 1:00 and 2:00am, n=3) and other water quality physico-chemical monitoring data were indicative of good water quality conditions. The water temperature was less than 20°C, the coldwater fishery standard, on all three occasions (Appendix B).

The *Aquatic Life Use* is assessed as support based on the benthic macroinvertebrate community and good water quality conditions. Given the small size of the drainage area and otherwise lack of any flow control structures, low flow conditions, which may be influencing the fish community, appear to be naturally occurring.






#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES**

DWM collected fecal coliform and *E. coli* bacteria samples in Leadmine Brook (Station LE01) on five occasions between May and September 2004. The geometric mean of *E. coli* counts was 14 cfu/100 mL.

DWM personnel also made field observations during the 2004 sampling season. DWM personnel did not note any objectionable deposits although foam, believed to be natural, was noted (Appendix B).

The geometric mean of *E. coli* counts meets both the *Primary* and *Secondary Contact Recreation Use* criteria and so these uses are assessed as support. Given the lack of objectionable conditions, the *Aesthetics Use* is also assessed as support.

Leadmine Brook (Segment MA41-21) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT
Secondary Contact		
Aesthetics		

**Unnamed Tributary (MA41-26)**

Location: Unnamed tributary locally known as 'Freeman's Brook' from headwaters west of Cronin Road, Warren to an unnamed tributary to Long Pond, Sturbridge.

Segment Length: 2.6 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

It should be noted that MA DFG identifies this waterbody as a Cold Water Fishery Resource (MA DFG 2007b).

**USE ASSESSMENT****AQUATIC LIFE**Biology

MA DFG conducted fish population sampling in Freeman's Brook upstream from the Webber Road crossing (Site 1028) on 1 September 2004 using backpack electroshocking equipment. A total of fifty-five fish were collected including fifty-two blacknose dace and three wild brook trout, both fluvial specialists (Richards 2006).






MA DFG conducted backpack electrofishing in Freeman's Brook south of Webber Road (Site 119) at the Warren/Sturbridge line on 27 June 2000. A total of sixty fish were collected including thirty-nine blacknose dace and twenty-one brook trout (multiple age classes) (Richards 2006).

MA DFG conducted fish population sampling in Freeman's Brook at the Webber Road crossing (Site 1967) on 21 August 2006 using backpack electroshocking equipment. A total of one hundred and seven fish were collected including fifty-five brook trout, thirty-six blacknose dace, eight bluegill, three white sucker, three pumpkinseed and two brown bullhead (MassWildlife 2008). One MA DFG biologist noted that it was "one of the better eastern brook trout streams I've seen" (MassWildlife 2008).

The *Aquatic Life Use* is assessed as support based on the presence of a reproducing population of brook trout, a pollution intolerant, fluvial specialist species.

No other recent quality assured information is available. All other uses are not assessed.

Freeman's Brook (Segment MA41-26) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		



**Unnamed Tributary (MA41-25)**

Location: Unnamed tributary to Tufts Branch, headwaters, outlet Wielock Pond, Dudley to confluence with Tufts Branch, Dudley.

Segment Length: 0.2 miles.

Classification: Class B.

This is a new segment so it was not on the 2008 Integrated List.

**NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)**

Town of Dudley (MAR041108)






**USE ASSESSMENT****AQUATIC LIFE**Biology

MA DFG biologists conducted fish population sampling in this unnamed tributary to Tufts Branch north of Route 197 and downstream from Wielock Pond (Site 1383) on 13 July 2005 using backpack electroshocking equipment. A total of forty-four fish were collected including eighteen brook trout, fourteen pumpkinseed, five white sucker, two blacknose dace, two golden shiner, one brown bullhead, one common shiner and one largemouth bass (Richards 2006). Multiple age classes of wild brook trout were collected.

The *Aquatic Life Use* is assessed as support based on the presence of a reproducing population of brook trout, a pollution intolerant species.

No other recent quality assured information is available. All other uses are not assessed.

Unnamed Tributary (Segment MA41-25) Use Summary

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

### QUINEBAUG RIVER WATERSHED - LAKE ASSESSMENTS

The 25 lakes assessed in this report represent 1,981 of the 2,358 acres in the Quinebaug River Basin (Figure 12).

A number of Quinebaug River Watershed lakes have no updated information (TMDL completion, etc) or new information to make an assessment of designated uses. Information on these waterbodies is summarized below. All the following waterbodies are not assessed for all uses.

Segment	Name	Size (acres)	Class	Description	2008 Integrated List Details
MA41027	Leadmine Pond	52	B	Sturbridge	Category 3 - No Uses Assessed
MA41031	McIntyre Pond	11	B	Charlton	Category 3 - No Uses Assessed
MA41033	Morse Pond	41	B	Southbridge	Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO, Noxious aquatic plants)
MA41035	New Boston Road Pond	13	B	Sturbridge	Category 3 - No Uses Assessed
MA41038	No. 3 Reservoir	24	A\PWS\ORW	Southbridge	Category 3 - No Uses Assessed
MA41040	No. 5 Reservoir	30	A\PWS\ORW	Southbridge	Category 3 - No Uses Assessed
MA41048	Sibley Pond	19	B	South Basin, Charlton	Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO, Noxious aquatic plants, Turbidity)
MA41059	Monson Road Pond	4	B	Wales	Category 3 - No Uses Assessed

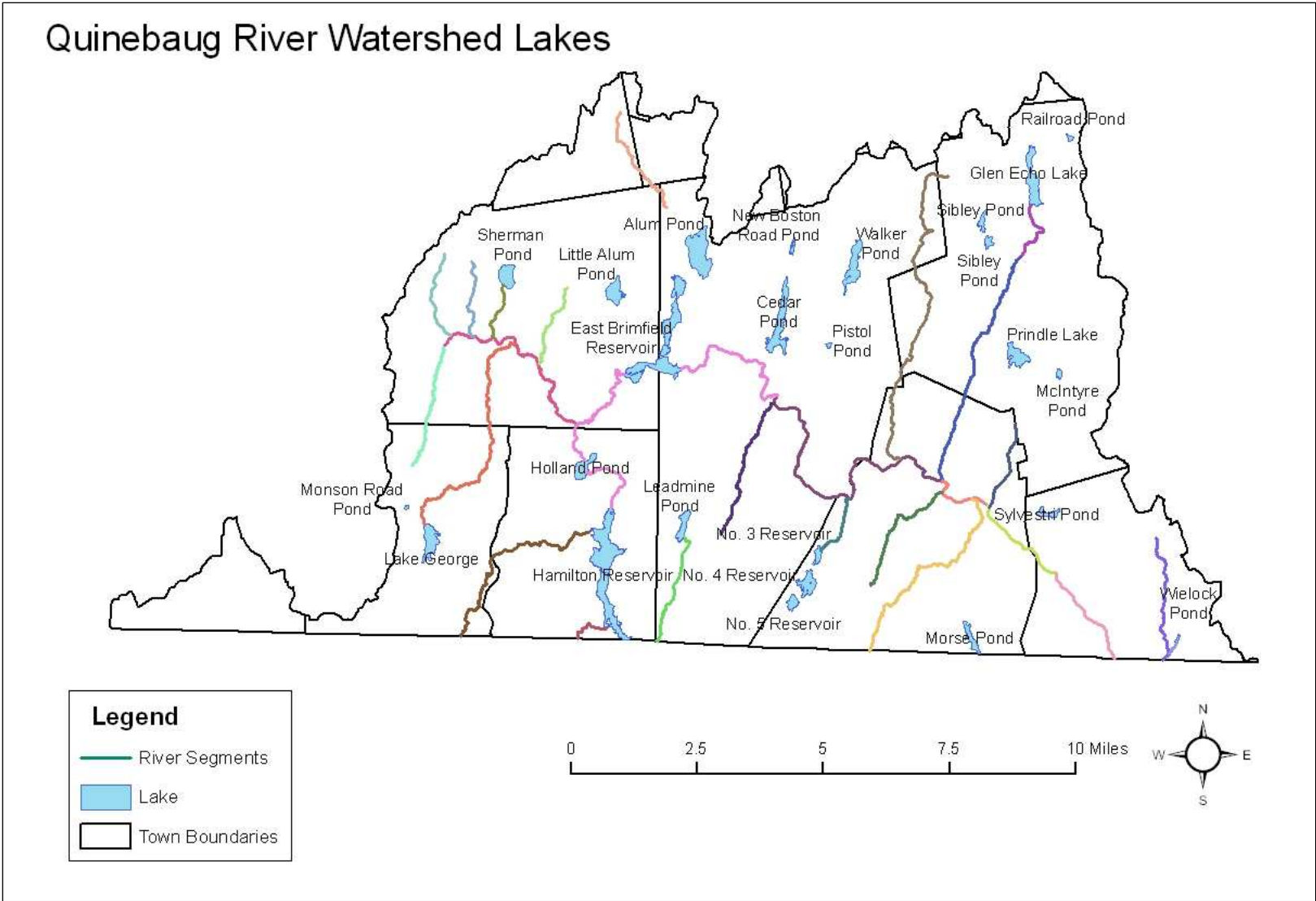


Figure 12: Quinebaug River Watershed Lake Segments

**Alum Pond (MA41001)**

Location: Sturbridge.

Size: 198 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO).

**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum sp.* has been documented by the MA DCR Lakes and Ponds Program (MassDCR 2006) and has also been detailed in herbicide permit applications (MassDEP 2006b). Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed.

A fish kill affecting primarily sunfish occurred in the pond in June 2004. The cause is considered natural by DWM and MA DFG biologists.

Water Chemistry

Baseline lake water quality monitoring was conducted in Alum Pond in the summer of 2004 (Haque and Mattson 2008). On 19 August 2004 a depth profile in the deep hole of Alum Pond was conducted. *In-situ* water quality monitoring that included measurements of temperature, pH, conductivity, TDS, depth and dissolved oxygen was conducted. Dissolved oxygen depletion occurred at depths below 8m (Haque and Mattson 2008). There was some evidence of internal phosphorus loading from anoxic sediments. Chlorophyll *a* concentrations were low and all other measured parameters were indicative of good water quality conditions.






The *Aquatic Life Use* is assessed as impaired because of low DO below 8m depth representing approximately 45% of lake area. In addition, there was some evidence of internal phosphorus loading from anoxic sediments. The possible presence of a non-native macrophyte species is also noted as a concern.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

Secchi depth measurements made at the deep hole of Alum Pond during the summer of 2004 were all high (5.4 to 7.0m n=3) ((Haque and Mattson 2008). With the exception of the strong odors associated with the fish kill DWM personnel did not note any other objectionable conditions (e.g., deposits, scums, algal blooms) during the surveys in the summer of 2004.

The *Primary Contact Recreational Use* is not assessed for Alum Pond because of the lack of any bacteria data. The *Secondary Contact Recreational* and *Aesthetics* uses are assessed as support based on the excellent Secchi depth measurements, low chlorophyll *a* concentrations and lack of any objectionable conditions.

### Alum Pond (MA41001) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Low dissolved oxygen Source: Unknown
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

### RECOMMENDATIONS

Field identification of *Myriophyllum sp.* is needed when flowering heads are present.

### Cedar Pond (MA41008)

Location: Sturbridge.

Size: 149 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Sturbridge (MAR041240)

### USE ASSESSMENT

#### AQUATIC LIFE

##### Biology

The presence of *Myriophyllum heterophyllum* in Cedar Pond is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b) and has also been detailed in herbicide permit applications (MassDEP 2006b). Herbicide applications also indicate the presence of *Potamogeton crispus* (MassDEP 2006b).





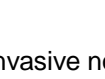
The *Aquatic Life Use* is assessed as impaired due to the presence of non-native macrophyte species.

#### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

There are two beaches on Cedar Pond (Sturbridge Host Hotel Beach and the Sturbridge Recreation Center Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

No other recent quality assured data are available so these uses are not assessed.

Cedar Pond (MA41008) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant

species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Support improvement of freshwater Beaches Bill data quality and reporting.

### **East Brimfield Reservoir (MA41014)**

Location: Brimfield/Sturbridge.

Size: 313 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant (Metals [12/20/2007NE HgTMDL], (Exotic species\*)). \* denotes a non-pollutant.

A TMDL was recently approved for mercury by the U.S. EPA. The Northeast Regional Mercury Total Maximum Daily Load (TMDL) was prepared by the New England Interstate Water Pollution Control Commission (NEIWPCC) in cooperation with the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The TMDL covers waterbodies including East Brimfield Reservoir that are impaired primarily due to atmospheric deposition of mercury (Northeast States 2007). The TMDL target for Massachusetts is 0.3 ppm or less of mercury in fish tissue. The plan calls for a 75% reduction of in-region and out of region atmospheric sources by 2010 and a 90% or greater reduction in the future (NEIWPCC 2007).

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b) and has also been detailed in herbicide permit applications (MassDEP 2006b). Herbicide applications also indicate the presence of *Potamogeton crispus* (MassDEP 2006b).

The *Aquatic Life Use* is assessed as impaired due to the presence of non-native macrophyte species.

#### **FISH CONSUMPTION**

In 1998 fish were collected from East Brimfield Reservoir, Quinebaug River Watershed, and edible fillets were analyzed for select metals and organochlorine pesticides. Due to the presence of mercury, MA DPH issued the following advisory (MA DPH 2008) recommending:

*“Children under 12 years of age, pregnant women, nursing mothers, and women of childbearing age who may become pregnant should not eat any fish from East Brimfield Reservoir” and “The general public should limit consumption of all fish from East Brimfield Reservoir to two meals per month”.*

Because of the site-specific fish consumption advisory for East Brimfield Reservoir due to mercury contamination, the *Fish Consumption Use* is assessed as impaired.






#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There is one beach on the shoreline of East Brimfield Reservoir (Streeter Point Beach). US ACOE collected weekly *E. coli* samples between May and September in 2004, 2005, 2006, and 2007. The beach at East Brimfield Reservoir was not closed for any days during 2004, 2005, and 2006 swimming seasons (US ACOE 2006 and 2007).

Based on the lack of beach closures, the *Primary and Secondary Contact Recreational Uses* are assessed as support. The *Aesthetics Use* is not assessed.



### East Brimfield Reservoir (MA41014) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		IMPAIRED Cause: Mercury in fish tissue Source: Atmospheric Deposition
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		NOT ASSESSED

### RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Continue to conduct fish toxics monitoring to evaluate if Hg concentrations are decreasing.

**Lake George (MA41016)**

Location: Wales.

Size: 93 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**USE ASSESSMENT****AQUATIC LIFE**Biology






The presence of *Myriophyllum heterophyllum* is indicated in herbicide application permits (MassDEP 2006b). Field confirmation of the presence of a non-native *Myriophyllum* sp. is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophyte species.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There are three beaches on Lake George (Town Beach, Sichols Beach, and Lakeland Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

Lake George (MA41016) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment

**RECOMMENDATIONS**

Conduct macrophyte survey of Lake George and determine species of *Myriophyllum* sp. when flowering heads are present.

Support improvement of freshwater Beaches Bill data quality and reporting.

### Glen Echo Lake (MA41017)

Location: Charlton.

Size: 115 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO).

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Charlton (MAR041100)

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

The presence of *Myriophyllum heterophyllum* is indicated in herbicide application permits (MassDEP 2006b). Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an "Alert Status" due to the possible presence of a non-native macrophytes species.

No other recent quality assured data are available so all other uses are not assessed.

Glen Echo Lake (MA41017) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment

### RECOMMENDATIONS

Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed when flowering heads are present.

## Hamilton Reservoir (MA41019)

Location: Holland/Union (CT).

Size: 386 Acres (size indicates portion in Massachusetts).

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

## USE ASSESSMENT

### AQUATIC LIFE

#### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b) and has also been detailed in herbicide permit applications (MassDEP 2006b).






The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native macrophyte species.

### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

There are two beaches on Hamilton Reservoir one in the north basin and one in the south basin.

Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

Hamilton Reservoir (MA41019) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

## RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Support improvement of freshwater Beaches Bill data quality and reporting.

## **Holland Pond (MA41022)**

Location: Holland.

Size: 66 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4a-TMDL is Completed (Metals [12/20/2007NE HgTMDL]).

### **USE ASSESSMENT**

#### **AQUATIC LIFE**

##### Biology

The presence of *Myriophyllum heterophyllum* is suspected in Holland Pond (MassDEP 2002b). Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophyte species.

#### **FISH CONSUMPTION**

In 1998 fish were collected from Holland Pond, Quinebaug River Watershed, and edible fillets were analyzed for select metals and organochlorine pesticides. Due to the presence of mercury, MA DPH issued the following advisory (MA DPH 2008) recommending:

*“Children under 12 years of age, pregnant women, nursing mothers, and women of childbearing age who may become pregnant should not eat any fish from Holland Pond” and*

*“The general public should limit consumption of all fish from Holland Pond to two meals per month”.*






A TMDL was recently approved for mercury by the U.S. EPA. The Northeast Regional Mercury Total Maximum Daily Load (TMDL) was prepared by the New England Interstate Water Pollution Control Commission (NEIWPCC) in cooperation with the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The TMDL covers waterbodies including Holland Pond that are impaired primarily due to atmospheric deposition of mercury (Northeast States 2007). The TMDL target for Massachusetts is 0.3 ppm or less of mercury in fish tissue. The plan calls for a 75% reduction of in-region and out-of-region atmospheric sources by 2010 and a 90% or greater reduction in the future (NEIWPCC 2007).

Because of the site-specific fish consumption advisory for Holland Pond due to mercury contamination, the *Fish Consumption Use* is assessed as impaired.

#### **PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There are two beaches on Holland Pond (the Holland Pond Recreation Area and the Town Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

### Holland Pond (MA41022) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED*
Fish Consumption		IMPAIRED Cause: Mercury in fish tissue Source: Atmospheric deposition
Primary Contact		NOT ASSESSED
Secondary Contact		
Aesthetics		

\*Alert Status issues identified, see details in use assessment

### RECOMMENDATIONS

Conduct aquatic macrophyte survey and determine species of *Myriophyllum* when flowering heads are present.

Support improvement of freshwater Beaches Bill data quality and reporting.

**Little Alum Pond (MA41029)**

Location: Brimfield.

Size: 73 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed.






**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of *Myriophyllum* sp. in Little Alum Pond was detailed in an herbicide permit application (MassDEP 2006b). Field confirmation of the presence of a non-native *Myriophyllum* sp. is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophyte species.

No other recent quality assured data are available so all other uses are not assessed.

Little Alum Pond (MA41029) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment section

**RECOMMENDATIONS**

Conduct aquatic macrophyte survey and determine species of *Myriophyllum* when flowering heads are present.



**No. 4 Reservoir (MA41039)**

Location: Southbridge.

Size: 69 Acres.

Classification: Class A\PWS\ORW.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed







**USE ASSESSMENT****AQUATIC LIFE**Biology

The presence of a potential non-native *Myriophyllum sp.* was noted during a DEP synoptic survey (MassDEP 1994). Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophyte species.

No other recent quality assured data are available so all other uses are not assessed.

No. 4 Reservoir (MA421039) Use Summary

Aquatic Life*	Fish Consumption	Drinking Water**	Primary Contact	Secondary Contact	Aesthetics
					
NOT ASSESSED					

\*Alert Status issues identified, see details in use assessment

\*\* The MassDEP Drinking Water Program maintains current drinking water supply data.

**RECOMMENDATIONS**

Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed when flowering heads are present.

### Pistol Pond (MA41057)

Location: Sturbridge.

Size: 5 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters Category 5 - Waters Requiring a TMDL (Noxious aquatic plants).

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Sturbridge (MAR041240)

### USE ASSESSMENT

#### AQUATIC LIFE

##### Habitat and Flow

It should be noted that this waterbody is within the Westville Dam flood control project boundary.

##### Water Chemistry

Baseline lake water quality monitoring was conducted in Pistol Pond in the summer of 2004 (Haque and Mattson 2008). On 18 August 2004 a depth profile in the deep hole of Pistol Pond was conducted. *In-situ* water quality monitoring that included measurements of temperature, pH, conductivity, TDS, depth and dissolved oxygen was conducted. Little oxygen was present in the water column (2.2 mg/L). Chlorophyll *a* concentrations ranged from 3.1 to 20.7 mg/m<sup>3</sup>. Temperature and DO measurements were also taken by a deployed probe between 17/18 August 2004. The maximum dissolved oxygen concentration was 3.2 mg/L and the maximum temperature was 21.2°C (MassDEP 2004b). Conductivity was also elevated in this waterbody (1,027µS/cm at 1.3 m depth).






The *Aquatic Life Use* is assessed as impaired for Pistol Pond based on the extremely low DO conditions. While these conditions may be related to the extensive wetlands associated with this waterbody, the high conductivities and the proximity of major roadways are likely contributors. Moderate to high chlorophyll *a* concentrations are also possible indicators of algal blooms.

#### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

The Secchi depth measurements were low on two of the three surveys dates (ranging from 0.7 to >1.6m). No other objectionable conditions (e.g., odors, scums, deposits, or other conditions) were noted during the surveys conducted in DWM staff on 16 June, 14 July, and 18 August 2004 (MassDEP 2004b). Moderate to high chlorophyll *a* concentrations are also possible indicators of algal blooms.

The *Primary* and *Secondary Contact Recreational* and *Aesthetics Uses* are assessed as impaired based on the low Secchi depth measurements.

Pistol Pond (MA41057) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Low dissolved oxygen Source: Unknown
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Low Secchi disk transparency Source: Unknown Suspected source: Runoff highway/road/bridge runoff
Secondary Contact		
Aesthetics		

**Prindle Lake (MA41043)**

Location: Charlton.

Size: 75 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 3 - No Uses Assessed

**USE ASSESSMENT****AQUATIC LIFE**Biology






The presence of *Myriophyllum heterophyllum* is indicated in herbicide application permits (MassDEP 2006b). Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed.

The *Aquatic Life Use* is given an “Alert Status” due to the possible presence of a non-native macrophyte species.

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

There is one beach on Prindle Lake (Prindle Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

Prindle Lake (MA41043) Use Summary

Aquatic Life*	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

\*Alert Status issues identified, see details in use assessment

**RECOMMENDATIONS**

Field confirmation of the presence of a non-native *Myriophyllum sp.* is needed when flowering heads are present.

Support improvement of freshwater Beaches Bill data quality and reporting.

### Railroad Pond (MA41058)

Location: Charlton.

Size: 7 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

### NPDES SURFACE WATER DISCHARGES (APPENDIX F, TABLE F3)

Town of Charlton (MAR041100)

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native macrophyte species.

No other recent quality assured data are available. All other uses are not assessed.

Railroad Pond (MA41058) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

### Sherman Pond (MA41046)

Location: Brimfield.

Size: 76 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

### USE ASSESSMENT

#### AQUATIC LIFE






##### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native aquatic macrophyte species.

No other recent quality assured data are available so all other uses are not assessed.

Sherman Pond (MA41046) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATION

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

### Sibley Pond (MA41047)

Location: North Basin, Charlton.

Size: 22 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Organic enrichment/Low DO, Noxious aquatic plants, Turbidity).

### USE ASSESSMENT

#### AQUATIC LIFE

##### Biology

Sparse amounts of algae were noted in Sibley Pond by DWM field crews (MassDEP 2004b). *"There was a sample collected by Katie O'Brien on July 29, 2004 at North Sibley Pond. There appeared to be two samples collected a "glob" from the water column and a mat type sample from some substrate that were both examined qualitatively. The "glob" or algae in a mucilaginous matrix was the cyanobacteria Spirulina major which was very abundant. Within the matrix were other cyanobacteria i.e Oscillatoria, Microcystis, Anabaena. In the mat type sample there were the above genera but Anabaena was more abundant. Two diatom genera were noted Gyrosigma and another staled pennate diatom."* (Beskenis 2009b)

##### Water Chemistry

Temperature and DO measurements were taken by a deployed probe between 28/29 July 2004 met standards (DO ranged from 7.5 to 9.1 mg/L and maximum temperature was 23.6°C) (MassDEP 2004b).






Too limited data are available so the *Aquatic Life Use* is not assessed for Sibley Pond.

#### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

DWM field crews did not note any objectionable conditions (e.g., odors, scums, deposits) in Sibley Pond on 28 July 2004 (MassDEP 2004b).

Too limited data are available so the *Primary and Secondary Contact Recreation Uses* and *Aesthetic Uses* are not assessed.

Sibley Pond (MA41047) Use Summary

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

## Sylvestri Pond (MA41049)

Location: Dudley.

Size: 30 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

## USE ASSESSMENT

### AQUATIC LIFE






#### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b).

The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native macrophyte species.

No other recent quality assured data are available. All other uses are not assessed.

Sylvestri Pond (MA41049) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

## RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

## Walker Pond (MA41052)

Location: Sturbridge.

Size: 104 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 4c - Impairment Not Caused by a Pollutant ((Exotic species\*)). \* denotes a non-pollutant.

### USE ASSESSMENT

#### AQUATIC LIFE

##### Biology

The presence of *Myriophyllum heterophyllum* is detailed in the French and Quinebaug 2001 Water Quality Assessment Report (MassDEP 2002b) and has also been detailed in herbicide permit applications (MassDEP 2006b).






The *Aquatic Life Use* is assessed as impaired due to the presence of a non-native macrophytes species.

#### PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

There are three beaches on Walker Pond (the Main Beach, Oak Cove Beach and Wells State Park Beach). Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to the Massachusetts DPH, which is required as part of the Beaches Bill. Therefore, no *Primary Contact Recreational Use* assessments (either support or impairment) decisions are being made using Beaches Bill data for this waterbody.

No other recent quality assured data are available so these uses are not assessed.

Walker Pond (MA41052) Use Summary

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native plants Source: Introduction of a non-native organism
Fish Consumption		NOT ASSESSED
Primary Contact		
Secondary Contact		
Aesthetics		

### RECOMMENDATIONS

Continue to monitor for the presence of invasive non-native aquatic vegetation and determine the extent of the infestation. Prevent spreading of invasive aquatic plants. Once the extent of the problem is determined and control practices are exercised, vigilant monitoring needs to be practiced to guard against infestations in unaffected areas, including downstream from the site, and to ensure that managed areas stay in check. A key portion of the prevention program should be posting of boat access points with signs to educate and alert lake-users to the problem and their responsibility to prevent spreading these species. The Final GEIR for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) should also be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (e.g., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should not be used



for many species because of the propensity for these invasive species to reproduce and spread vegetatively (from cuttings).

Support improvement of freshwater Beaches Bill data quality and reporting.

**Wielock Pond (MA41056)**

Location: Dudley.

Size: 6 Acres.

Classification: Class B.

This segment is on the 2008 Integrated List of Waters in Category 5 - Waters Requiring a TMDL (Turbidity).

**USE ASSESSMENT****AQUATIC LIFE**Water Chemistry

Baseline lake water quality monitoring was conducted in Wielock Pond in the summer of 2004 (Haque and Mattson 2008). On 18 August 2004 a depth profile in the deep hole of Wielock Pond was conducted. *In-situ* water quality monitoring that included measurements of temperature, pH, conductivity, TDS, depth and dissolved oxygen was conducted. Although there was low oxygen near the bottom, this waterbody is so shallow the single profile was not adequate to determine the areal extent of low dissolved oxygen conditions. Chlorophyll *a* concentrations were high (14.0 to 62mg/m<sup>3</sup>). Temperature and DO measurements taken by a deployed probe between 17/18 August 2004 met standards (DO ranged from 5.1 to 7.8 mg/L and maximum temperature was 22.1°C).






Too limited data are available so the *Aquatic Life Use* is not assessed for Wielock Pond. Because of the elevated chlorophyll *a* concentrations, however, this use is identified with an "Alert Status".

**PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS**

Secchi depth measurements made at the deep hole of Wielock Pond during the summer of 2004 ranged from 1.7 to 2.1m (n=3) ((Haque and Mattson 2008). DWM personnel did note high turbidity on one occasion but they did not note any other objectionable conditions (e.g., odors, deposits, algal blooms) during the surveys in the summer of 2004. Chlorophyll *a* concentrations were elevated (14.0 to 62mg/m<sup>3</sup>).

The *Primary Contact Recreational Use* is not assessed for Wielock Pond because of the lack of any bacteria data. The *Secondary Contact Recreational* and *Aesthetics* uses are assessed as support based on the adequate Secchi depth measurements and lack of other objectionable conditions however these uses are identified with an "Alert Status" because of a single occurrence of high turbidity and the elevated chlorophyll *a* concentrations which may be indicative of algal blooms.

Wielock Pond (MA41056) Use Summary

Designated Uses		Status
Aquatic Life		NOT ASSESSED*
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		SUPPORT*
Aesthetics		SUPPORT*

\*Alert Status issues identified, see details in use assessment

## REFERENCES

- Ackerman, M.T., 1989. *Compilation of Lakes, Ponds, Reservoirs and Impoundments Relative to the Massachusetts Lake Classification Program*. Publication: #15901-171-50-4-89-c.r. Technical Services Branch, Massachusetts Division of Water Pollution Control, Department of Environmental Quality Engineering, Westborough, MA.
- Barker, Townsend. 2007. *Re: Buffumville Lake Data*. United States Army Corps of Engineers, Concord, MA. Email to Matthew Reardon, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA. Dated 4 December 2007.
- Barker, Townsend. 2008. ERDC Visit to Buffumville Lake, 23-24 September 2008. *Memorandum for Chiefs, Con/Ops and Eng/Plng*.
- Beaudoin, Therese. 2002. Personal Communication. *French & Quinebaug River Watershed data and information*. Massachusetts Department of Environmental Protection, Central Regional Office, Worcester, MA.
- Beaudoin, Therese. 2003. Memo to Robert Kimball, Water Pollution Control Section Chief. 9/29/2003. Environmental scientist. MassDEP, Worcester, MA.
- Beaudoin, Therese. 11 Aug 2006. Unpublished photos. Robinson Pond, Oxford.
- Beaudoin, Therese. 15 July 2009. Personal communication.
- Benoit, E. 2007. *Re: Monitoring results from Webster Lake with attachments 2006 field data sheets and Microbac reports and 2005 field sheets and Microbac reports*. Webster Lake Association, Webster, MA. Email to Adrienne Pappal, Massachusetts Department of Environmental Protection, Division of Watershed Management dated 23 May 2007.
- Benoit, S. 2009. *Re: Quick questions*. Quinebaug River Advocacy Group, Southbridge, MA. Email to Therese Beaudoin, Massachusetts Department of Environmental Protection, Division of Watershed Management dated 3 June 2009.
- Beskenis, J. L. 2009a. *2004 Merrimack and French & Quinebaug Periphyton Study Stream Velocity and Canopy Cover Considerations*. CN179.8. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.
- Beskenis, J. L. 2009b. 8 April 2009. *North Sibley*. Email to Laurie Kennedy, Massachusetts Department of Environmental Protection, Central Regional Office, Worcester, MA.
- Cohen, Russ. 2001. Personal Communication. *Field observations/information for the French & Quinebaug River Watersheds*. Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement, Riverways Program, Boston, MA.
- CT DEP and USDA NRCS. October 1998. Connecticut Unified Watershed Assessment. CT DEP, Hartford, CT.
- Dignam, J. 2004. *French River cleanup in Webster yields two tons of trash*. Worcester Telegram & Gazette. Worcester, MA. June 15, 2004.
- Dignam, J. 2006. Worcester Telegram & Gazette. Worcester, MA. May 11, 2006.
- Dulmaine, G. and Nadeau, P. 2004-2006. unpublished photos. Erosion runoff near Huguenot Road and Lowes Pond, Oxford.
- Environmental Law Reporter. 1988. *Clean Water Deskbook*. Environmental Law Institute, Washington, D.C.
- Fennessey, N.M. 2004. *A Decision Support System Model Test of Instream Flow Augmentation Policies for the Quinebaug River Watershed*. Hydrologic Services Inc., Dartmouth, MA.
- Fiorentino, J. F. 2007. *Technical Memorandum TM-41/42-6 French & Quinebaug River Watershed 2004 Benthic Macroinvertebrate Bioassessment*. CN178.3. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

FRC. 2005. *2005 Water Quality Monitoring Report*. French River Connection, Webster, MA.

FRC. 2006. *Draft 2006 Water Quality Monitoring Report*. French River Connection, Webster, MA.

FRC 2008a. *2007 Water Quality Monitoring Report, January 21, 2008*. French River Connection, Webster, MA.

FRC 2008b. *2008 Water Quality Monitoring Report, December 5, 2008*. French River Connection, Webster, MA.

Geosyntec Consultants Inc. 2003. *2003 Webster Lake Aquatic Vegetation Survey and Water Quality Assessment*. Boxborough, MA.

Geosyntec Consultants Inc. 2004. *Webster Lake 2004 Water Quality and Aquatic Vegetation Assessment Webster*. Acton, MA.

Geosyntec Consultants Inc. 2006. *2006 Lake Webster Aquatic Vegetation Assessment*. Acton, MA.

Grader, Melissa. 2009. *RE: Quinebaug River Flows*. U.S. Fish & Wildlife Service, New England Field Office, Sunderland, MA. Email to Robert Kubit, Massachusetts Department of Environmental Protection, Division of Watershed Management dated 15 June 2009.

Halliwell, D.B., W.A. Kimball and A.J. Screpetis. 1982. *Massachusetts Stream Classification Program Part I: Inventory of Rivers and Streams*. Massachusetts Division of Fisheries and Wildlife, Department of Fisheries, Wildlife, and Recreational Vehicles and Massachusetts Division of Water Pollution Control, Department of Environmental Quality Engineering. Westborough, MA.

Hanacek, Robert. 2004. *Blackstone and Thames Basin Non-Emergency Release/Drawdowns*. Basin Manager. U.S. Army Corps of Engineers. Oxford, MA. Email to Therese Beaudoin, Massachusetts Department of Environmental Protection, Central Regional Office dated 22 November 2004.

Haque, A.A. and M.D. Mattson, PhD. 2008. *Draft Baseline Lake Survey 2004*. Technical Memo dated 24 March 2008. CN209.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MA DCR. 2006. *Non-native Plants DCR Database*. Excel Spreadsheet. Massachusetts Department of Conservation and Recreation, West Boylston, MA.

MA DPH. 2008. *Freshwater Fish Consumption Advisory List July 2008*. Massachusetts Department of Public Health, Bureau of Environmental Health Assessment. Boston, MA.

MA DFG 2007. [Online] *Massachusetts Trout Stocked Waters- 2007*. Massachusetts Department of Fish and Game, Division of Fisheries and Wildlife, Boston, MA. Retrieved 20 November 2007 from [http://www.mass.gov/dfwele/dfw/dfw\\_trout\\_waters.htm](http://www.mass.gov/dfwele/dfw/dfw_trout_waters.htm).

MA DFG 2007b. *Massachusetts Coldwater Fishery Resource List, January 29, 2007*. Massachusetts Department of Fish and Game, Division of Fisheries & Wildlife, Westborough, MA.

Maietta, R. 2007. *2004 French and Quinebaug River Watersheds Fish Population Assessments*. CN178.4. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

Maietta, R. 2007b. *1983-2007 Fish Toxics Monitoring Survey List*. CN270.2. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 1994. *Open lake survey files*. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MA DEP. 2001a. Open File. *PALIS updates*. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2001b. Open CERO water quality sampling files. Massachusetts Department of Environmental Protection, Central Environmental Office, Worcester, MA.

MassDEP 2002. Open CERO water quality sampling files. Massachusetts Department of Environmental Protection, Central Environmental Office, Worcester, MA.

MassDEP 2002b. *French and Quinebaug River Watersheds: 2001 Water Quality Assessment Report*. CN 51.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2002c. *Total Maximum Daily Loads of Phosphorus for Select French Basin Lakes*. CN 110.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2003. *Open CERO water quality sampling files*. Massachusetts Department of Environmental Protection, Central Environmental Office, Worcester, MA.

MassDEP 2004. *Open CERO water quality sampling files*. Massachusetts Department of Environmental Protection, Central Environmental Office, Worcester, MA.

MassDEP 2004b. *Lake sampling field sheets*. Open file. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2004c. *Biomonitoring and habitat assessment field sheets – French River Watershed 2004 surveys*. Open file. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2005a. *Open 2005 Lakes sampling files*. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2005b. *Open CERO water quality sampling files*. Massachusetts Department of Environmental Protection, Central Environmental Office, Worcester, MA.

MassDEP 2006. *Massachusetts Surface Water Quality Standards (Revision of 314 CMR 4.00, effective December 29, 2006)*. Massachusetts Department of Environmental Protection, Boston, MA.

MassDEP 2006b. *Herbicide Application Files Database 1992-2006*. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2006c. *Open CERO water quality sampling files*. Massachusetts Department of Environmental Protection, Central Environmental Office, Worcester, MA.

MassDEP 2007a. *Baseline Lake Survey 2003*. Technical Memo. CN 205.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2007b. [Online] *Cleanup Sites*. Massachusetts Department of Environmental Protection, Boston, MA. [http://db.state.ma.us/dep/cleanup/sites/Site\\_Info.asp?textfield RTN=2-0012851](http://db.state.ma.us/dep/cleanup/sites/Site_Info.asp?textfield RTN=2-0012851)

MassDEP 2008a. *Massachusetts Year 2008 Integrated List of Waters*. CN281.1. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2008. *NPDES Toxicity testing discharge monitoring summary*. Toxicity Testing Database (TOXTD). Dbase Application. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassWildlife. 2008. *MDFW Fisheries Database Distribution Copy\_093008*. Massachusetts Department of Fish and Game, Division of Fisheries & Wildlife, Westborough, MA.

Mattson, M., P.J. Godfrey, R.A. Barletta and A. Aiello. 2004. *Eutrophication and Aquatic Plant Management in Massachusetts. Final Generic Environmental Impact Report*. Edited by Kenneth J. Wagner. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA and Massachusetts Department of Conservation and Recreation, Boston, MA.

Meek, J. 2008. *Total River Miles*. Massachusetts Department of Environmental Protection, Division of Water Management, Worcester, MA. Email to Matthew Reardon, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA dated 14 February 2008.

Menzie-Cura and Associates. 2006. *Post-Remediation Environmental Risk Characterization: Former Webster Lens Facility, Dudley Massachusetts DEP RTN 2-12746 and 2-13250*. Menzie-Cura and Associates Inc., Winchester, MA.

Moraff, K. 2009. Letter dated 4 May 2009 to Laurie Burt, Commissioner, Massachusetts Department of Environmental Protection. *Re: 2008 Clean Water Act Section 303(d) List Approval*. United States Environmental Protection Agency, Office of Ecosystem Protection, Boston, MA.

NEIWPCC. 2007. *Northeast Regional Mercury TMDL Fact Sheet October 2007*. [Online]. New England Interstate Water Pollution Control Commission, Lowell, MA. Retrieved 23 January 2008 from <http://www.neiwpcc.org/mercury/mercury-docs/FINAL%20Northeast%20Regional%20Mercury%20TMDL%20Fact%20Sheet.pdf>.

Northeast States. 2007. *Northeast Regional Mercury Total Maximum Daily Load*. Connecticut Department of Environmental Protection, Maine Department of Environmental Protection, Massachusetts Department of Environmental Protection, New Hampshire Department of Environmental Services, New York State Department of Environmental Conservation, Rhode Island Department of Environmental Management, Vermont Department of Environmental Conservation, New England Interstate Water Pollution Control Commission.

O'Brien-Clayton, K. *French and Quinebaug River Basins 2004 Water Quality Technical Memorandum, TM-41/42-5*. CN 178.2. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

Ostrosky, J. 2009. Personal communication. *Quinebaug River Watershed Wastewater Treatment Plant Information*. Massachusetts Department of Environmental Protection, Central Regional Office, Worcester, MA.

Pelto, Maurice. 16 Nov 2001. *Re: Dresser Hill Pond*. Email to Therese Beaudoin, Massachusetts Department of Environmental Protection, Central Regional Office, Worcester, MA.

Pelto, M. 2009. *Re: Quick questions-longer question*. Email to Therese Beaudoin, Massachusetts Department of Environmental Protection, Division of Watershed Management dated 3 June 2009.

Persaud, D.R. Jaagumagi, R. and A. Hayton. 1993. *Guidelines for the protection and management of aquatic sediment quality in Ontario*. Water Resources Branch, Ontario Ministry of the Environment, Ontario, Canada.

Parasiewicz, P. 2004. *Ecohydrology study of the Quinebaug River – Final Report for New England Interstate Water Pollution Control Commission*. Ithaca, NY.

Parasiewicz, P. 2007. *RE: Data Request* [with xls attachments]. Rushing Rivers Institute, Amherst, MA. Email to Matthew Reardon, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA, dated 26 December 2007.

Richards, T. 2006. *DFG Fish Population Database (Distribution Copy) 1998-2005*. Massachusetts Department of Fish and Game, Division of Fisheries and Wildlife, Westborough, MA.

Richards, T. 2008. *DFG Fish Population Database (Distribution Copy) dated 093008*. Massachusetts Department of Fish and Game, Division of Fisheries and Wildlife, Westborough, MA.

Rizzo Associates. 2006. *Response Action Outcome Statement: Former Webster Lens, Oxford Avenue Dudley Massachusetts DEP RTNs 2-12746 and 2-13250*. Rizzo Associates, Framingham, MA.

Robinson, Michelle. 2007. *RE: Webster Lake*. Massachusetts Department of Conservation and Recreation, West Boylston, MA. Email to Matthew Reardon, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA, dated 7 December 2007.

Russell, Timothy A. 15 July 2009. *Re: Buffumville closures*. U.S. Army Corps of Engineers, Charlton, MA. Email to Therese Beaudoin, Massachusetts Department of Environmental Protection, Central Regional Office, Worcester, MA.

St. George, J. 2009. *RE: Charlton Masonic Home*. Charlton WWTP Plant Manager, Charlton, MA. Email to John Ostrosky, Massachusetts Department of Environmental Protection, Central Regional Office, Wastewater Management, Worcester, MA, dated 11 June 2009.

Thomas, Eric. 10 October, 2001. Personal communication. *Source of flows into Hamilton Reservoir from Connecticut lakes and streams*. Connecticut Department of Environmental Protection, Hartford, CT.

Thomas, Eric. 2002. *Comments on the draft French & Quinebaug River Basin Water Quality Assessment Report*. Connecticut Department of Environmental Protection, Hartford, CT. Letter to Theresa Beaudoin, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA, dated 8 January 2002.

US ACOE undated. [Online] *US Army Corps of Engineers, Massachusetts Water Resources*. United States Army Corps of Engineers, Concord, MA. Retrieved 16 November 2007 from

<http://www.nae.usace.army.mil/water/topic.asp?mytopic=fd-hodges>

US ACOE. 1997. *Westville Lake Brochure*. US Army Corps of Engineers, New England District. NAEEP-360-1-51. Southbridge, MA.

US ACOE. 2001. *Update Report for Massachusetts October 31, 2001*. US Army Corps of Engineers New England District, Concord, MA.

US ACOE. 2006. *Annual Water Quality Report: Fiscal Year 2005*. US Army Corps of Engineers New England District, Concord, MA.

US ACOE. 2007. *Annual Water Quality Report: Fiscal Year 2006*. US Army Corps of Engineers New England District, Concord, MA.

USGS 2007a. [Online] *USGS 01124350 French River below dam at Hodges Village, MA*. United States Geological Survey, Northborough, MA. Retrieved 13 June 2007 from  
[http://waterdata.usgs.gov/ma/nwis/uv/?site\\_no=01124350&PARAMeter\\_cd=00065.00060](http://waterdata.usgs.gov/ma/nwis/uv/?site_no=01124350&PARAMeter_cd=00065.00060)

USGS 2007b. [Online] *USGS 01124500 Little River near Oxford, MA*. United States Geological Survey, Northborough, MA. Retrieved 13 June 2007 from  
[http://waterdata.usgs.gov/ma/nwis/uv/?site\\_no=01124500&PARAMeter\\_cd=00065.00060](http://waterdata.usgs.gov/ma/nwis/uv/?site_no=01124500&PARAMeter_cd=00065.00060)

USGS 2007c. [Online] *USGS 01125000 French River at Webster, MA*. United States Geological Survey, Northborough, MA. Retrieved 13 June 2007 from  
[http://waterdata.usgs.gov/ma/nwis/uv/?site\\_no=01125000&PARAMeter\\_cd=00065.00060](http://waterdata.usgs.gov/ma/nwis/uv/?site_no=01125000&PARAMeter_cd=00065.00060)

USGS 2007d. [Online] *Water-resources data for the United States Water Year 2007*. United States Geological Survey, Northborough, MA. Retrieved 14 June 2007 from  
<http://wdr.water.usgs.gov/wy2007/search.jsp>

USGS. 2007e. *USGS 01125000 French River at Webster, MA*. United States Geological Survey, Northborough, MA. Accessed 30 September 2007.  
[http://waterdata.usgs.gov/ma/nwis/uv/?site\\_no=01125000&PARAMeter\\_cd=00065.00060](http://waterdata.usgs.gov/ma/nwis/uv/?site_no=01125000&PARAMeter_cd=00065.00060)

Webber, Peter C. 27 Aug 2001. *Declaration of Dam Safety Emergency*. Commissioner, Department of Environmental Management, Commonwealth of Massachusetts.

Zimmerman, M.J. and Breault, R.F. 2003. *Sediment Quantity and Quality in Three Impoundments in Massachusetts: US Geological Survey-Water Resources Investigations Report 03-4017*. 36 pg. United States Geological Survey, Northborough, MA.