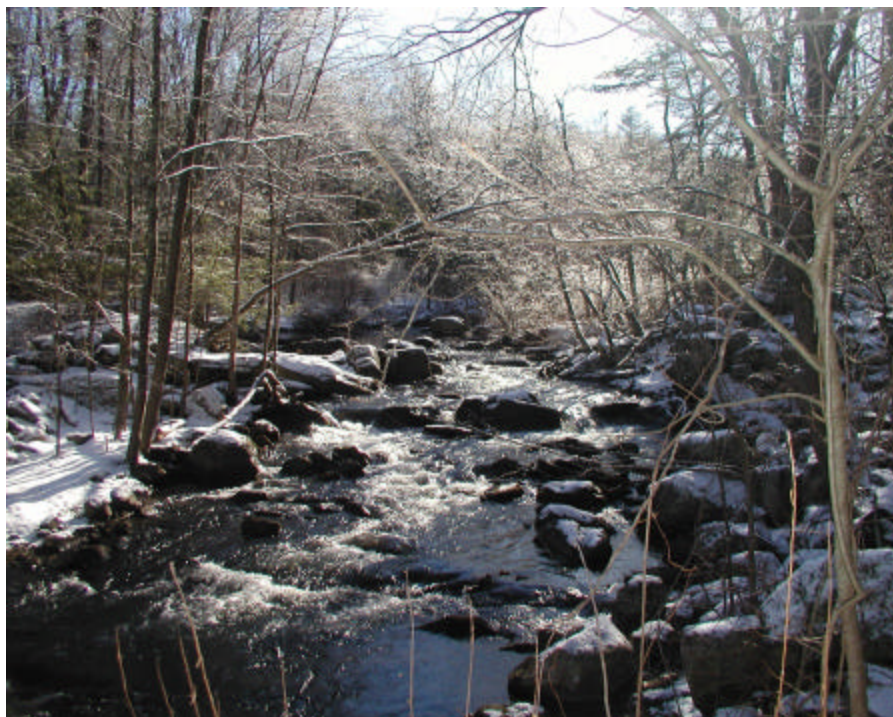


## **FRENCH & QUINEBAUG RIVER WATERSHEDS 2001 WATER QUALITY ASSESSMENT REPORT**



Quinebaug River upstream of bridge off of Alexander Road, Holland



French River upstream of Hodges Village Dam, Oxford

**COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
BOB DURAND, SECRETARY  
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION  
LAUREN A. LISS, COMMISSIONER  
BUREAU OF RESOURCE PROTECTION  
CYNTHIA GILES, 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.state.ma.us/dep/brp/wm/wmpubs.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  
2001 WATER QUALITY ASSESSMENT REPORT

Prepared by:

Laurie E. Kennedy, Stella Kiras, and Richard McVoy, Ph. D.

Department of Environmental Protection  
Division of Watershed Management

Report Number:

41/42-AC-1

DWM Control Number:

51.0

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

March 2002

## ACKNOWLEDGEMENTS

Coordination of local, state and federal agencies and private organizations is fundamental to the success of the Massachusetts Watershed Initiative. We would like to thank John Desmond, Executive Office of Environmental Affairs and the French/Quinebaug River Watershed Team for facilitating that process. Data and information used in this report were provided in part by the following agencies and organizations:

### State

- Massachusetts Executive Office of Environmental Affairs (EOEA), French/Quinebaug Watershed Team
- Massachusetts Department of Environmental Protection (MA DEP):
  - 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 (MDPH)
- Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE)
  - Division of Fisheries and Wildlife (MassWildlife)
  - Riverways Program
- Massachusetts Department of Environmental Management (DEM)
- Connecticut Department of Environmental Protection (CT DEP)

### Federal

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

Much appreciation is also extended to several MA DEP employees for their contributions: Jim Blair, Terry Beaudoin, Richard Chase, Jane Colonna-Romano, Tom Dallaire, Ken Dominick, John Fiorentino, Elaine Hartman, Bob Maietta, Juliet Mathers, Arthur Screpetis, and Mollie Weinstein.

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.

Cover photo credit: French River – Staff photographer, United States Army Corps of Engineers, New England District  
Quinebaug River – Laurie Kennedy, MA DEP Division of Watershed Management

## TABLE OF CONTENTS

Table of Contents .....	i
List of Tables and Figures .....	i
List of Acronyms.....	iii
List of Units .....	iii
Executive Summary .....	iv
Introduction .....	
Assessment Methodology .....	
French & Quinebaug River Watersheds Description and Classification.....	
Summary of Existing Conditions and Perceived Problems .....	
Sources of Information .....	
Total Maximum Daily Loads (TMDL) .....	
Objectives .....	
Report Format .....	
French River Watershed - River Segment Assessments .....	
Town Meadow Brook (Segment MA42-01) .....	
Town Meadow Brook (Segment MA42-02) .....	
Burncoat Brook (Segment MA42-07) .....	
Bartons Brook (Segment MA42-08) .....	
French River (Segment MA42-03) .....	
French River (Segment MA42-04) .....	
Unnamed Tributary (Segment MA42-12) .....	
Wellington Brook (Segment MA42-11) .....	
Little River (Segment MA42-09).....	
Mill Brook (Segment MA42-10) .....	
French River (Segment MA42-05) .....	
French River (Segment MA42-06) .....	
French River Watershed - Lake Assessments .....	
Quinebaug River Watershed - River Segment Assessments.....	
Quinebaug River (Segment MA41-01) .....	
Wales Brook (Segment MA41-08).....	
Mill Brook (Segment MA41-07) .....	
Quinebaug River (Segment MA41-02) .....	
Cady Brook (Segment MA41-05).....	
Cady Brook (Segment MA41-06).....	
Quinebaug River (Segment MA41-09) .....	
Quinebaug River (Segment MA41-03) .....	
Quinebaug River (Segment MA41-04) .....	
Quinebaug River Watershed - Lake Assessments .....	
Literature Cited.....	

## LIST OF APPENDICES

APPENDIX A - DATA VALIDATION REPORT FOR 1999 MA DEP/DWM FRENCH & QUINEBAUG RIVER BASINS MONITORING DATA (ALSO INCLUDES 1998 AND 1994 FISH TOXICS MONITORING DATA)
APPENDIX B - 1999 MA DEP DWM FRENCH & QUINEBAUG RIVER BASINS SURVEY DATA (ALSO INCLUDES 1998 AND 1994 FISH TOXICS MONITORING DATA)
APPENDIX C - <i>TECHNICAL MEMORANDUM</i> #TM- 41/42- FRENCH & QUINEBAUG RIVER WATERSHEDS 1999 BIOLOGICAL ASSESSMENT
APPENDIX D - SUMMARY OF NPDES AND WMA PERMITTING INFORMATION, FRENCH & QUINEBAUG RIVER BASINS
APPENDIX E - MA DEP GRANT AND LOAN PROGRAMS
APPENDIX F - SUMMARY OF INSTREAM FLOW STUDIES QUINEBAUG RIVER MASSACHUSETTS AND CONNECTICUT 1999 - 2001
APPENDIX G - <i>TECHNICAL MEMORANDUM</i> FRENCH AND QUINEBAUG RIVERS – PERIPHYTON SURVEY RESULTS 1999

## LIST OF TABLES AND FIGURES

Table 1.	Summary of Massachusetts Surface Water Quality Standards.....	3
Table 2.	1998 303(d) list of impaired waters in the French River Watershed .....	16
Table 3.	1998 303(d) list of impaired waters in the Quinebaug River Watershed. ....	17
Table 4.	Summary of Data Collection by USGS NAWQA Program in the French/Quinebaug River Basins. ....	22
Table 5.	French River Watershed lake trophic status evaluation .....	59
Table 6.	French River Watershed lake assessments.....	65
Table 7.	Quinebaug River Watershed lake trophic status evaluation .....	113
Table 8.	Species-level taxa list and counts for fish collected by the Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement (MA DWFELE), Division of Fisheries and Wildlife between July and September 1999 in lakes and ponds in the Quinebaug River Watershed .....	115
Table 9.	Quinebaug River Watershed lake assessments.....	120
Figure 1.	French & Quinebaug River Watersheds <i>Aquatic Life Use</i> Assessment Summary – Rivers. ....	xiii
Figure 2.	French & Quinebaug River Watersheds <i>Aquatic Life Use</i> Assessment Summary – Lakes.....	xv
Figure 3.	French & Quinebaug River Watersheds <i>Fish Consumption Use</i> Assessment Summary–Lakes and Rivers .....	xvii
Figure 4.	French & Quinebaug River Watersheds <i>Primary and Secondary Contact Recreational uses</i> Assessment Summary - Rivers.....	xix
Figure 5.	French & Quinebaug River Watersheds <i>Aesthetics Use</i> Assessment Summary – Rivers. ....	xxi
Figure 6.	French & Quinebaug River Watersheds <i>Primary and Secondary Contact Recreational uses</i> Assessment Summary - Lakes. ....	xxiii
Figure 7.	French & Quinebaug River Watersheds <i>Aesthetics Use</i> Assessment Summary – Lakes.....	xxv
Figure 8.	Five-year cycle of the Watershed Approach .....	1
Figure 9.	Location of French and Quinebaug River Watersheds.....	12
Figure 10.	French River Watershed – river segment locations identified by WBID .....	27
Figure 11.	French River Watershed – lake segments locations identified by WBID .....	58
Figure 12.	French River Watershed – presence of non-native aquatic vegetation and potential for downstream spreading .....	61
Figure 13.	Quinebaug River Watershed – river segment locations identified by WBID .....	73
Figure 14.	Quinebaug River Watershed – lake segments locations identified by WBID .....	112
Figure 15.	Quinebaug River Watershed – presence of non-native aquatic vegetation and potential for downstream spreading WBID.....	116

## LIST OF ACRONYMS

ACOE	Army Corps of Engineers
BPJ	Best professional judgement
CMR	Code of Massachusetts Regulations
CNOEC	Chronic no observed effect concentration
CT DEP	Connecticut Department of Environmental Protection
CWA	Clean Water Act
DMF	Division of Marine Fisheries
DFWELE	Department of Fisheries, Wildlife and Environmental Law Enforcement
DMR	Discharge Monitoring Report
DO	dissolved oxygen
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
LC <sub>50</sub>	lethal concentration to 50% of the test organisms
L-EL	Low effect level
MA DEM	Massachusetts Department of Environmental Management
MA DEP	Massachusetts Department of Environmental Protection
MassGIS	Massachusetts Geographic Information System
MDPH	Massachusetts Department of Public Health
NAS/NAE	National Academy of Sciences/National Academy of Engineers
NAWQA	National Water-Quality Assessment
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source pollution
ORW	Outstanding Resource Water
PALIS	Pond and Lake Information System
PCB	polychlorinated biphenyls
PWS	public water supply
QA/QC	quality assurance/ quality control
RBP	rapid bioassessment protocol
SARIS	Stream and River Inventory System
S-EL	Severe effect level
SWPPP	Stormwater pollution prevention plan
SWQS	Surface Water Quality Standards
TMDL	total maximum daily load
TOC	total organic carbon
TOXTD	MA DEP DWM Toxicity Testing Database
TRC	total residual chlorine
USGS	United States Geological Survey
WBID	Waterbody Identification Code
WBS	Waterbody System Database
WMA	Water Management Act
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
ng	nanogram
NTU	nephelometric turbidity units
PPB	parts per billion
PPM	parts per million
SU	standard units

**EXECUTIVE SUMMARY  
FRENCH & QUINEBAUG RIVER WATERSHEDS  
2001 WATER QUALITY ASSESSMENT REPORT**

The Massachusetts Surface Water Quality Standards (SWQS) designate the most sensitive uses for which surface waters in the Commonwealth shall be protected. The Massachusetts Department of Environmental Protection (MA DEP) is responsible for the assessment of current water quality conditions, which is a key step in the successful implementation of the Massachusetts Watershed Initiative. This critical phase provides an assessment of whether or not the designated uses are being met (support, partial support, non-support) 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 assessment report presents a summary of current water quality data/information in the Massachusetts portion of the French & Quinebaug River Watersheds used to assess the status of the designated uses as defined in the SWQS. These watersheds (i.e., the nine Massachusetts communities) were designated as part of the Quinebaug and Shetucket Rivers Valley National Heritage Corridor in December 1999. The designated uses, where applicable, include: *Aquatic Life, Fish Consumption, Drinking Water, Primary and Secondary Contact Recreation and Aesthetics*. Each use, within a given segment, is individually assessed as 1) **support**, 2) **partial support**, or 3) **non-support**. When too little current or reliable data/information are available the use is **not assessed**. However, if the limited information indicates some evidence of water quality impairment, which is not "naturally occurring", the use is identified with an "Alert Status". It is important to note that not all waters are assessed. Many small and/or unnamed rivers and ponds are currently **unassessed**; the status of their designated uses has never been reported to the United States Environmental Protection Agency (EPA) in the Commonwealth's Summary of Water Quality report (or 305(b) Report) nor is information on these waters maintained in the Waterbody System (WBS) database.

***French River Watershed:***

There are a total of eight rivers, streams, brooks or creeks (the term "rivers" will hereafter be used to include all) assessed in this report in the French River Watershed. These include: the French and Little rivers; Town Meadow, Burncoat, Bartons, Wellington and Mill brooks; and an unnamed tributary of Wellington Brook. These assessments represent 46% of the 15 named streams and approximately 93% (32.3 miles) of the estimated total of 34.6 "named" river miles in the basin. The one unnamed tributary to Wellington Brook adds another 1.5 miles to the total river length assessed in this report. The remaining rivers are small and/or unnamed and currently unassessed. This report also includes information on 46 of the 68 lakes, ponds or impoundments (the term "lakes" will hereafter be used to include all) in the French River Watershed. The 46 lakes assessed in this report represent 3,393 acres of the 3,556 total lake acreage (or 95% of the lake acreage) in the French River Watershed.

***Quinebaug River Watershed:***

There are a total of four rivers in the Quinebaug River Watershed assessed in this report: the mainstem Quinebaug River and Wales, Mill and Cady brooks. These four rivers represent approximately 14% of the 29 named streams and 46% (37.9 river miles) of the estimated total of 82.7 "named" river miles in the basin. The remaining rivers are small and/or unnamed and currently unassessed. Information on 27 of the basin's 54 lakes is presented in this report. These 27 lakes represent 1,955.9 acres of the 2,358 total lake surface acreage (or 83% of the lake acreage) in the Quinebaug River Watershed.

The status of the designated uses for these waterbodies is summarized in a segment format, which includes 12 river segments and 46 lake segments in the French River Watershed and 9 river segments and 27 lake segments in the Quinebaug River Watershed.



## **AQUATIC LIFE USE**

The *Aquatic Life Use* is supported when suitable habitat (including water quality) is available for sustaining a native, naturally diverse, community of aquatic flora and fauna. Impairment of the *Aquatic Life Use* (partial or non-support) may result from anthropogenic stressors that include point and/or nonpoint source(s) of pollution and hydrologic modification.

**FRENCH RIVER WATERSHED:**  
***Aquatic Life Use* assessment for rivers**  
**(total length assessed in report - 33.8 miles)**

- **Support - 7.9 miles (23%)**
- **Partial Support - 3.0 miles (9%)**
- **Not Assessed - 22.9 miles (68%)**

### ***French River Watershed – Aquatic Life Use Summary:***

Approximately 7.9 miles (23%) of the 33.8 river miles in the French River Watershed included in this report are assessed as supporting the *Aquatic Life Use* (Figure 1). These include Town Meadow and Mill brooks and the upper 4.7-mile reach of the French River. The *Aquatic Life Use* is assessed as impaired (partial support) for the lower three miles of the French River. This impairment is a result of organic enrichment and habitat quality degradation (sedimentation), although flow alteration is also suspected as a cause of impairment. Sources include hydromodification (upstream impoundments), urban runoff and municipal wastewater discharges, although runoff from sand and gravel operations and flow regulation (hydropower operations) are also suspected. The majority (68%) of the river miles in the basin included in this report are currently not assessed for this use.

Few lakes in the French River Watershed have recently been surveyed for variables used to assess the status of the *Aquatic Life Use* (i.e., dissolved oxygen, pH, nutrients, macrophytes and plankton/chlorophyll a). None of the lakes in the French River Watershed are assessed as support for the *Aquatic Life Use*. The majority (63%) of the lake acreage assessed for the *Aquatic Life Use* (Figure 2) is impaired (partial or non-support). The *Aquatic Life Use* is assessed as partial support for 11 lakes, representing 62% of the lake acreage, because they are infested with non-native aquatic vegetation; *Myriophyllum heterophyllum* (variable milfoil) and/or *Cabomba caroliniana* (fanwort). These two non-native aquatic plant species are particularly invasive and reproduce vegetatively. Therefore, they may spread readily downstream on currents or by mechanical transport. Variable milfoil is also present in one additional lake, where the *Aquatic Life Use* is assessed as non-support because of the severity of plant growth (native and non-native). The *Aquatic Life Use* is assessed as non-support in two other ponds because of noxious plants, organic enrichment/low dissolved oxygen, nutrients, and/or algal blooms. A portion of Rochdale Pond (10 acres) is assessed as partial support because of organic enrichment/low dissolved oxygen. Thirty-one lakes and the remaining 31 acres of Rochdale Pond, representing 37% of the lake acreage in the French River Watershed, are currently not assessed for the *Aquatic Life Use*.

**FRENCH RIVER WATERSHED:**  
***Aquatic Life Use* assessment for lakes**  
**(total acreage assessed in report 3,393 acres)**

- **Partial Support - 2,105 acres (62%)**
- **Non-Support – 33 acres (1%)**
- **Not Assessed – 1,255 acres (37%)**

### ***Quinebaug River Watershed – Aquatic Life Use Summary:***

The majority (approximately 77%) of the 37.9 river miles in the Quinebaug River Watershed included in this report is assessed as supporting the *Aquatic Life Use* (Figure 1). This includes the majority of the Quinebaug River, Wales Brook, and a long reach of Cady Brook. Despite the generally good condition of these rivers, hydromodification, primarily the result of operations of the two Federal Energy Regulatory Commission (FERC)-exempt licensed facilities, as well as the operations of the impoundments (lake outlet control practices) and water withdrawals, has been identified as an issue of concern. Fluctuations in streamflow and/or reduced base-flow conditions from hydromodification may result in the loss or degradation of aquatic habitat and communities. These issues are currently being studied as part of the Millennium Power Project from which preservation and/or stream restoration measures will be developed.

**QUINEBAUG RIVER WATERSHED:**  
***Aquatic Life Use* assessment for rivers**  
**(total length assessed in report – 37.9 miles)**

- **Support – 29.3 miles (77%)**
- **Partial Support – 4.5 miles (12%)**
- **Not Assessed – 4.1 miles (11%)**

The upper 1.3-mile reach of Cady Brook and a 3.2-mile reach of the Quinebaug River are assessed as partial support for the *Aquatic Life Use*. Flow-related habitat constraints limit the biological potential in the upper reach of Cady Brook primarily as a result of operations of the dam at Glen Echo Lake. Organic enrichment and nutrient loadings from the Charlton WWTP, compounded by the low-base flow conditions in Cady Brook, impairs the *Aquatic Life Use* for an additional 0.3-miles. Between the confluence with Cady Brook and the West Dudley Impoundment, the Quinebaug River is assessed as partial support for the *Aquatic Life Use* due to organic enrichment/low dissolved oxygen and habitat alteration in the form of organic deposition. These conditions are likely the result of highly productive upstream impoundments (hydromodification) as well as various point (municipal wastewater treatment plant discharges) and nonpoint (urban runoff) sources of nutrient loadings. Additionally, elevated concentrations of heavy metals in the sediment and PCB in whole fish are of concern and warrant further investigation in the lower mainstem Quinebaug River (downstream from the Lensdale Pond Dam at the American Optical Company in Southbridge). Here, the PCB concentration in whole fish exceeded the National Academy of Sciences/National Academy of Engineers (NAS/NAE) guideline for the protection of fish-eating wildlife. Source(s) of total PCB are unknown at this time and warrant further investigation. Only one tributary, Mill Brook, is not assessed for the *Aquatic Life Use*.

As a result of the limited current data available, a portion of only one lake (Sibley Pond) in the Quinebaug River Watershed is assessed as support for the *Aquatic Life Use*. Slightly over half (57%) of the lake acreage assessed for this use is impaired (partial and non-support). The *Aquatic Life Use* is assessed as partial support for nine lakes (a total of 1,062 acres) because they are infested with non-native aquatic vegetation, noxious plant growth and/or organic enrichment/low dissolved oxygen (Figure 2). Eight of these lakes (a total of 1,043 acres) are infested with the non-native plant *M. heterophyllum*. The *Aquatic Life Use* is assessed as non-support in all or part of two ponds (55 acres) because of noxious plants and organic enrichment/low dissolved oxygen. Sixteen lakes representing 42% of the lake acreage in the Quinebaug River Watershed are currently not assessed for the *Aquatic Life Use* (Figure 2).

**QUINEBAUG RIVER WATERSHED:  
*Aquatic Life Use* assessment for lakes  
(total acreage 1,955.9 acres)**

- **Support – 11 acres (1%)**
- **Partial Support – 1,062 acres (54%)**
- **Non-Support – 55 acres (3%)**
- **Not Assessed – 827.9 acres (42%)**

### **FISH CONSUMPTION USE**

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

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

### **French & Quinebaug River Watersheds – Fish Consumption Use Summary:**

Because of elevated levels of mercury in edible portions of fish, MDPH has issued fish consumption advisories for four lakes in the French and Quinebaug River Watersheds because of health concerns related to mercury. In the French River watershed, these waterbodies include: Buffumville Lake and Texas Pond (a total of 213 acres and 2.0 river miles). In the Quinebaug River watershed, these include: Holland Pond and the East Brimfield Reservoir (a total of 485 acres) (MDPH 2001a). The *Fish Consumption Use* is, therefore, assessed as non-support for these lakes (a total of 698 lake acres). MDPH also issued a fish consumption advisory due to mercury contamination for the Quinebaug River in Holland and Brimfield including both Holland Pond and the East Brimfield Reservoir (MA DPH 2001a). The *Fish Consumption Use* is, therefore, assessed as non-support for a total of 7.1 miles (from the outlet of Hamilton Reservoir, Holland to the outlet of the East Brimfield Reservoir, Sturbridge) (Figure 3). Because of the statewide advisory (see previous page), the majority of the rivers and lakes in the French and Quinebaug River basins default to not assessed for the *Fish Consumption Use*. Sources of mercury in this area are currently unknown, although atmospheric deposition is suspected.

#### **FRENCH RIVER WATERSHED:**

##### ***Fish Consumption Use* assessment for rivers (total length assessed in report –33.8 miles)**

- **Non-Support – 2.0 miles (6%)**
- **Not Assessed – 31.8 miles (94%)**

##### ***Fish Consumption Use* assessment for lakes (total area assessed in report 3,393 acres)**

- **Non-Support – 213 acres (6%)**
- **Not Assessed – 3,180 acres (94%)**

#### **QUINEBAUG RIVER WATERSHED:**

##### ***Fish Consumption Use* assessment for rivers (total length assessed in report – 37.9 miles)**

- **Non-Support – 7.1 miles (19%)**
- **Not Assessed – 30.8 miles (81%)**

##### ***Fish Consumption Use* assessment for lakes (total area assessed in report 1,955.9 acres)**

- **Non-Support – 485 acres (25%)**
- **Not Assessed – 1,470.9 acres (75%)**

### **DRINKING WATER USE**

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

Public water suppliers monitor their finished water (tap water) for major categories of both naturally occurring and man-made contaminants such as: microbiological, inorganic, organic, pesticides, herbicides and radioactive contaminants.

Specific information on community drinking water sources including SWAP activities and drinking water quality information are updated and distributed annually by the public water system to its customers in a "Consumer Confidence Report". These reports are available from the public water system, the local boards of health, MDPH and MA DEP.

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

The *Primary Contact Recreational Use* is supported when conditions are suitable (fecal coliform bacteria densities, pH, temperature, turbidity and aesthetics meet the Surface Water Quality Standards) for any recreational or other water related activity during which there is prolonged and intimate contact with the water and there exists a significant risk of ingestion. Activities include, but are not limited to, wading, swimming, diving, surfing and water skiing. The *Secondary Contact Recreational Use* is supported when conditions are suitable for any recreational or other water use during which contact with the water

is either incidental or accidental. These include, but are not limited to, fishing, boating and limited contact incident to shoreline activities. For lakes, macrophyte cover and/or transparency (Secchi disk depth) data are assessed to evaluate the status of the recreational uses. The *Aesthetics Use* is supported when surface waters are free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.

### ***French River Watershed – Primary and Secondary Contact Recreational and Aesthetic Use Summary:***

Few rivers and lakes in the French River Watershed have recently been surveyed for variables used to assess the status of the recreational and aesthetic uses (i.e., bacteria data, macrophyte cover, transparency). Only the Little River (6.8 miles) is assessed as support for the recreational uses (Figure 4), while Town Meadow Brook, the upper 4.7-mile reach of the French River, and the upper 5.0-mile reach of the Little River support the *Aesthetics Use*. The *Aesthetics Use* is assessed as impaired (partial support) for the lower 12.7-miles of the French River as a result of objectionable deposits, odor, and/or turbidity resulting from urban runoff, illegal dumping and municipal point source discharges (Figure 5). A total of nine miles, including the lower 1.8-mile reach of the Little River, are currently not assessed for the *Aesthetics Use*.

FRENCH RIVER WATERSHED: <i>Recreational and Aesthetic Uses assessment for rivers</i> (total length assessed in report –33.8 miles) <i>Primary and Secondary Contact Recreational Uses</i>	
• Support – 6.8 miles (20%)	
• Not Assessed – 27.0 miles (80%)	
<i>Aesthetics Use</i>	
• Support – 12.1 miles (36%)	
• Partial Support – 12.7 miles (38%)	
• Not Assessed – 9.0 miles (27%)	

Of the lake acreage in the French River Watershed, the *Primary and Secondary Contact Recreational and Aesthetic uses* for Buffumville Lake (the ACOE flood control project on the Little River) are all assessed as support (Figures 6 and 7). In addition to Buffumville Lake (186 acres), the *Secondary Contact Recreational and Aesthetic Uses* are assessed as support in the open-water areas (205 acres) of four lakes including Gore, Pierpoint Meadow, Rochdale and Lerner ponds in the French River Watershed (a total of 391 acres). Only 5% of the lake acreage in the basin is assessed as support for the *Primary Contact Recreational Use* and 12% supports the *Secondary Contact Recreational and Aesthetic Uses*.

FRENCH RIVER WATERSHED: <i>Recreational and Aesthetic Use Summary for lakes</i> (total lake area assessed - 3,393 acres)		
PRIMARY	SECONDARY	AESTHETICS
• Support – 186 acres (5%)	• Support – 391 acres (12%)	• Support – 391 acres (12%)
• Partial Support – 1 acre (<1%)	• Partial Support – 1 acre (<1%)	• Partial Support – 1 acre (<1%)
• Non-Support – 325 acres (10%)	• Non-Support – 325 acres (10%)	• Non-Support – 325 acres (10%)
• Not Assessed – 2,881 acres (85%)	• Not Assessed – 2,676 acres (79%)	• Not Assessed – 2,676 acres (79%)

Approximately 10% of the lake acreage in the French River Watershed is assessed as impaired (partial and non-support) for the *Primary and Secondary Contact Recreational and Aesthetic Uses*. Causes of impairment include: noxious and/or non-native plants, nutrients and algal blooms; all presumably the result of organic enrichment. Although sources are currently unknown, nutrient enrichment from storm water runoff; failing, substandard, or inappropriately sited sewage disposal systems; and/or drainage from agricultural lands is likely to contribute to increased macrophyte productivity, resulting in impairments to this use. The majority (79%) of the lake acreage in the French River Watershed is not assessed for the *Recreational and Aesthetics Uses* (Figures 6 and 7).

**Quinebaug River Watershed –Recreational and Aesthetic Use Summary:**

Few rivers in the Quinebaug River Watershed have recently been surveyed for variables used to assess the status of the *Recreational* uses (e.g., bacteria data). As a result, the majority (91%) of the rivers are not assessed for these uses (Figure 4). Only the 1.2-mile reach of the Quinebaug River flowing through the East Brimfield Reservoir is assessed as support for the *Primary Contact Recreational Use*. Because of elevated fecal coliform bacteria levels, the lower 2.3-mile reach of the Quinebaug River is assessed as partial support for the *Primary Contact Recreational Use*. Both of these reaches, however, are assessed as support for the *Secondary Contact Recreational Use*.

<b>QUINEBAUG RIVER WATERSHED:</b> <b><i>Recreational and Aesthetic Use assessment for rivers</i></b> <b>(total length assessed in report –37.9 miles)</b>		
<b>PRIMARY</b> <ul style="list-style-type: none"> <li>• Support – 1.2 miles (3%)</li> <li>• Partial Support – 2.3 miles (6%)</li> <li>• Not Assessed – 34.4 miles (91%)</li> </ul>	<b>SECONDARY</b> <ul style="list-style-type: none"> <li>• Support – 3.5 miles (9%)</li> <li>• Not Assessed – 34.4 miles (91%)</li> </ul>	<b>AESTHETICS</b> <ul style="list-style-type: none"> <li>• Support – 30.6 miles (81%)</li> <li>• Partial Support – 4.5 miles (12%)</li> <li>• Non-Support – 2.8 miles (7%)</li> </ul>

The majority (81%) of the river miles in the Quinebaug River Watershed included in this report is assessed as support for the *Aesthetics Use* (Figure 5). This includes the Quinebaug River (the upper 13.5 miles and the lower 2.3 miles), most of Cady Brook, and both Mill and Wales brooks. The *Aesthetics Use* is impaired (partial and non-support) for 7.0 miles of the Quinebaug River and a 0.3-mile reach of Cady Brook (Figure 5). The aesthetics of the mainstem Quinebaug River is partially supported for a 2.2-mile reach downstream from the Sturbridge WWTP discharge as a result of the high percentage of instream filamentous/matted algae and slight turbidity. As the river enters the urban area of Southbridge (downstream from Westville Dam) the *Aesthetics Use* is degraded (non-support) for 2.8 miles due to an abundance of objectionable deposits (trash and debris) and turbidity. Downstream from the Southbridge WWTP discharge to the West Dudley Impoundment (a 2.0-mile reach) the *Aesthetics Use* is assessed as partial support. Causes of impairment include some objectionable deposits of trash and debris and the effluent odor from the Southbridge WWTP. The *Aesthetics Use* is also assessed as partial support for a 0.3-mile reach of Cady Brook downstream from the Charlton WWTP because of effluent odor and the presence of filamentous algae.

Very few lakes in the Quinebaug River Watershed have recently been surveyed for variables used to assess the status of the recreational uses (i.e., bacteria data, macrophyte cover, transparency). East Brimfield Reservoir and Walker Pond are the only two lakes (a total 523 acres) assessed as support for the *Primary Contact Recreational Use* (Figure 6). In addition to these two lakes, the open-water areas of Mill Road and Sherman ponds (an additional 71 acres) are assessed as support for the *Secondary Contact Recreational and Aesthetic* uses for a total of 594 acres (Figures 6 and 7). Because of the lack of current data, however, the majority of the lakes in the watershed are not assessed for the *Recreational and Aesthetics* uses. Turbidity, noxious and/or non-native plants impair (partial or non-support) these uses in approximately 8% of the lake acreage in the Quinebaug River Watershed, presumably the result of organic enrichment. Although sources are currently unknown, nutrient enrichment from storm water runoff; failing, substandard, or inappropriately sited sewage disposal systems; and/or drainage from agricultural lands are likely to have increased macrophyte productivity, which result in the impairment.

<b>QUINEBAUG RIVER WATERSHED:</b> <b><i>Recreational and Aesthetic Use Summary for lakes</i></b> <b>(total lake area assessed -1,955.9 acres)</b>		
<b>PRIMARY</b> <ul style="list-style-type: none"> <li>• Support – 523 acres (27%)</li> <li>• Partial Support – 16 acre (&lt;1%)</li> <li>• Non-Support – 145 acres (7%)</li> <li>• Not Assessed – 1,271.9 acres (65%)</li> </ul>	<b>SECONDARY</b> <ul style="list-style-type: none"> <li>• Support – 594 acres (30%)</li> <li>• Partial Support – 16 acre (&lt;1%)</li> <li>• Non-Support – 145 acres (7%)</li> <li>• Not Assessed – 1,200.9 acres (61%)</li> </ul>	<b>AESTHETICS</b> <ul style="list-style-type: none"> <li>• Support – 594 acres (30%)</li> <li>• Partial Support – 16 acre (&lt;1%)</li> <li>• Non-Support – 145 acres (7%)</li> <li>• Not Assessed – 1,200.9 acres (61%)</li> </ul>

## RECOMMENDATIONS

In addition to specific issues for the individual segments, the evaluation of current water quality conditions in the French & Quinebaug River Watersheds has revealed the need for the following:

- The effects of hydromodification resulting from the operations of the three FERC exempt-licensed facilities (North Village Pond Project #5824, Old Sturbridge Project #6077 and West Dudley Project #7254) on the French and Quinebaug rivers warrant further investigation. Determine if these facilities release their minimum flow requirements and evaluate and monitor their operations for compliance with their run-of-river requirements. These facilities should be operated to minimize fluctuations in streamflow.
- Stream gaging data for the following USGS gages should be analyzed and published in the annual USGS Water Resources Data reports: the Quinebaug River at the East Brimfield Dam (USGS gage #01123360 at Fiskdale, MA) and the Westville Dam (USGS gage # 01123600 at Southbridge, MA), and the French River at Webster (USGS gage #01125000). Continuous daily measurements from these gages are available however the data have not been validated nor published.
- Habitat quality evaluations should be conducted along streams/rivers to assess streamflow conditions as related to water withdrawals and/or flow management practices (e.g., outlet control operations). Collect additional data, where necessary, to determine the frequency, duration, and spatial extent of the low-flow conditions.
- Habitat quality evaluations should be conducted along streams/rivers to document areas of erosion and sedimentation. Develop and implement best management practices (BMPs) to control storm water runoff.
- Review and consider implementing forthcoming recommendations from the Millennium Power Project Mitigation Work Group.
- Work with the French & Quinebaug River Watershed Team to conduct stream cleanups, and encourage/strengthen local stewardship.
- Work with DFWLE to incorporate/designate Cold Water Fishery resources in the French & Quinebaug River Watersheds into the next revision of the Massachusetts Surface Water Quality Standards.
- Continue to conduct biological and water quality monitoring to evaluate the effect(s), if any, of National Pollutant Discharge Elimination System (NPDES) discharges, water withdrawals, power plant operations, and nonpoint sources of pollution and to document any changes in water quality conditions as a result of infrastructure improvements/pollution abatement controls.
- Develop and reissue NPDES permits for surface water discharges in the French & Quinebaug River Watersheds. If dischargers in these watersheds have problems meeting their whole effluent toxicity limits, the need for a toxicity identification evaluation/toxicity reduction evaluation (TIE/TRE) may be warranted. Additionally, the Phosphorus Loading and Evaluation and Reduction Programs for the municipal wastewater treatment facilities should be carefully reviewed and the effectiveness of these programs should be evaluated.
- Continue to monitor survival of *Pimephalas promelas* (fathead minnows) exposed to the Quinebaug River as part of the NPDES permittees whole effluent toxicity testing requirements. If survival of the organisms exposed to the river water is frequently below 75% at the end of the acute and/or chronic tests an instream toxicity evaluation should be conducted.
- Conduct additional monitoring (e.g., passive water column PCB samplers, whole fish tissue), to determine the extent and, if necessary, source(s) of PCB contamination along the lower mainstem Quinebaug River. Determine locations of current and historical sources of PCB in the Quinebaug River and its tributaries.
- As part of the Water Management Act (WMA) 5-year review process, MA DEP should continue to evaluate compliance with registration and/or permit limits for withdrawals in the French & Quinebaug River watersheds. Work with water suppliers to optimize and implement water conservation measures to maintain and/or reduce water withdrawals as well as encourage the development and implementation of local watershed and wellhead protection plans.
- Water suppliers and the French & Quinebaug River basin communities should develop and implement reservoir outlet operations to protect and/or restore downstream flows.
- Coordinate with the MA Department of Environmental Management (MA DEM) and/or other groups conducting lake and watershed surveys to generate quality assured lakes data. As part of any lake

water quality evaluation, include identification of non-native species and mapping of macrophyte cover in order to evaluate the status of the *Aquatic Life*, *Recreational* and *Aesthetic* uses.

- Review data from the “Beaches Bill” required water quality testing (bacteria sampling at all formal bathing beaches) to assess the status of the recreational uses.
- Review recommendations for long-term restoration/preservation from lake diagnostic/feasibility studies and watershed management plans and effect their implementation. Implement recommendations from the nutrient total maximum daily load (TMDL) analysis currently being prepared by MA DEP.
- Monitor and control the spread and growth of exotic aquatic and wetland vegetation. Determine the effectiveness of the herbicide treatment on the non-native, aquatic plant infestations. Prevent the further spread of these plants to unaffected areas (within this pond as well as to other ponds) by alerting pond-users to the problem and responsibility of spreading these exotic species. This should include posting of boat access points with educational warning signs.

*Intentionally left blank*





# FRENCH & QUINEBAUG RIVER WATERSHEDS

## *Aquatic Life Use Assessment Summary – Rivers*

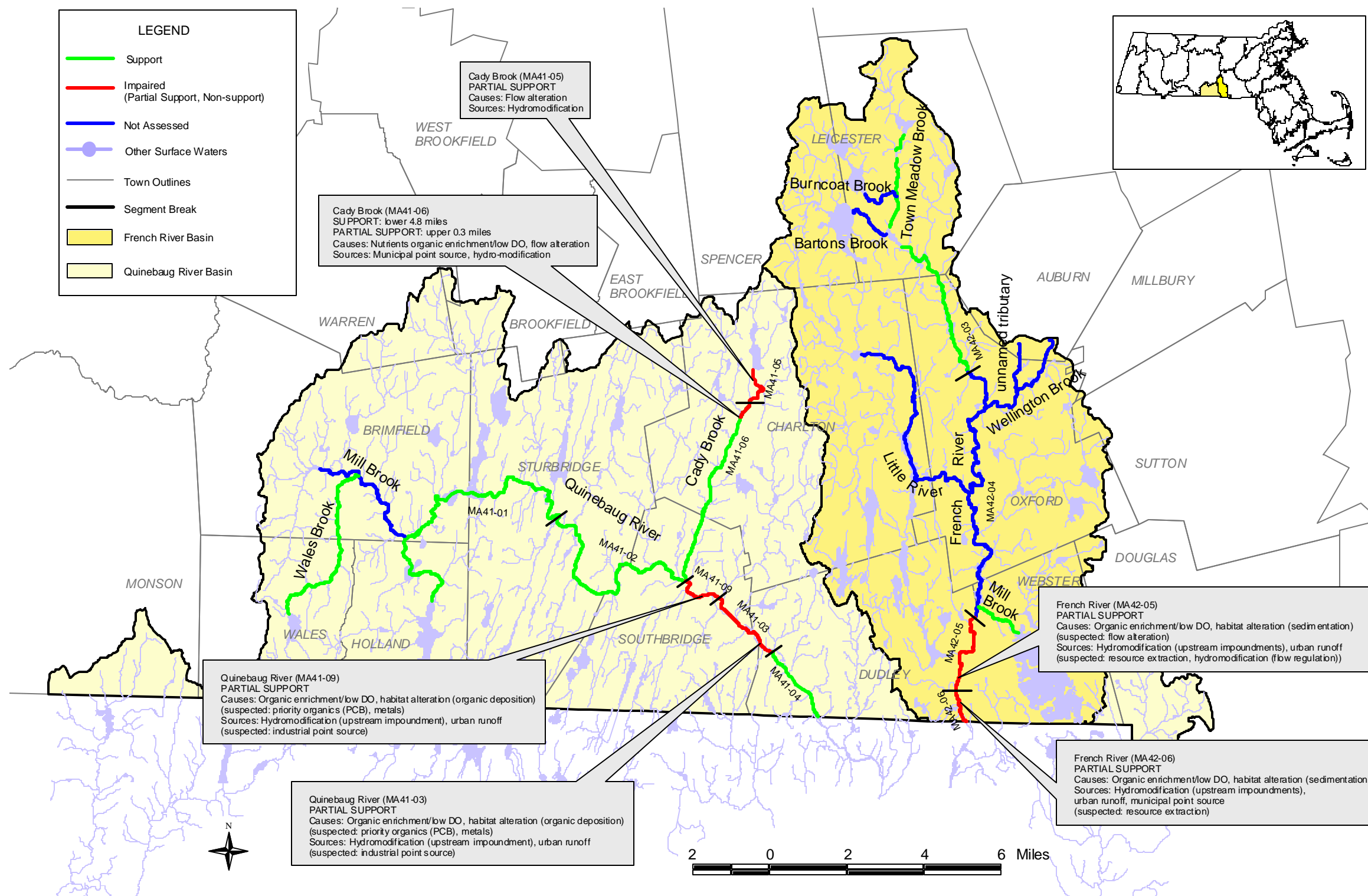


Figure 1. French & Quinebaug River Watersheds *Aquatic Life Use Assessment Summary – Rivers*.

*Intentionally left blank*



# FRENCH & QUINEBAUG RIVER WATERSHEDS

## Aquatic Life Use Assessment Summary – Lakes

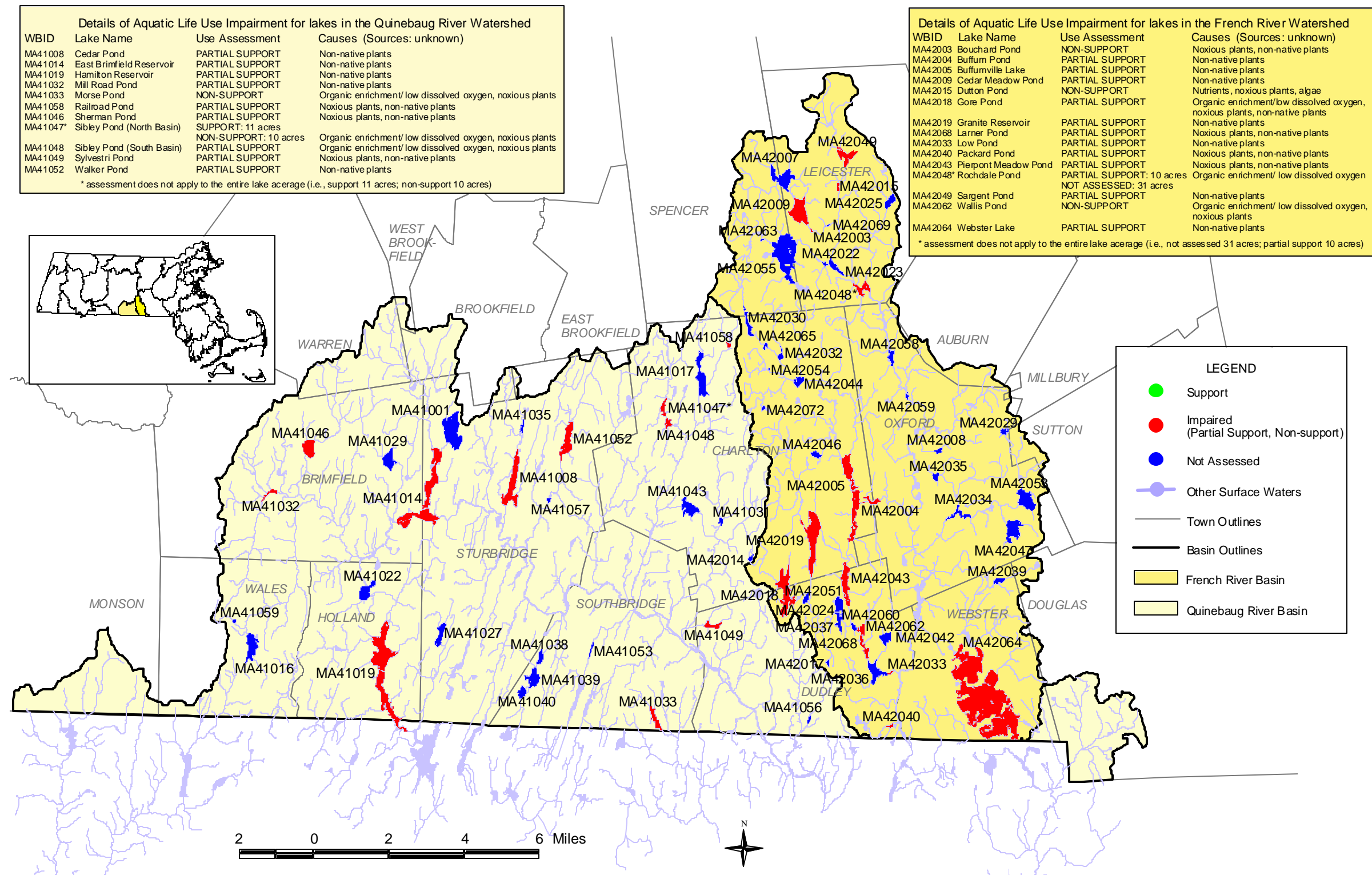


Figure 2. French & Quinebaug River Watersheds Aquatic Life Use Assessment Summary – Lakes.

*Intentionally left blank*



# FRENCH & QUINEBAUG RIVER WATERSHEDS

## *Fish Consumption Use Assessment Summary – Lakes and Rivers*

### NOTE: MDPH Statewide Advisory

In July 2001, MDPH issued new consumer advisories for fish consumption because of mercury contamination. The MDPH "...is advising pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age to refrain from eating the following marine fish; shark, swordfish, king mackerel, tuna steak and tilefish. In addition, MDPH is expanding its previously issued statewide fish consumption advisory which cautioned pregnant women to avoid eating fish from all freshwater bodies due to concerns about mercury contamination, to now include women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age (MDPH 2001b)."

Additionally, MDPH "...is recommending that pregnant women, women of childbearing age who may become pregnant, nursing mothers and children under 12 years of age limit their consumption of fish not covered by existing advisories to no more than 12 ounces (or about 2 meals) of cooked or uncooked fish per week. This recommendation includes canned tuna, the consumption of which should be limited to 2 cans per week. Very small children, including toddlers, should eat less (MDPH 2001b)."

Because of the statewide advisory no waters can be assessed as support or partial support for the *Fish Consumption Use*.

MDPH issued site-specific advisories for 4 lakes and one river segment in the French & Quinebaug River Watersheds due to elevated levels of mercury in edible fillets of fish.

**French River Watershed**  
Buffumville Lake  
MA42005  
Texas Pond  
MA42058

**Quinebaug River Watershed**  
East Brimfield Reservoir  
MA41014  
Holland Pond  
MA41022

Quinebaug River – segment MA41-01  
- from outlet Hamilton Reservoir,  
Holland to outlet of East Brimfield  
Reservoir, Sturbridge (includes  
Holland Pond)

The cause for all *Fish Consumption Use* non-support assessments is mercury contamination. Sources of contamination are unknown although atmospheric deposition is suspected.

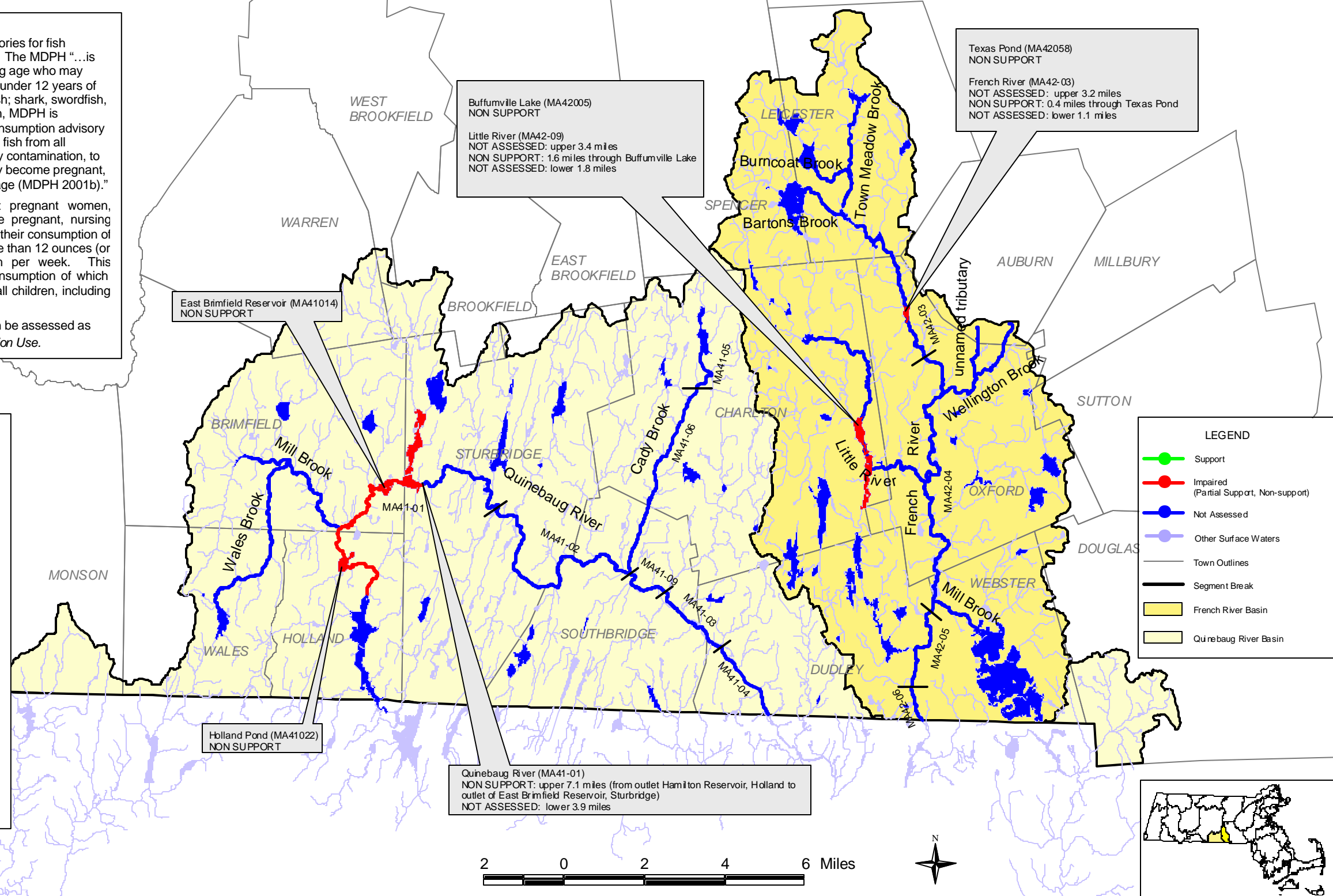


Figure 3. French & Quinebaug River Watersheds *Fish Consumption Use* Assessment Summary – Lakes and Rivers.  
French & Quinebaug River Watersheds 2001 Water Quality Assessment Report  
41/42wqar.doc DWM CN 51.0

*Intentionally left blank*





# FRENCH & QUINEBAUG RIVER WATERSHEDS

## Primary and Secondary Contact Recreational Uses Assessment Summary

### Rivers

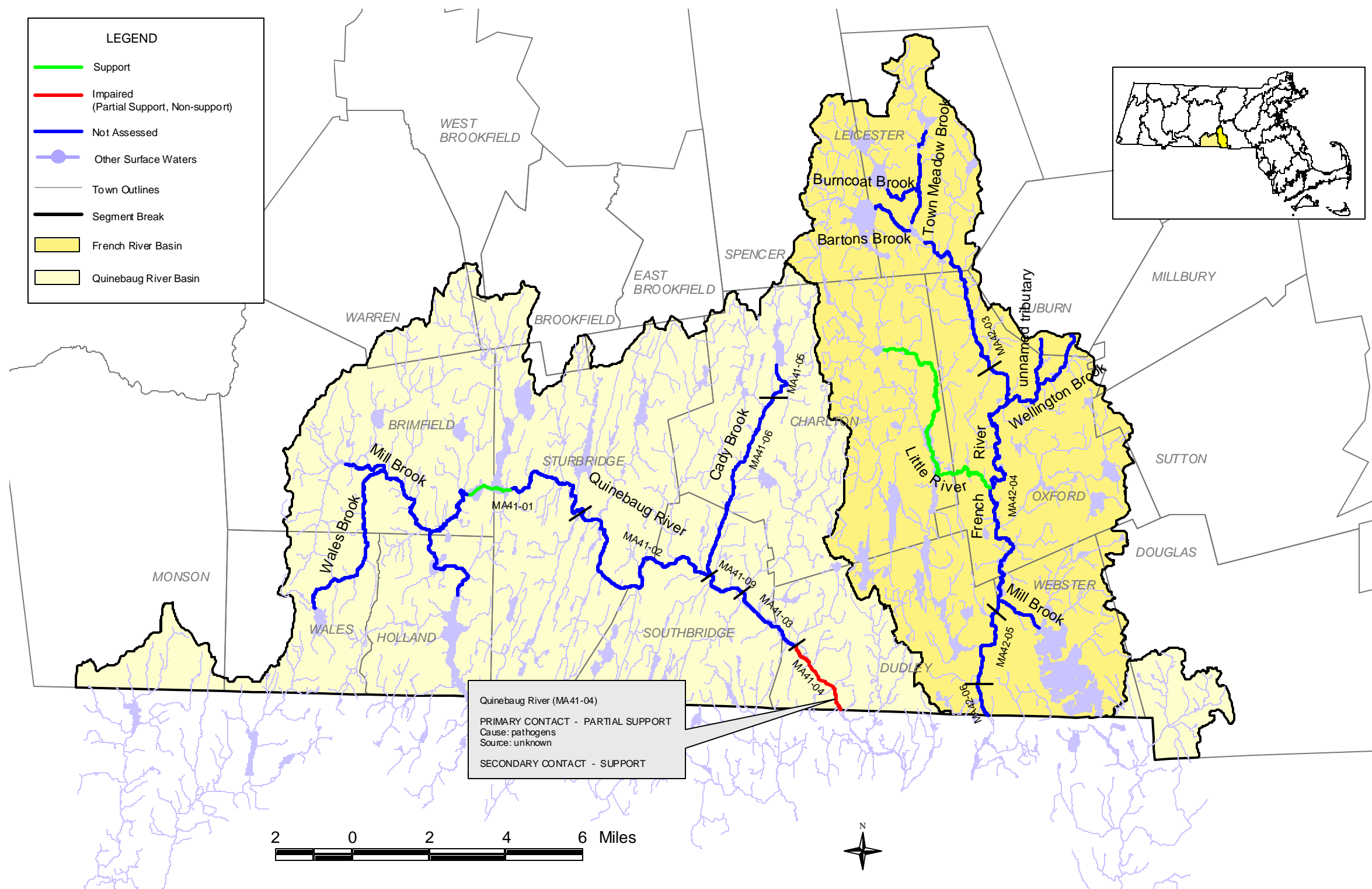
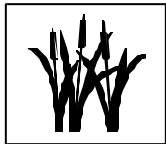


Figure 4. French & Quinebaug River Watersheds *Primary and Secondary Contact Recreational Uses Assessment Summary – Rivers.*

*Intentionally left blank*





# FRENCH & QUINEBAUG RIVER WATERSHEDS

## *Aesthetics Use Assessment Summary – Rivers*

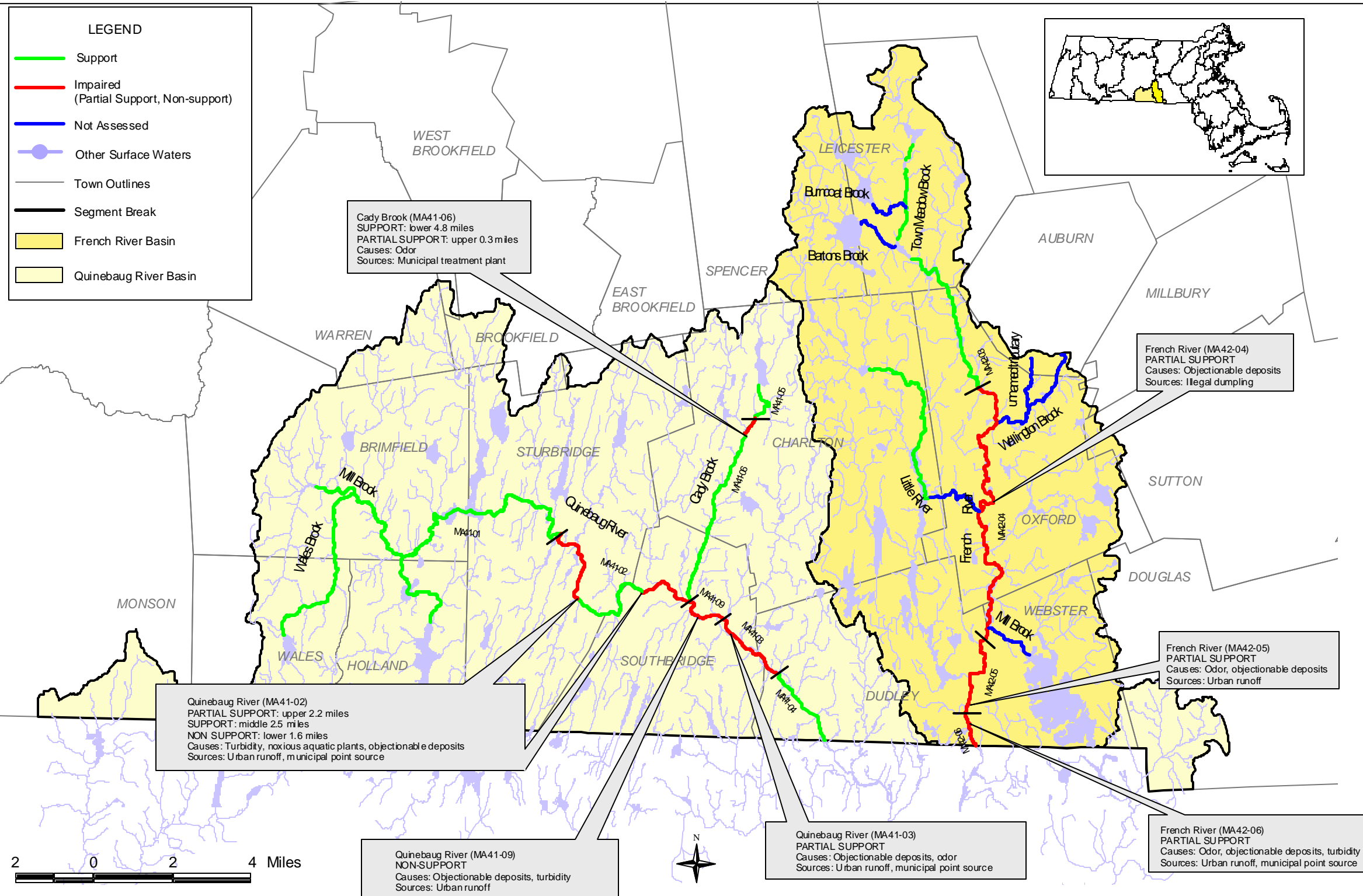


Figure 5. French & Quinebaug River Watersheds *Aesthetics Use* Assessment Summary – Rivers.

*Intentionally left blank*



# FRENCH & QUINEBAUG RIVER WATERSHEDS

## Primary and Secondary Contact Recreational Uses Assessment Summary

### Lakes

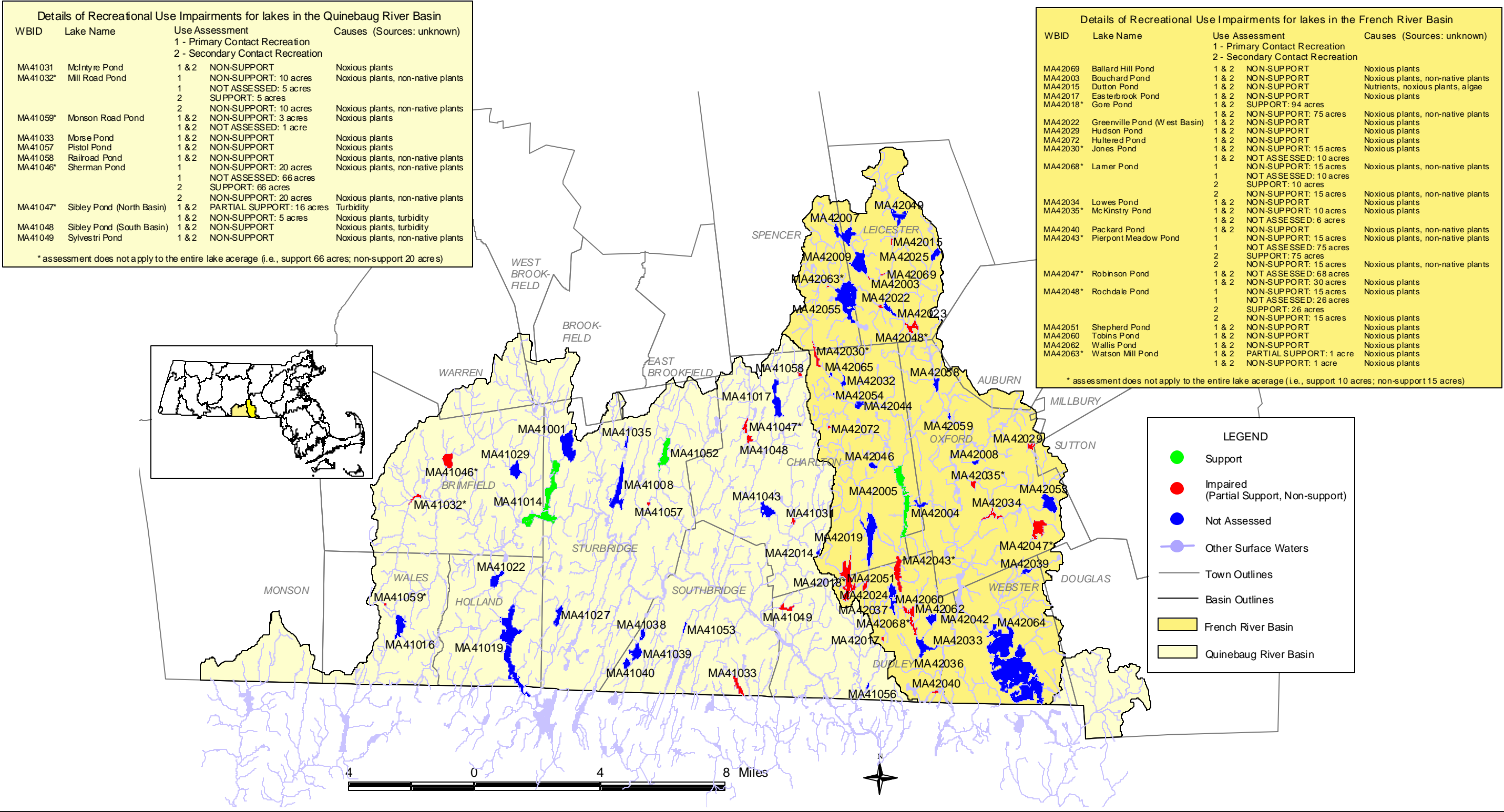
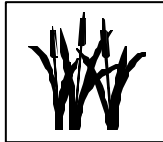


Figure 6. French & Quinebaug River Watersheds Primary and Secondary Contact Recreational Uses Assessment Summary – Lakes.

*Intentionally left blank*



# FRENCH & QUINEBAUG RIVER WATERSHEDS

## Aesthetics Use Assessment Summary – Lakes

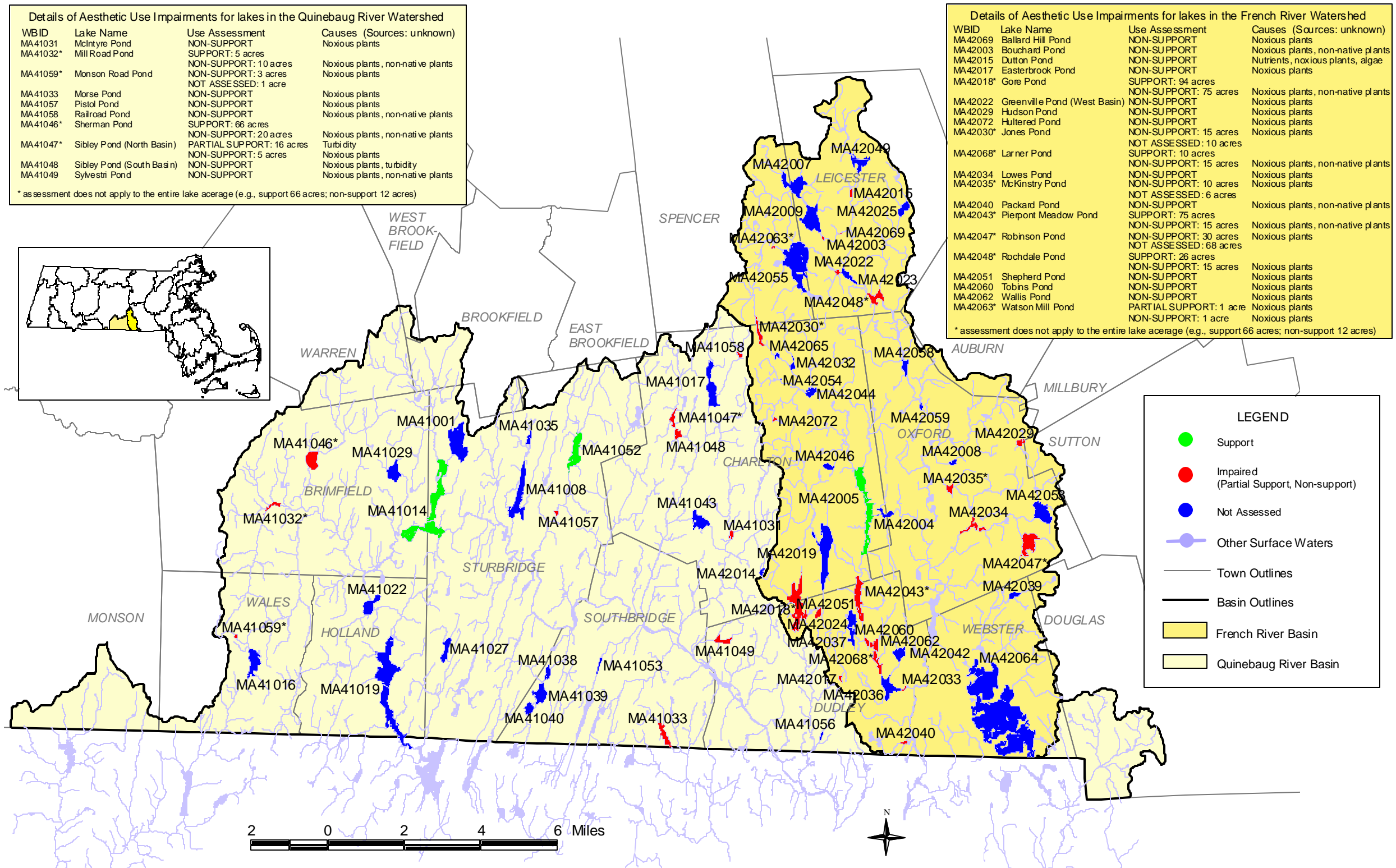


Figure 7. French & Quinebaug River Watersheds Aesthetics Use Assessment Summary – Lakes.

Intentionally left blank