34-AC-2

CONNECTICUT RIVER WATERSHED

2003 WATER QUALITY ASSESSMENT REPORT

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
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CONNECTICUT RIVER BASIN

2003 WATER QUALITY ASSESSMENT REPORT

Prepared by:

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Department of Environmental Protection
Division of Watershed Management

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

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State
Department of Environmental Protection (MassDEP):
- Bureau of Resource Protection (BRP)
  - Division of Watershed Management (DWM)
- Bureau of Strategic Policy and Technology Wall Experiment Station (WES)
- Bureau of Waste Prevention (BWP)
- Bureau of Waste Site Cleanup (BWSC)

Department of Conservation and Recreation (MA DCR)
Department of Fish and Game (MA DFG)
- Division of Fisheries and Wildlife (MDFW)

Department of Public Health (MA DPH)

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

Regional
Connecticut River Watershed Council (CRWC)

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: View of the Connecticut River Valley from Sugarloaf Mountain in Deerfield, taken by Jamie Carr.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACOE	Army Corps of Engineers (United States)
BMP	best management practice
BPJ	best professional judgment
CMR	Code of Massachusetts Regulations
CNOEC	chronic no observed effect concentration
CRWC	Connecticut River Watershed Coalition
CSO	combined sewer overflow
CWA	Clean Water Act
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
DPW	Department of Public Works
DWM	Division of Watershed Management
EPA	United States Environmental Protection Agency
GIS	geographic information system
LC_{50}	lethal concentration to 50% of the test organisms
MA DCR	Massachusetts Department of Conservation and Recreation
MassDEP	Massachusetts Department of Environmental Protection
MA DFG	Massachusetts Department of Fish and Game
MA DPH	Massachusetts Department of Public Health
MassGIS	Massachusetts Geographic Information System
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
QAPP	quality assurance project plan
SOP	standard operating procedure
SWQS	Surface Water Quality Standards
TMDL	total maximum daily load
TRC	total residual chlorine
TSS	total suspended solids
USGS	United States Geological Survey
WBS	Waterbody System database
WMA	Water Management Act
WPCF	Water Pollution Control Facility
WWTP	wastewater treatment plant

LIST OF UNITS

cfs	cubic feet per second
cfu	colony forming unit
gpm	gallons per minute
MG	million gallons
MGD	million gallons per day
M	meter
ml	milliliters
mg/L	milligram per liter
MG/yr	million gallons per year
MPN	most probably number
NTU	nephelometric turbidity units
psi	pounds per square inch
µeq/L	microequivalants per liter
µg/kg	microgram per kilogram
µS/cm	micro seimens per centimeter

LIST OF FISH SPECIES

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Atlantic Salmon	*Salmo salar*
Blacknose dace	*Rhinichthys atratulus*
Bluegill	*Lepomis macrochirus*
Bowfin	*Amia calva*
Brook trout	*Salvelinus fontinalis*
Brown bullhead	*Ameiurus nebulosus*
Brown trout	*Salmo trutta*
Chain pickerel	*Esox niger*
Common shiner	*Notropis cornutus*
Creek chub	*Semotilus atromaculatus*
Creek chubsucker	*Erimyzon oblongus*
Fallfish	*Semotilus corporalis*
Golden shiner	*Notemigonus crysoleucas*
Hybrid bluegill/ pumkinseed	*Lepomis macrochirus X Lepomis gibbosus*
Largemouth bass	*Micropterus salmoides*
Longnose dace	*Rhinicthys cataractae*
Pumpkinseed	*Lepomis gibbosus*
Rainbow trout	*Oncorhynchus mykiss*
Redbreast sunfish	*Lepomis auritus*
Redfin pickerel	*Esox americanus americanus*
Rock bass	*Ambloplites rupestris*
Sea lamprey	*Petromyzon marinus*
Slimy sculpin	*Cottus cognatus*
Smallmouth bass	*Micropterus dolomieu*
Tessellated darter	*Etheostoma olmstedi*
White sucker	*Catostomus commersoni*
Yellow bullhead	*Ameiurus natalis*
Yellow perch	*Perca flavescens*

LIST OF INVASIVE PLANT SPECIES

Latin Name	Common Name
Cabomba caroliniana	Fanwort
Myriophyllum heterophyllum	Variable Watermilfoil
Myriophyllum sp.	Watermilfoil
Myriophyllum spicatum	Eurasian Watermilfoil
Najas minor	European Naiad
Nelumbo lutea	American Lotus
Potamogeton crispus	Curly-leaved Pondweed
Trapa natans	Water Chestnut

EXECUTIVE SUMMARY

CONNECTICUT RIVER BASIN 2001 -2007 WATER QUALITY ASSESSMENT REPORT

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 Watershed Approach. 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 Connecticut River Watershed 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 segment, is individually assessed as ***support*** or ***impaired***. When too little current data/information exists or no reliable data are available the use is ***not assessed***. However, if there is some indication of water quality impairment, which is not "naturally-occurring", the use is identified with an "Alert Status". It is important to note that not all waters are assessed. Many small and/or unnamed rivers, lakes, and estuarine areas have ***never been assessed***; the status of their designated uses has never been 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). Summaries of the assessments for the *Aquatic Life, Fish Consumption, Primary* and *Secondary Contact Recreation,* and *Aesthetics* uses in the Connecticut River Watershed segments are illustrated in Figures 1 through 5, respectively.

The term *Drinking Water Use* is used to indicate sources of public drinking water. While this use is not assessed in this report, the state provides general guidance on drinking water source protection of both surface water and groundwater sources (available at http://www.mass.gov/dep/water/drinking.htm). These waters are subject to stringent regulation in accordance with the Massachusetts Drinking Water Regulations. MassDEP's Drinking Water Program has responsibility for implementing the provisions of the federal Safe Drinking Water Act. The Drinking Water Program also continues to work on its Source Water Assessment Program, 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 Source Water Assessment Program 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, MA DPH and MassDEP.

On December 20, 2007, the U.S. EPA approved the Northeast Regional Mercury Total Maximum Daily Load (TMDL). This TMDL is a Federal Clean Water Act mandated document that identifies pollutant load reductions necessary for regional waterbodies to meet and maintain compliance with state and federal water quality standards. It 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). Currently, the MA DPH statewide fish advisory regarding fish consumption and mercury contamination encompasses all freshwaters in Massachusetts (MA DPH 2001), thus the Fish Consumption Use for all waterbodies in this report cannot be assessed as support (see Fig. 2, page xiii).

Figure 1. 2003 *Aquatic Life Use* assessment summary for river and lake segments in the Connecticut Watershed
Note: The *Aquatic Life Use* is supported when suitable habitat (including water quality) is available for sustaining a native, naturally diverse, community of aquatic flora and fauna. Impairment of the *Aquatic Life Use* may result from anthropogenic stressors that include point and/or non-point source(s) of pollution and hydrologic modification. Causes and/or sources of impairments, when known, are noted in the callouts.

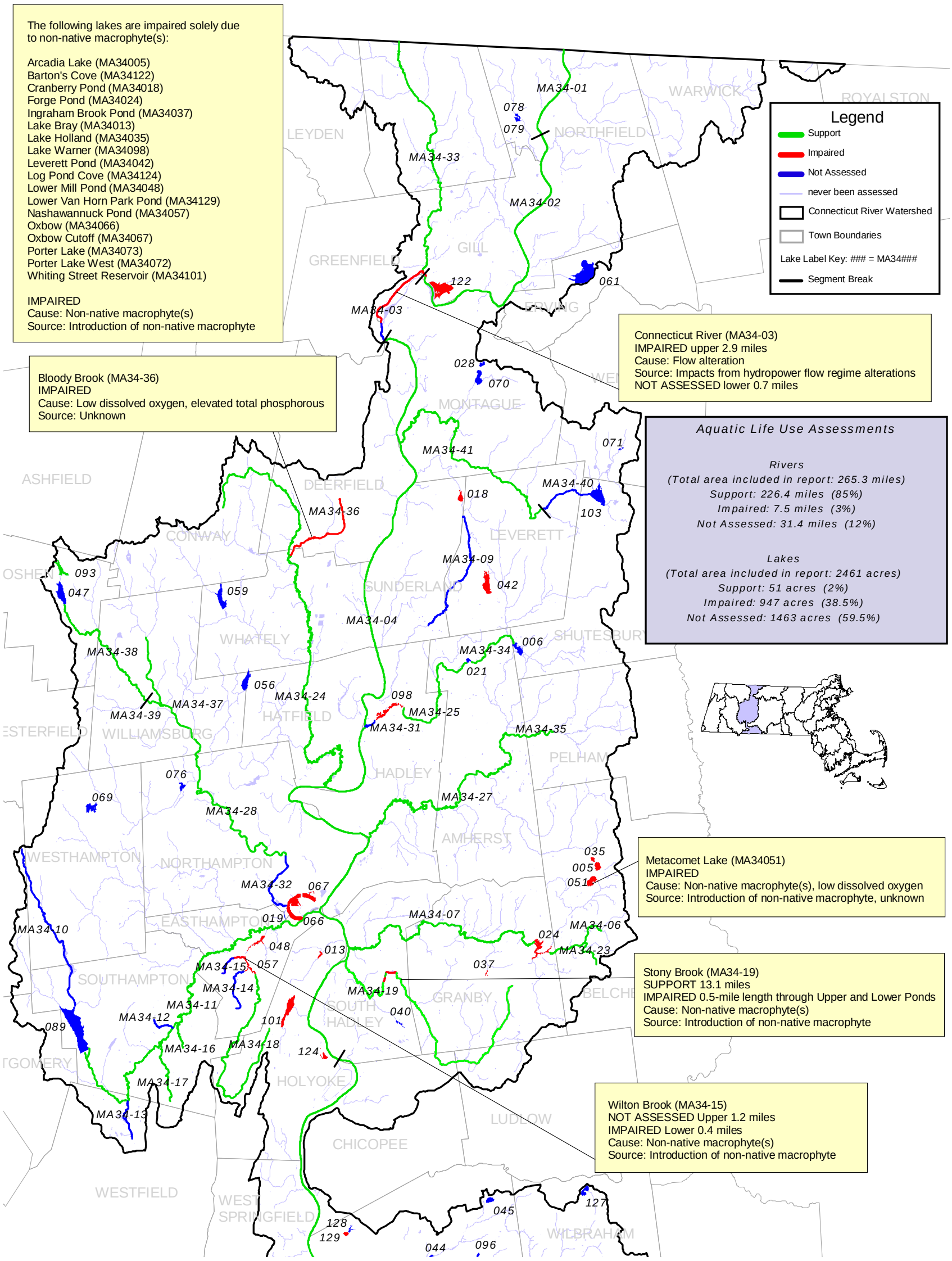

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Figure 2. 2003 *Fish Consumption Use* assessment summary for river and lake segments in the Connecticut Watershed.
Note: The *Fish Consumption Use* is supported when there are no pollutants present that result in unacceptable concentrations in edible portions (as opposed to whole fish - see *Aquatic Life Use*) of 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 (MA DPH), Bureau of Environmental Health Assessment (MA DPH 2007). The MA DPH list identifies waterbodies where elevated levels of a specified contaminant in edible portions of freshwater species pose a health risk for human consumption; hence, the *Fish Consumption Use* is assessed as impaired in these waters. In July 2001 MA DPH issued new consumer advisories on fish consumption and mercury contamination (MA DPH 2001). Because of these statewide advisories no waters can be assessed as support for the *Fish Consumption Use*. These waters default to "not assessed". Causes and/or sources of impairments, when known, are noted in the callouts.

The current MA DPH statewide advisory (MA DPH 2001):

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

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

Since the statewide advisory encompasses all freshwaters in Massachusetts, the Fish Consumption Use for waterbodies cannot be assessed as support.

Northeast Regional Mercury TMDL: On 20 December 2007 the U.S. EPA approved the Northeast Regional Mercury Total Maximum Daily Load (TMDL). This TMDL is a Federal Clean Water Act mandated document that identifies pollutant load reductions necessary for regional waterbodies to meet and maintain compliance with state and federal water quality standards. It 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 inland 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.

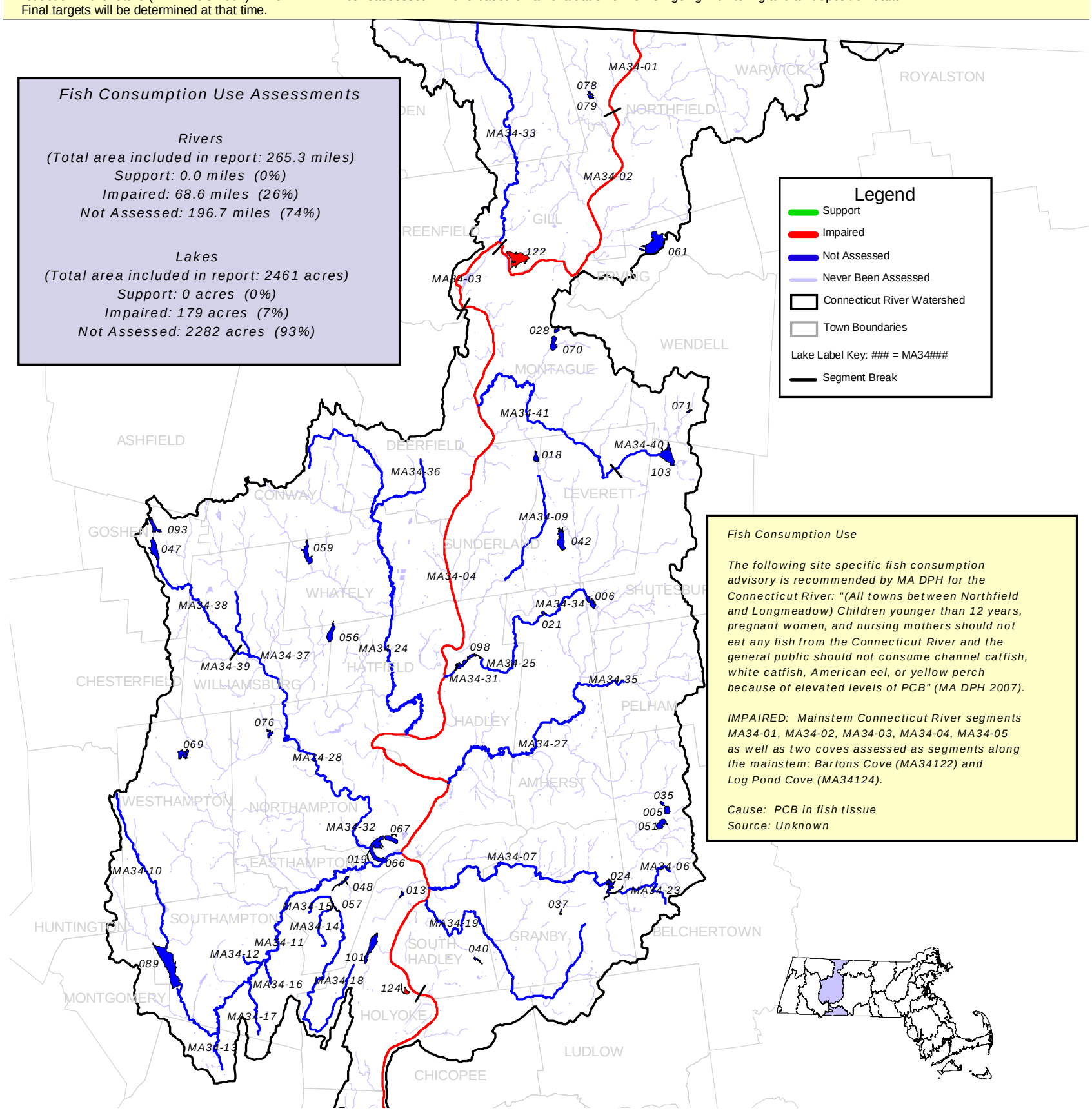

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Figure 3. 2003 *Primary Contact Recreational Use* assessment summary for river and lake segments in the Connecticut Watershed
Note: The *Primary Contact Recreational Use* is supported when conditions are suitable (fecal coliform bacteria densities, turbidity and aesthetics meet the SWQS and/or the MA DPH Bathing Beaches State Sanitary Code and/or guidance) for any recreational or other water related activity during which there is prolonged and intimate contact with the water and there exists a significant risk of ingestion. Activities include, but are not limited to, wading, swimming, diving, surfing and water skiing. Causes and/or sources of impairments, when known, are noted in the callouts.

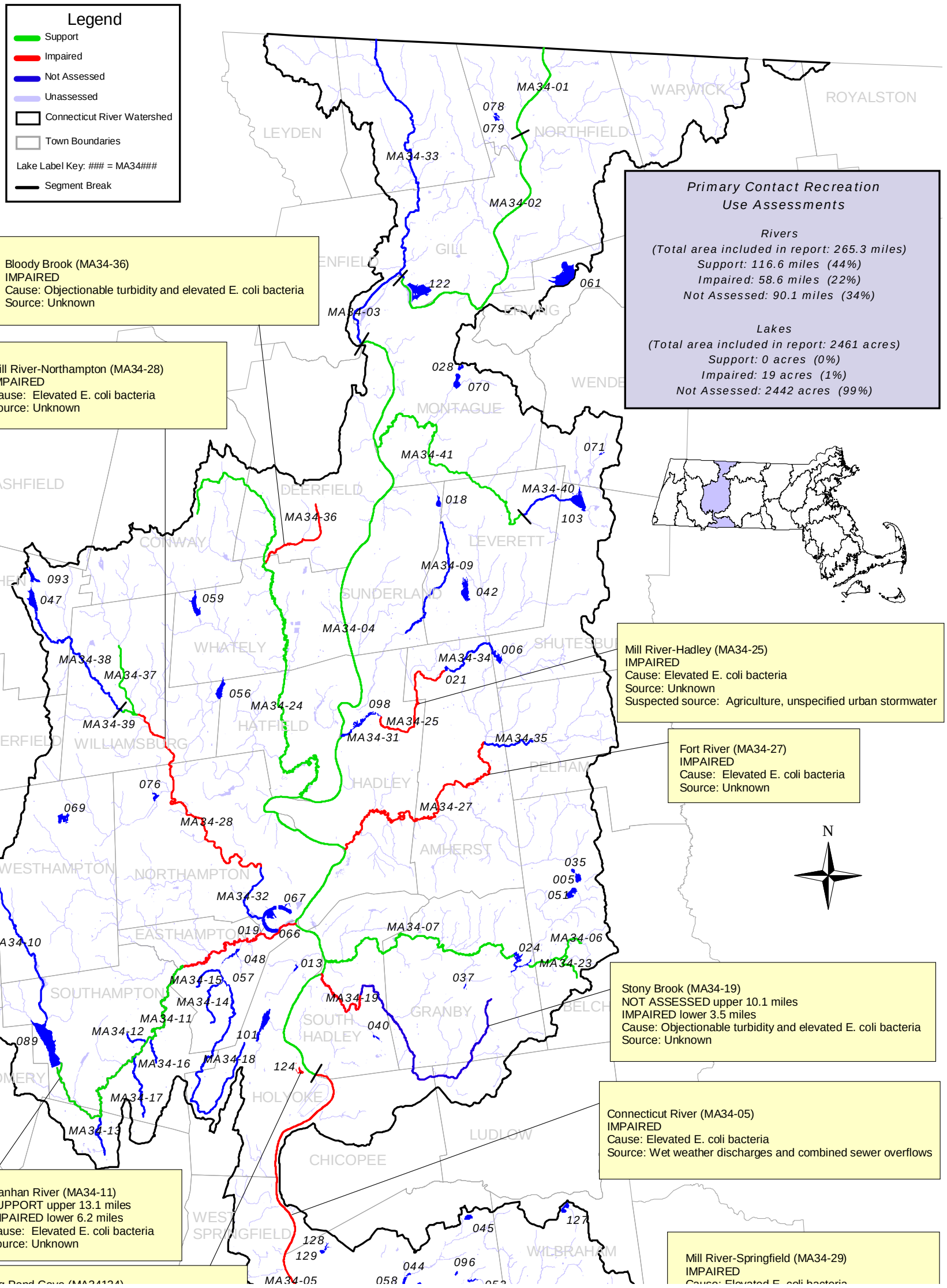

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Figure 4. 2003 *Secondary Contact Recreational Use* assessment summary for river and lake segments in the Connecticut Watershed
Note: The *Secondary Contact Recreational Use* is supported when conditions are suitable for any recreational or other water use during which contact with the water is either incidental or accidental. These include, but are not limited to, fishing, boating and limited contact related to shoreline activities. For lakes, non-native aquatic macrophyte cover and/or transparency data (Secchi disk depth) are evaluated to assess the status of the recreational uses. Causes and/or sources of impairments, when known, are noted in the callouts.

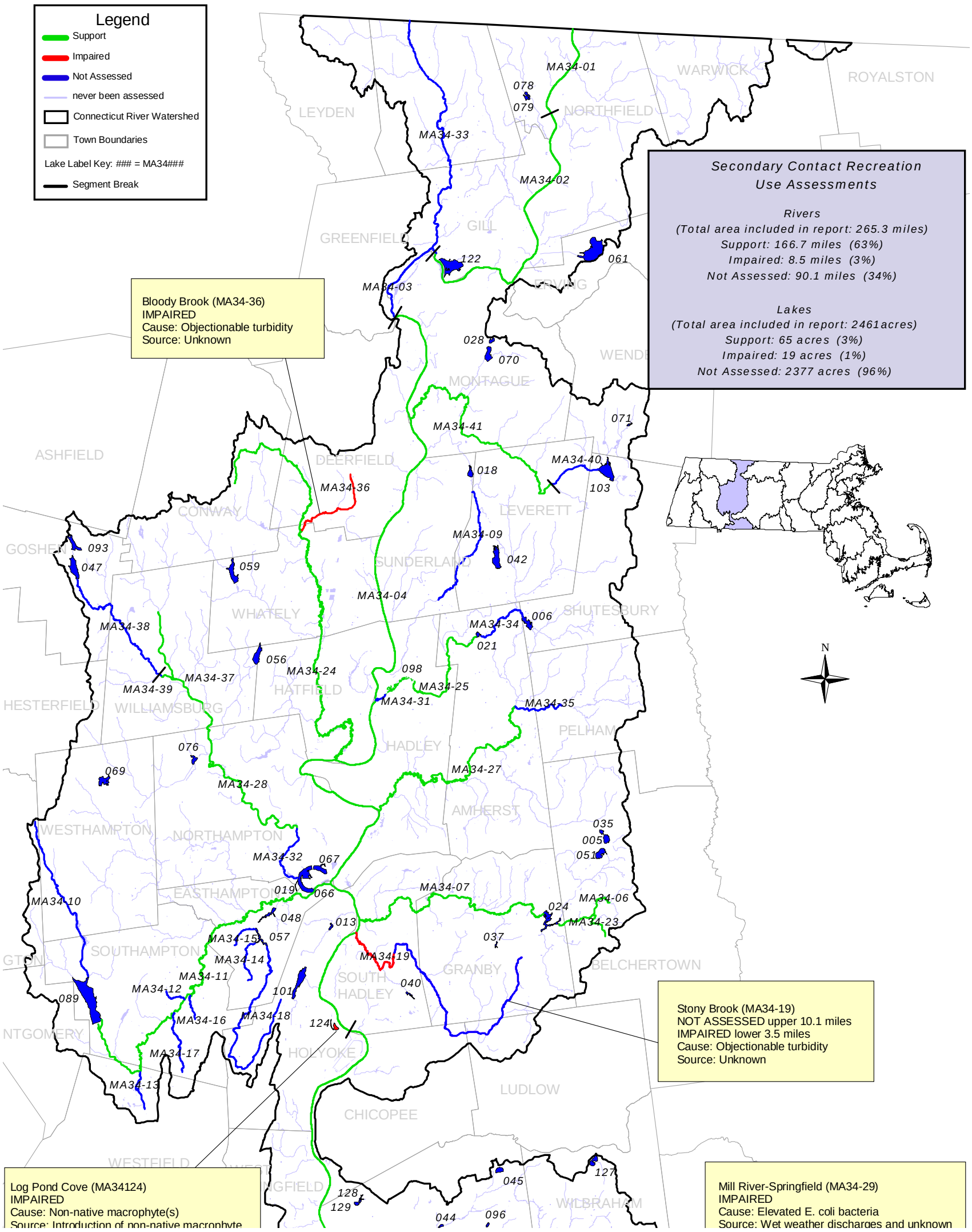

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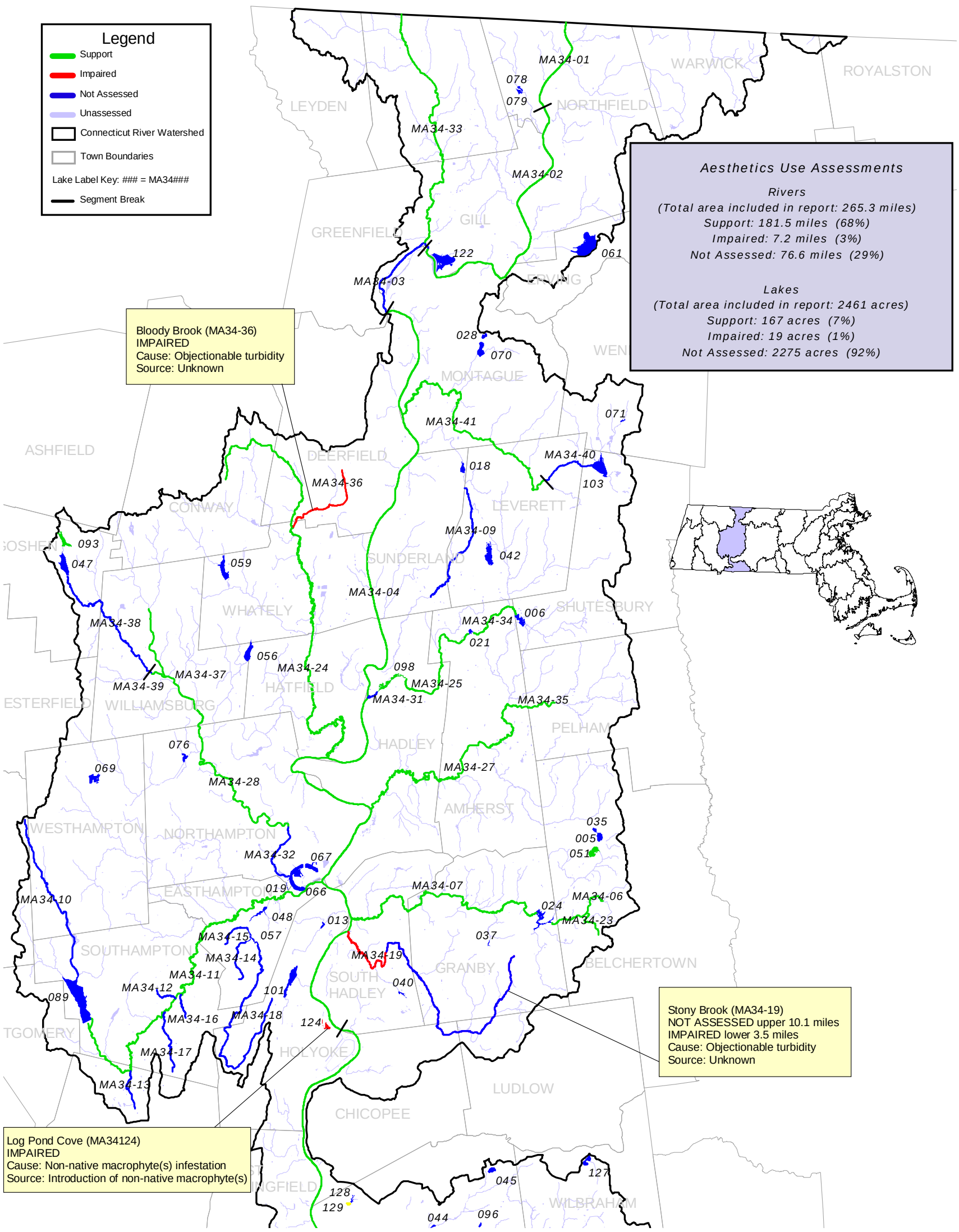
Figure 5. 2003 *Aesthetics Use* assessment summary for river and lake segments in the Connecticut Watershed
Note: The *Aesthetics Use* is supported when surface waters are free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life. Causes and/or sources of impairments, when known, are noted in the callouts.



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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. Massachusetts has opted to write individual watershed surface water quality assessment reports and use them as the supporting documentation for the Integrated List. The assessment reports utilize data compiled from a variety of sources and provide an evaluation of water quality, progress made towards maintaining and restoring water quality, and the extent to which problems remain at the watershed level. 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 Appendix A (Assessment Methodology) of this report.

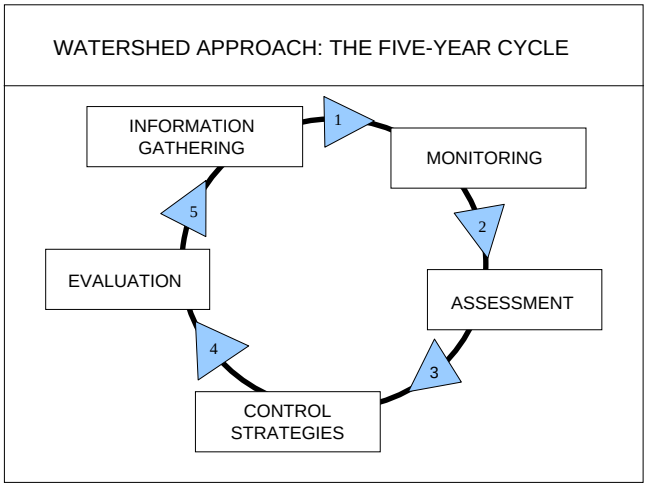


Figure 6. Five-year cycle of the Watershed Approach

This report presents the current assessment of water quality conditions in the Connecticut River Watershed. The 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 cycle (Figure 6) 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 and since 2003 were utilized to make assessment decisions. All of these data are provided as Appendices to this report. Other sources of water quality data used to make use assessment attainment decisions are also utilized and cited in this report.

MASSACHUSETTS INTEGRATED LIST OF WATERS

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

The Massachusetts Year 2006 Integrated List of Waters was approved by the EPA in September 2007 (MassDEP 2007). In that report each waterbody segment was placed in one of five major categories. Category 1 included those waters that were meeting all designated uses. No Massachusetts waters were listed in Category 1 because a statewide health advisory pertaining to the consumption of fish precludes any waters from being in full support of the fish consumption use. Waters listed in Category 2 were found to support some of the uses for which they were assessed but other uses were unassessed. Category 3 contained those waters for which insufficient or no information was available to assess any uses.

Waters exhibiting impairment for one or more uses were placed in either Category 4 (impaired but not requiring a TMDL report) or Category 5 (impaired and requiring one or more TMDLs) according to the EPA guidance. Category 4 was further divided into three sub-categories – 4A, 4B and 4C – depending upon the reason that TMDLs were not needed. Category 4A included waters for which the required TMDL(s) had already been completed and approved by the EPA. However, since segments could only appear in one-category waters that had an approved TMDL for some pollutants, but not others, remained in Category 5. Category 4B was to include waters for which other pollution control requirements were reasonably expected to result in the attainment of the designated use before the next listing cycle (i.e., 2008). Because of the uncertainty related to making predictions about conditions in the future the MassDEP made a decision not to utilize Category 4B in the 2006 Integrated List. Finally, waters impaired by factors, such as flow modification or habitat alteration, that are not subjected to TMDL calculations because the impairment is not related to one or more pollutants were included in Category 4C. See individual segment assessments for information pertaining to the 2006 Integrated List category and causes of impairment.

CONNECTICUT RIVER WATERSHED DESCRIPTION

The Connecticut River and its tributaries constitute the largest river basin in New England. From its origin in the Connecticut Lakes Region near the Canadian border, the 410-mile Connecticut River flows southward to form the boundary between New Hampshire and Vermont. It then flows through Massachusetts and Connecticut to the Long Island Sound. The Connecticut River traverses approximately 67 river miles and drains approximately 2,726 square miles within Massachusetts. In Massachusetts it is bordered by the Deerfield River Basin to the northwest, the Westfield River Basin to the southwest, the Millers River Basin to the northeast and by the Chicopee River Basin to the southeast.

Based upon the Massachusetts Water Resources Commission's delineation, the Connecticut River Basin drains approximately 670 square miles (exclusive of the Deerfield, Millers, Westfield and Chicopee subbasins). The communities of Agawam, Amherst, Ashfield, Belchertown, Bernardston, Chesterfield, Chicopee, Conway, Deerfield, East Longmeadow, Easthampton, Erving, Gill, Goshen, Granby, Greenfield, Hadley, Hampden, Hatfield, Holyoke, Huntington, Leverett, Leydon, Longmeadow, Ludlow, Monson, Montague, Montgomery, Northampton, Northfield, Pelham, Royalston, Shutesbury, South Hadley, Southampton, Southwick, Springfield, Sunderland, Warwick, Wendell, West Springfield, Westfield, Westhampton, Whately, Wilbraham, and Williamsburg lie wholly or partly within the watershed boundary. Major tributaries discharging to the Connecticut River within Massachusetts include the Millers, Deerfield, Chicopee and Westfield rivers.

OBJECTIVES

This report summarizes information generated in the Connecticut River Watersheds since the last water quality assessment report that was published in November 2000 (Kennedy and Weinstein 2000). The methodology used to assess the status of water quality conditions of rivers, estuaries and lakes in accordance with EPA's and MassDEP's use assessment methods is provided in Appendix A. Data collected by DWM in 2003 are provided in Appendices B through G of this report. Appendix H provides a summary of Water Management Act (WMA) registration/permit holders and National Pollutant Discharge Elimination System (NPDES) permittees in the Connecticut River Watershed.

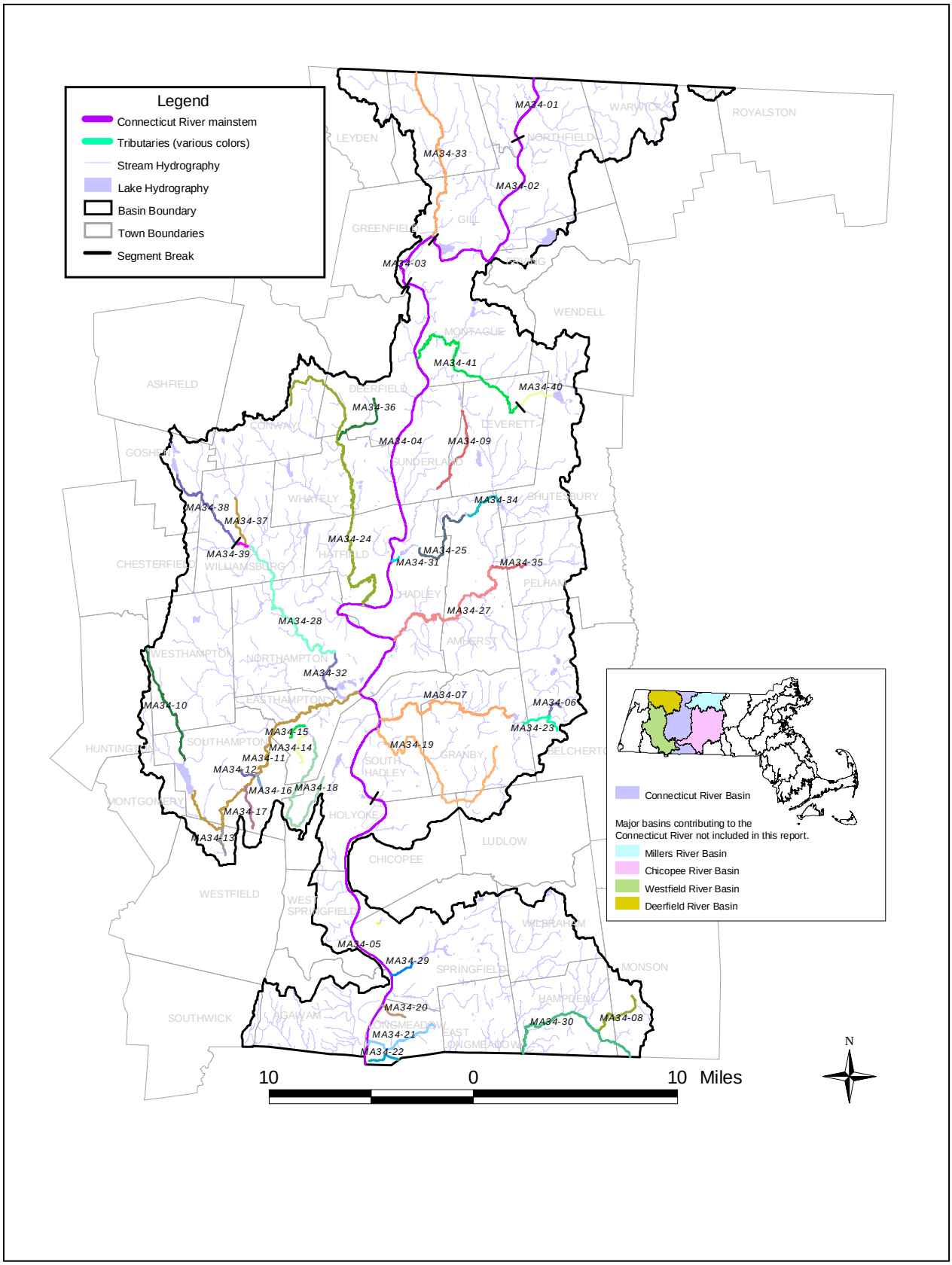
Not all waters in the Connecticut River Watershed are included in the MassDEP/EPA databases (either the waterbody system database -- WBS, or the newer assessment database – ADB) or this report.

The objectives of this water quality assessment report are to:

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

CONNECTICUT RIVER WATERSHED – RIVER SEGMENTS ASSESSED

Figure 7. River segments in the Connecticut River Watershed included in this report.



CONNECTICUT RIVER (SEGMENT MA34-01)
Location: New Hampshire/Vermont/Massachusetts state line to Route 10 bridge, Northfield.
Segment Length: 3.5 miles.
Classification: Class B, Warm Water Fishery.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics, flow alteration, other habitat alterations, and pathogens (MassDEP 2007).

The State of New Hampshire identifies aluminum, copper, and pH as pollutants impairing the *Aquatic Life Use* of the mainstem Connecticut River segment immediately upstream from Massachusetts (Edwardson 2007). The *Fish Consumption Use* was impaired due to mercury (likely source atmospheric deposition) and PCB contamination (source unknown). The *Primary and Secondary Contact Recreation Uses* were assessed as support.

The Connecticut River from Vernon, Vermont, to Turners Falls, Massachusetts, is commonly known as the Turner Falls Power Pool. This segment (MA34-01) is entirely contained within the 22-mile Turners Falls Power Pool. Bank erosion caused by a complex interaction of multiple factors is a significant problem in this reach of the Connecticut River. Flood flows, boat wakes, overland flow, groundwater seeps, and pool fluctuation resulting from operation of multiple hydroelectric generating facilities directly impact the day-to-day hydrodynamics of the Turners Falls Power Pool.

The 1979 "Report on Connecticut River Streambank Erosion Study" Report by the Army Corps of Engineers (ACOE) attempted to identify the causes of erosion and rate the importance of each. In addition to natural causes such as shear stress and stage variation, the report identified pool fluctuations and boat waves as contributing erosional factors. Pool fluctuations were named as causing an increase in bank instability on the order of 18% of the shear stress exerted in the bank merely by flowing water. The report also identifies the difference in the nature of the erosion caused by wave action, which only works at the level of the water and the various shear stress forces that work on the full height of the submerged bank, where the maximum shear stress is exerted on the bank below water at about 2/3 of the water's depth (Franklin Regional Council of Governments and Connecticut River Streambank Erosion Committee 1999).

In July of 1991, the ACOE completed a follow-up report on the erosion in the Turners Falls Pool, "General Investigation Study, Connecticut River Streambank Erosion: Connecticut River, Turners Falls Dam to State Line, MA." This study concluded that the riverbank erosion had increased almost threefold since 1979, with approximately one-third of the shoreline undergoing active erosion (Franklin Regional Council of Governments and Connecticut River Streambank Erosion Committee 1999). A follow up study conducted in 2007 found that bank recession rates are on the order of 1.0 ft/yr, but that as much as 9.0 ft of erosion has occurred in a single year (Field 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
East Northfield Water Company (9P210621702)

NPDES (Appendix H, Table H2)
Town of Northfield Wastewater Treatment Facility (MA0100200)

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
Three hydroelectric generating facilities directly impact the day-to-day hydrodynamics of the Turners Falls Power Pool: Vernon, VT, Northfield Mountain, and Turners Falls. In the Turners Falls Pool section of the Connecticut the banks of the river, which are often twenty or more feet above the water level, are characterized by slumping and mass wasting of huge sections of bank, with trees and other riparian vegetation frequently falling and sliding into the water (Franklin Regional Council of Governments and Connecticut River Streambank Erosion Committee 1999). Evidence of extreme erosion prompted the Franklin Regional Council of Governments to carry out a series of 319-funded bank stabilization projects implemented between 1996 and 2007. These Connecticut River Watershed Restoration Projects

included: Phase I (96-03/319); Phase II (00-04/319); and Phase III (03-07/319). Eroding sites in this segment of the Connecticut River were inventoried and prioritized according to factors including severity of the problem and feasibility of stabilization, and selected for restoration via design and installation of bioengineered bank. Over 1,500 linear feet of eroded bank have been stabilized by these three projects using a variety of bioengineering techniques.

Toxicity

Ambient

The Northfield Wastewater Treatment Facility staff collected water from the Connecticut River at the boat ramp, north of Schell Bridge, for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and August 2007, survival of *C. dubia* exposed (48-hours) to the Connecticut River water ranged from 90 to 100% (n=15). Hardness ranged from 23 to 52 mg/L (n=15).

Effluent

Acute whole effluent toxicity tests have been conducted on the Northfield Wastewater Treatment Facility treated effluent. No acute toxicity was detected in the 15 *C. dubia* test events conducted between August 2000 and August 2007 ($LC_{50} \geq$ 100% effluent).

Chemistry - water

DWM conducted water quality sampling at the Route 10 Bridge in Northfield, Station CT06, on this segment of the Connecticut River between April and October 2003 (Appendix B). All measurements were indicative of good water quality conditions.

Chemistry- fish tissue

The Connecticut River Fish Tissue Contaminant Study (2000) was a collaborative federal and multi-state project designed to provide a baseline of tissue contaminant data from several fish species and learn what threat eating these fish poses to other mammals, birds, and fish (Hellyer 2006). This study reached the following conclusions: mercury poses a risk to fish-eating wildlife, DDT homologs (chemical physical, and biological breakdown products of the parent compound) pose a risk to fish-eating birds, coplanar PCBs pose a risk to fish-eating mammals and fish-eating birds, and dioxin constituted a risk to fish-eating wildlife.

This segment of the Connecticut River is assessed as support with Alert Status for the *Aquatic Life Use.* This decision is based upon the good survival of test organism in toxicity tests and the good water quality conditions. However, this use is identified with an Alert Status due to the regulated flow regime, the severe bank erosion issues, and the risk that fish tissue contaminants pose to fish-eating wildlife. At this time there is insufficient evidence of a negative impact to in-stream biota to result in the impairment of this use.

FISH CONSUMPTION

The following site specific fish consumption advisory is recommended by MA DPH for the mainstem Connecticut River:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

DWM collected *E. coli* samples from the Connecticut River at the Route 10 Bridge in Northfield (Station CT06) between April and November 2003 (Appendix B). The geometric mean of these samples was 12 cfu/100ml.

DWM personnel made field observations at Station CT06 during the surveys conducted between April and October 2003. This station was free from odors and objectionable deposits during all visits, although the water clarity was recorded as highly turbid on three occasions (MassDEP 2003).

The *Primary* and *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support based upon the low bacteria counts and the lack of objectionable deposits, odors, or oils. However these uses are identified with an Alert Status due to the highly turbid conditions, regulated flow regime and severe bank erosion issues.

Connecticut River (Segment MA34-01) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		SUPPORT*
Secondary Contact		SUPPORT*
Aesthetics		SUPPORT*

* Alert Status, see details in use assessment

RECOMMENDATIONS

Didymosphenia geminata, otherwise known as Didymo or “rock snot”, is considered an invasive algae and has been found in the Connecticut River in Vermont and New Hampshire. Infestation and nuisance blooms of Didymo can produce thick mats that blanket stream and river substrates, causing a loss of habitat for fish and other aquatic organisms. Didymo blooms can make fishing, swimming, or boating undesirable or impossible (MA DCR 2008). Although it is currently not known if Didymo will colonize and/or bloom in the Massachusetts section of the Connecticut River, every effort should be made to prevent the spread of this nuisance algae in the mainstem Connecticut River and its tributaries. MA DCR recommends the Check-Clean-Dry protocol be followed when exiting waters that may be infested with Didymo. For more information visit: http://www.mass.gov/dcr/waterSupply/lakepond/hot_topic.htm.

The Town of Northfield Wastewater Treatment Facility NPDES Permit MA0100200 should be reissued. Based on the lack of any evidence of acute whole effluent toxicity, the whole effluent toxicity testing requirements should be reduced to annually (testing required in August of each year).

Field determined that 20 percent of the bank length has been protected by rock armor. Field recommends using new approaches for subsequent bank stabilization work, as continued reliance on armoring could lead to increased erosion elsewhere (Field 2007).

Water quality testing, especially TSS and turbidity, should continue to be monitored to assess the impact of the severe bank erosion upon the *Aquatic Life Use*.

CONNECTICUT RIVER (SEGMENT MA34-02)
Location: Route 10 bridge, Northfield, to Turners Falls Dam, Gill/Montague.
Segment Length: 11.2 miles.
Classification: Class B, Warm Water Fishery.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics, flow alteration, and other habitat alterations (MassDEP 2007).

This segment of the Connecticut River (MA34-02) is entirely contained within the 22-mile Turners Falls Power Pool. Bank erosion caused by a complex interaction of multiple factors is a significant problem in this reach of the Connecticut River. In addition to flood flows, boat wakes, overland flow, and groundwater seeps, pool fluctuation resulting from operation of one of three hydroelectric generating facilities directly impact the day-to-day hydrodynamics of the Turners Falls Power Pool. The Northfield Mountain Pumped Storage Project is located within this segment. The joint operation of the Turners Falls and the Northfield projects has affected the daily flow regime of the river in this pool, resulting in larger and quicker pool fluctuations than would naturally occur (Franklin Regional Council of Governments and Connecticut River Streambank Erosion Committee 1999).

The Northfield Mountain Pumped Storage Project is located about five miles upstream from the Turners Falls dam. It consists of an upper reservoir and an underground pumping and generating plant, which uses reversible pump turbine units. The Project also relies on the Turners Falls Pool to serve as a lower reservoir. During periods of low electrical demand, the Northfield Mountain Pumped Storage Facility pumps water from the lower reservoir to the upper reservoir using the pump turbine generators. The water is then released during periods of high electrical demand, again through the pump turbine generators. In this way, the project is able to generate a maximum of 1,080 megawatts of electricity. The increase in dam height over time, from 163.9 feet in 1867 to 185.5 feet in 1970 (21.6 feet in 103 years), has significantly altered the hydrodynamics of the reach. The joint operation of the Turners Falls and the Northfield projects has also significantly changed the daily flow regime of the river in the Turners Falls Pool, resulting in larger and quicker pool fluctuations. Typically, pool fluctuations may average as much as 3.5 feet per day, and much higher fluctuations (9-10.5 feet) may occur over the weekly cycle (Franklin Regional Council of Governments and Connecticut River Streambank Erosion Committee 1999).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Four Star Farms, Inc., Northfield (9P210621703)

NPDES (Appendix H, Table H2)
Northfield Mount Hermon School, Gill Facility (MA0032573)
First Light Hydro Generating Company (MA0035530)

FEDERAL ENERGY REGULATORY COMMISSION (FERC)

Project Name	Owner	Project #	Issue Date	Expiration Date	River	Kilowatts
Northfield Mountain Power Station	FirstLight Hydro Generating Company	2485	14 May 1968	30 April 2018	Connecticut River	1,080,000

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
Three hydroelectric generating facilities directly impact the day-to-day hydrodynamics of the Turners Falls Power Pool: Vernon, VT, Turners Falls, and Northfield Mountain. The banks of the Connecticut River in the Turners Falls Pool section are often twenty or more feet above the water level, and are characterized by slumping and mass wasting of huge sections of streambank. Trees and other riparian vegetation frequently fall and slide into the water (Franklin Regional Council of Governments and Connecticut River Streambank Erosion Committee 1999). Evidence of extreme erosion prompted the Franklin Regional Council of Governments to carry out a series of 319-funded bank stabilization projects implemented

between 1996 and 2007. These Connecticut River Watershed Restoration Projects included: Phase I (96-03/319); Phase II (00-04/319); and Phase III (03-07/319). Eroding sites in this segment of the Connecticut River were inventoried and prioritized according to factors including severity of the problem and feasibility of stabilization, and selected for restoration via design and installation of bioengineered bank. Over 2,500 linear feet of eroded bank have been stabilized by these three projects using a variety of bioengineering techniques.

Biology

The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported isolated patches of this non-native aquatic macrophyte in this segment of the Connecticut River along the shoreline upstream from Barton Cove near the end of Barton Cove Road and near the Turners Falls Rod and Gun club (Boettner 2007).

Note: Three non-native species (*Myriophyllum spicatum, Cabomba caroliniana,* and *Potamogeton crispus*) have been observed on surveys and are known to occur in Barton Cove (MA DCR 2005). Impairments due to the presence of these non-native plant species are reported under segment MA34122 Barton Cove.

Toxicity

Ambient

Water was collected from the Connecticut River, approximately 400 yards upstream from the Northfield Mount Hermon School WWTP discharge, for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48-hours) to the Connecticut River water has been $\geq$ 95% (n=14). River water hardness ranged from 28 to 52mg/L (n=14).

Effluent

Whole effluent toxicity tests have been conducted on the Northfield Mount Hermon School treated effluent. Between August 2000 and September 2006, 13 valid tests were conducted using *C. dubia*. The LC_{50}s were all $\geq$100% effluent (n=13).

Chemistry - water

DWM conducted water quality sampling downstream from Fourmile Brook in Gill (Station 02A) on this segment of the Connecticut River between July and September 2003 (Appendix B and E). All measurements were indicative of good water quality conditions.

Chemistry- fish tissue

The Connecticut River Fish Tissue Contaminant Study (2000) was a collaborative federal and multi-state project designed to provide a baseline of tissue contaminant data from several fish species and learn what threat eating these fish poses to other mammals, birds, and fish (Hellyer 2006). This study reached the following conclusions: mercury poses a risk to fish-eating wildlife, DDT homologs (chemical physical, and biological breakdown products of the parent compound) pose a risk to fish-eating birds, coplanar PCBs pose a risk to fish-eating mammals and fish-eating birds, and dioxin constituted a risk to fish-eating wildlife.

This segment of the Connecticut River is assessed as support with an Alert Status for the *Aquatic Life Use.* This decision is based upon the good survival of test organisms in toxicity tests and the good water quality conditions. However, this use is identified with an Alert Status due to the regulated flow regime, severe bank erosion issues, the isolated presence of non-native plant species, and the risk that fish tissue contaminants pose to fish-eating wildlife. At this time there is insufficient evidence of a negative impact to in-stream biota to result in the impairment of this use.

FISH CONSUMPTION

The following site specific fish consumption advisory is recommended by MA DPH for the mainstem Connecticut River:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS

DWM collected *E. coli* samples from left bank, right bank, and center stream of the Connecticut River downstream from Fourmile Brook in Gill (Station 02A) between April and November 2003 (Appendix B). The geometric mean of these samples was 20 cfu/100ml.

DWM personnel made field observations at Station 02A during the surveys conducted between July and September 2003. No objectionable deposits or water odors were recorded, but pollen or dust blankets were noted as being present on the water surface on three occasions. Water clarity was noted as clear or slightly turbid at this station (MassDEP 2003).

The *Primary* and *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support based upon the low bacteria counts and the lack of objectionable deposits, odors, or oils. However, these uses are identified with an Alert Status due to the turbid conditions, regulated flow regime and severe bank erosion issues identified in the upstream segment.

Connecticut River (Segment MA34-02) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		SUPPORT*
Secondary Contact		SUPPORT*
Aesthetics		SUPPORT*

* Alert Status, see details in use assessment

RECOMMENDATIONS

Didymosphenia geminata, otherwise known as Didymo or “rock snot”, is considered an invasive algae and has been found in the Connecticut River in Vermont and New Hampshire. Infestation and nuisance blooms of Didymo can produce thick mats that blanket stream and river substrates, causing a loss of habitat for fish and other aquatic organisms. Didymo blooms can make fishing, swimming, or boating undesirable or impossible (MA DCR 2008). Although it is currently not known if Didymo will colonize and/or bloom in the Massachusetts section of the Connecticut River, every effort should be made to prevent the spread of this nuisance algae in the mainstem Connecticut River and its tributaries. MA DCR recommends the Check-Clean-Dry protocol be followed when exiting waters that may be infested with Didymo. For more information visit: http://www.mass.gov/dcr/waterSupply/lakepond/hot_topic.htm.

Field determined that 20 percent of the bank length has been protected by rock armor. Field recommends using new approaches for subsequent bank stabilization work, as continued reliance on armoring could lead to increased erosion elsewhere (Field 2007).

Water quality testing, especially TSS and turbidity, should continue to be monitored to assess the impact of the severe bank erosion upon the *Aquatic Life Use*.

The First Light Hydro Generating Company NPDES permit should be reissued with appropriate limits and monitoring requirements. Special consideration should be given to best available cooling water intake structure technologies that minimize fish impingement and entrainment.

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 users to the problem and their responsibility to prevent spreading these species.

CONNECTICUT RIVER (SEGMENT MA34-03)
Location: Turners Falls Dam, Gill/Montague, to confluence with Deerfield River, Greenfield/Montague/Deerfield.
Segment Length: 3.6 miles.
Classification: Class B, Warm Water Fishery, combined sewer overflow.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics, flow alteration and suspended solids (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Australis Aquaculture LLC (9P10619202)
Southworth Company (Registration 10619203)

NPDES (Appendix H, Table H2)
Australis Aquaculture LLC (MA0110264)
Southworth Company Turners Falls Mills Canal Street Facility (MA0005011)
Esleeck Manufacturing Company (MA0003964) listed as inactive by EPA as of June 2001
First Light Hydro Generating Company (MA0035521)
Town of Montague Pollution Control Facility (MA0100137)

FEDERAL ENERGY REGULATORY COMMISSION (FERC)

Project Name	Owner	Project #	Issue Date	Expiration Date	River	Kilowatts
Turners Falls	Turners Falls Hydro LLC	2622	29 June 1990	28 February 2021	Connecticut Canal	937
Turners Falls	FirstLight Hydro Generating Co.	1889	05 May 1980	30 April 2018	Connecticut River	56,573

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
The Connecticut River is diverted at Turners Falls Dam into the Northeast Utility's power canal (7000 feet long by 120 feet wide) where it is used to generate hydroelectric power. Despite a minimum flow release of 120 cfs during most of the year and slightly higher (400 cfs) releases during fish migration periods (Grader undated), approximately two miles of the mainstem Connecticut River are bypassed. Water is returned to the Connecticut River after passing through the Turners Falls power Canal. On average less than 25 percent of shad reaching the Turners Falls Dam are successful in passing the fishways and the dam, indicating significant passage problems within the complex of three fishways (Schrock 2005).

Toxicity
Ambient
The Southworth Company Turners Falls Mill staff collected water from the Power Canal, which flows into the Connecticut River, at the Loomis Road and Turner Falls Road Bridge for use as dilution water in the facility's whole effluent toxicity tests. Between July 2000 and October 2007, survival of *C. dubia* exposed (approximately 7-days) to the Connecticut River water was $\geq$ 80 % (n=26). River water hardness ranged from 23 to 84 mg/L (n=26).

Effluent
Whole effluent toxicity tests have been conducted on the Southworth Company Turner Falls Mill treated effluent. Between July 2000 and October 2007, 26 valid acute tests were conducted using *C. dubia*. The LC_{50}s ranged from 23.3 to >100% effluent and were below the LC_{50} limit of 50% in 7 of the 26 tests (October 2000, September 2002, March and June 2003, June 2004, June 2006, and September 2007). Results of the *C. dubia* chronic whole effluent toxicity tests ranged from <6.25 to 100% effluent. Chronic toxicity was detected in all but four test events (CNOEC < 100% effluent). Results of the *C. dubia* chronic whole effluent toxicity tests ranged from <6.25 to 100% effluent. Chronic toxicity was detected in all but four test events (CNOEC < 100% effluent).

Chemistry- fish tissue

The Connecticut River Fish Tissue Contaminant Study (2000) was a collaborative federal and multi-state project designed to provide a baseline of tissue contaminant data from several fish species and learn what threat eating these fish poses to other mammals, birds, and fish (Hellyer 2006). This study reached the following conclusions: mercury poses a risk to fish-eating wildlife, DDT homologs (chemical physical, and biological breakdown products of the parent compound) pose a risk to fish-eating birds, coplanar PCBs pose a risk to fish-eating mammals and fish-eating birds, and dioxin constituted a risk to fish-eating wildlife.

Although Fall River discharges into this segment of the Connecticut River just below the Turner's Falls Dam, the majority of the Connecticut River is diverted through the power canal. This renders a reach of the Connecticut River into a virtually dry streambed for part of the year, and therefore the *Aquatic Life Use* is assessed as impaired for the upper 2.9 miles of this segment. The flow of the river is returned to the channel at this point, however there are no water quality data available for this section. The lower 0.7 miles of this segment (downstream from the power canal) are not assessed. The *Aquatic Life Use* is identified with an Alert Status due to the risk that fish tissue contaminants pose to fish-eating wildlife.

FISH CONSUMPTION

The following site specific fish consumption advisory is recommended by MA DPH for the Connecticut River:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

Connecticut River (Segment MA34-03) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED upper 2.9 miles Cause: Flow alteration Source: Impacts from hydropower flow regime alterations NOT ASSESSED* lower 0.7 miles
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		NOT ASSESSED

* Alert Status, see details in use assessment

RECOMMENDATIONS

Didymosphenia geminata, otherwise known as Didymo or "rock snot", is considered an invasive algae and has been found in the Connecticut River in Vermont and New Hampshire. Infestation and nuisance blooms of Didymo can produce thick mats that blanket stream and river substrates, causing a loss of habitat for fish and other aquatic organisms. Didymo blooms can make fishing, swimming, or boating undesirable or impossible (MA DCR 2008). Although it is currently not known if Didymo will colonize and/or bloom in the Massachusetts section of the Connecticut River, every effort should be made to prevent the spread of this nuisance algae in the mainstem Connecticut River and its tributaries. MA DCR

recommends the Check-Clean-Dry protocol be followed when exiting waters that may be infested with Didymo. For more information visit: http://www.mass.gov/dcr/waterSupply/lakepond/hot_topic.htm. Review the information submitted by the Southworth facility (MA0005011) as part of their cooling water intake structure monitoring program annual reports.

The Southworth facility needs to reduce the acute whole effluent toxicity present in their treated process wastewater discharge.

Implement planned fish passage improvements at the Turners Falls Dam.

Collect appropriate data to assess the *Primary* and *Secondary Contact Recreation* uses.

FALL RIVER (SEGMENT MA34-33)
Location: Vermont/Massachusetts border, Bernardston, to the confluence with the Connecticut River, Greenfield/Gill
Segment Length: 10.2 miles.
Classification: Class B, Cold Water Fishery.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

Fall River is stocked with salmon fry by the Massachusetts Division of Fisheries and Wildlife as part of the ongoing Atlantic Salmon Restoration Program (Slater 2000).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Crumpin Fox Golf Club (9P2010602902)
Bernardston Fire & Water District (Sugarhouse Well) (9P010602901)

USE ASSESSMENT
AQUATIC LIFE
Habitat and Flow
DWM performed a habitat assessment of Fall River upstream from Bascom Road in Gill on 17 September 2003 as part of the fish population survey. The habitat was scored as optimal (175 / 200). This was the best habitat score out of six stations sampled in the Connecticut River Watershed in 2003 (Appendix D).

Biology
On 17 September 2003, DWM biologists sampled the fish community on the Fall River upstream from Bascom Road in Gill (Appendix D). Seven fish species were collected during this survey, including 122 blacknose dace, 11 slimy sculpin, 9 longnose dace, 5 Atlantic salmon, 5 brook trout, 4 creek chub, and one pumpkinseed. The community was dominated by a pollution tolerant fluvial specialist species, but three pollution intolerant cold water species were also present.

This segment of Fall River is assessed as support for the *Aquatic Life Use* based on the fish community and habitat data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
No objectionable conditions were noted by the DWM biologists during the fish population surveys conducted in 2003 (Mitchell 2007).

Fall River (Segment MA34-33) Use Summary Table

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

RECOMMENDATIONS
Conduct bacteria and water quality monitoring in order to assess the *Aquatic Life Use* and the *Primary* and *Secondary Contact Recreation* uses.

CONNECTICUT RIVER (SEGMENT MA34-04)
Location: Confluence with Deerfield River, Greenfield/Montague/Deerfield, to Holyoke Dam, Holyoke/South Hadley.
Segment Length: 34.4 miles.
Classification: Class B, Warm Water Fishery, combined sewer overflow.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics and pathogens (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
South Deerfield Water Supply District (10607402)
Chang Farms, Inc. (9P210633701)
Delta Sand And Gravel, Inc. (10628904)
Nourse Farm (10607401)
Sunderland Water District (10628905)
Mohawk Trout Hatchery (10628903)
Sunderland State Fish Hatchery (9P210628902, 10628907)
Mckinstry Market Garden (10606102)
Hadley Water Department (9P210611701, 10611702)
Earle M. Parsons & Sons, Inc. (10611705)
Mt Tom Generating Company, LLC. (10613712)
South Hadley Fire District 2 Water Dept. (10627502)
Ledges Golf Club (9P210627502)

NPDES (Appendix H, Table H2)
Town of Montague Pollution Control Facility (MA0100137)
Montague State Fish Hatchery, MA Division of Fisheries and Wildlife (MA0110051)
Boston and Maine Corporation (B&M) East Deerfield Rail Yard (MA0000272)
Town of Deerfield South Deerfield Wastewater Treatment Plant (MA0101648)
Chang Farms, Inc. Whately (MA0040207)
Town of Sunderland Wastewater Treatment Plant (MA0101079)
Town of Amherst Wastewater Treatment Plant (MA0100218)
Sunderland State Fish Hatchery, MA Division of Fisheries and Wildlife (MA0110035)
Town of Hatfield Wastewater Treatment Plant (MA0101290)
Town of Hadley Wastewater Treatment Plant (MA0100099)
Northampton Wastewater Treatment Plant (MA0101818)
Town of Easthampton Wastewater Treatment Plant (MA0101478)
Mt. Tom Generating Company (MA0005339)
Holyoke Department of Public Works (MA0101630): Five CSO outfalls discharge to the Connecticut River upstream from the Holyoke Dam (021, 020, 023, 019, and 018)

FEDERAL ENERGY REGULATORY COMMISSION (FERC)

Project Name	Owner	Project #	Issue Date	Expiration Date	River	Kilowatts
Holyoke	City of Holyoke (HG&E)	2004	20 August 1999	31 August 2039	Connecticut River	45,675

The Holyoke Dam Hydroelectric Project is an operating FERC licensed facility located on the Connecticut River in the City of Holyoke and the town of South Hadley. A complete description of the facility is presented in Segment MA34-05.

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
The USGS maintains a gage on the Connecticut River in Montague City, MA (Gage 01170500). The average annual discharge at this gage is 11,742 cfs (period of record 2000 to 2005). The maximum

discharge at this gage occurred on 19 March, 1936 (236,000 cfs). The minimum discharge occurred on 31 August and 1 September 1958 (215 cfs) (period of record March 1904 to 2004) (Socolow et al. 2004).

The Mt. Tom Generating Station is a 147 MW "base-load" generating facility that utilizes coal as its fuel source. Cooling water is withdrawn from the western shore of the Connecticut River and is oriented parallel to flow for use as once through cooling water at the Mt. Tom Generating Station. The following information on the intake was taken from the Proposal for Information Collection (PIC) for the facility required by Section 316(b) Phase II rule of the Clean Water Act (Kleinschmidt 2006b).

> *The intake is through an 8' diameter, 345' long concrete intake pipe at the Mt. Tom Generating Station. Directly in front of the intake pipe there is a series of seven, evenly spaced 4" diameter brass vertical bars installed in concrete sleeves, directly in front of the inlet of the pipe to preclude large debris from entering the cooling water system. An electric fish screen was installed immediately behind the brass bars to deter fish from entering the pipe. In addition, a five-foot tall sheet pile curtain wall was located approximately 20' in front of the intake pipe to direct fish and debris away from the entrance. The intake pipe terminates at a screenwell structure with two bays, each of which has a trash rack and a 10' wide traveling screen with 3/8" square mesh. The traveling screen rotation is activated on a signal from a differential pressure switch. The traveling screens are cleaned by a screen wash system consisting of two, 250 gpm, 70 psi rated screen wash pumps. The high-pressure spray washes impinged debris and fish into a debris trough and ultimately discharged back into the river downstream from the intake pipe. The design intake flow is 133.2 MGD and the design intake velocity at mean low water level is approximately 1.7 feet per second.*

Biology

The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Cove Island Cove at the mouth of White Brook in South Hadley and at the mouth of the Mill River in Northampton (Boettner 2007).

The Shortnose sturgeon (*Acipenser brevirostrum*), a federally endangered freshwater fish, is present in this section of the Connecticut River. This fish utilizes discrete habitats within this system for feeding and spawning. Historically, adult Shortnose sturgeon would spawn in the late spring near the confluence of the Deerfield and Connecticut Rivers and then migrate downstream to foraging areas as far downstream as Long Island Sound. At present, it is believed that the Holyoke Dam divides the Connecticut River Sturgeon into two separate populations (UMass 2007).

Toxicity

Ambient

The Montague Water Pollution Control Facility staff collected water from the Connecticut River, at the end of Poplar Street (near the sandbar) in Montague, for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48 hours) to the Connecticut River water was $\geq$ 85% (n=15). River water hardness ranged from 26 to 44.6 mg/L (n=15).

The South Deerfield Wastewater Treatment Facility staff collected water from the Connecticut River approximately 250 feet above the Sunderland Bridge in Deerfield for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48 hours) to the Connecticut River water was $\geq$90 % (n=16). River water hardness ranged from 26.9 to 51 mg/L (n=16).

The Sunderland Wastewater Treatment Plant staff collected water from the Connecticut River at the Riverside Cemetery in Sunderland for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and September 2007, survival of *P. promelas* exposed (48-hour) to the Connecticut River water was $\geq$ 95% (n=15). River water hardness ranged from 23 to 52 mg/L (n=15).

Water from the Connecticut River was collected from the boat launch in Hatfield just downstream from the Hatfield Wastewater Treatment Plant (WWTP) for use as dilution water in the facility's whole effluent toxicity tests. The sampling location will be properly located upstream from the discharge for tests conducted in June 2007 and thereafter. For the purposes of this report, however, survival of *C. dubia*

exposed (48 hours) to the Connecticut River water collected downstream from the Hatfield WWTP discharge between May 2001 and October 2006 ranged from 90 to 100% (n=12). Survival of *P. promelas* exposed (48 hours) to the Connecticut River water ranged from 98 to 100% (n=2). River water hardness ranged from 20 to 44 mg/L (n=12).

The Amherst Public Works staff collected water from the Connecticut River upstream from the Amherst WWTP discharge off Route 47 in Hadley for use as dilution water in the facility's whole effluent toxicity tests. (This sampling location is upstream from the confluence with Russellville Brook.) Between August 2000 and October 2007, survival of *C. dubia* exposed (48-hours) to the Connecticut River water was 100% (n=12). River water hardness ranged from 26 to 44 mg/L (n=12).

Water from the Connecticut River was collected from the boat dock at 29 Honey Pot Road (upstream from the Route 9 Calvin Coolidge Bridge) in Hadley for use as dilution water in the Hadley Wastewater Treatment Plant (WWTP) whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48 hours) to the Connecticut River water was $\geq$90% (n=15). River water hardness ranged from 25 to 51mg/L (n=15).

Water from the Connecticut River was collected approximately 300 yards upstream from the Northampton Wastewater Treatment Facility outfall diffuser off of Hockanum Road for use as dilution water in the facility's whole effluent toxicity tests. Between November 2000 and September 2007, survival of *C. dubia* exposed (48-hours) to the Connecticut River water was $\geq$95% (n=15). River water hardness ranged from 20 to 47mg/L (n=15).

The Easthampton Wastewater Treatment Plant (WWTP) staff collected water from the Connecticut River, across the railroad from East Street, approximately 15 feet upstream from the outfall, for use as dilution water in the facility's whole effluent toxicity tests. Between June 2000 and June 2007, survival of *C. dubia* exposed (48 hours) to the Connecticut River water ranged from 95 to 100% (n=15). River water hardness ranged from 26 to 38mg/L (n=15).

Water from the Connecticut River was collected near the Dinosaur Tracks (mile marker #17 on Route 5) in Holyoke for use as dilution water in the Holyoke WPCF facility's acute whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48- hours) to the Connecticut River water was $\geq$ 90 % (n=30). River water hardness ranged from 26.2 to 52.5mg/L (n=29).

Effluent

Acute whole effluent toxicity tests have been conducted on the Montague Water Pollution Control Facility treated effluent. Between August 2000 and September 2007, 15 tests were conducted using *C. dubia*. No acute toxicity has been detected in the effluent (LC_{50}s were all $\geq$100% effluent in the 14 valid tests conducted).

Acute whole effluent toxicity tests have been conducted on the South Deerfield Wastewater Treatment Plant treated effluent. Between August 2000 and September 2007, 16 tests were conducted using *C. dubia*. With the exception of one test event (September 2005 LC_{50}=18.4%effluent), no acute whole effluent toxicity has been detected.

Acute whole effluent toxicity tests have been conducted on the Sunderland Wastewater Treatment Plant treated effluent. Between August 2000 and September 2007, 15 tests were conducted using *P. promelas*. With the exception of one test event (May 2001 LC_{50}=72.2%effluent), no acute whole effluent toxicity has been detected. The facility has consistently passed its whole effluent toxicity testing limits.

Acute whole effluent toxicity tests have been conducted on the Hatfield WWTP treated effluent. Between May 2001 and October 2006, 12 tests were conducted using *C. dubia* and two were conducted using *P. promelas*. The effluent exhibited some acute toxicity to *C. dubia* in the May and August 2001, May 2002, October 2005, and May 2006 test events although the LC_{50} was $\leq$50% effluent (the permit limit) in only the October 2005 test event (LC_{50}=39.2% effluent). Some acute whole effluent toxicity was detected in the August 2001 *P. promelas* test (LC_{50}=73.3% effluent) but not the May 2001 test (LC_{50}>100% effluent).

Acute whole effluent toxicity tests have been conducted on the Amherst WWTP effluent. Between August 2000 and October 2007, 12 tests were conducted using *C. dubia*. With the exception of the most recent test event (October 2007, LC_{50}=70.7% effluent) no acute whole effluent toxicity has been detected (LC_{50}s were all >100% effluent).

Whole effluent toxicity tests have been conducted on the Hadley WWTP treated effluent. Between August 2000 and September 2007, no acute toxicity to *C. dubia* has been detected (LC_{50}s all $\geq$100% effluent (n=15).

Acute whole effluent toxicity tests have been conducted on the Northampton WWTF treated effluent. Between November 2000 and September 2007, 15 valid tests were conducted using *C. dubia*. The LC_{50}s were all $\geq$100% effluent.

Acute whole effluent toxicity tests have been conducted on the Easthampton WWTP treated effluent discharged via Outfall 001. Between June 2000 and June 2007, 15 valid tests were conducted using *C. dubia*. The LC_{50}s were all $\geq$100% effluent with the exception of three test events (December 2003, December 2005, and June 2006 with LC_{50}= 88.5, 70.7, and 69.8%, respectively).

Chemistry - water

DWM conducted water quality sampling at two stations along this segment in 2003. Station 04A was located at Route 116 in Deerfield/Sunderland. All measurements were indicative of good water quality conditions. Station 04C was located upstream from the confluence of the Mill River-Northampton, near the Oxbow, in Northampton/Hadley. All measurements were indicative of good water quality conditions. (Appendix B and E).

Chemistry- fish tissue

The Connecticut River Fish Tissue Contaminant Study (2000) was a collaborative federal and multi-state project designed to provide a baseline of tissue contaminant data from several fish species and learn what threat eating these fish poses to other mammals, birds, and fish (Hellyer 2006). This study reached the following conclusions: mercury poses a risk to fish-eating wildlife, DDT homologs (chemical physical, and biological breakdown products of the parent compound) pose a risk to fish-eating birds, coplanar PCBs pose a risk to fish-eating mammals and fish-eating birds, and dioxin constituted a risk to fish-eating wildlife.

This segment of the Connecticut River is assessed as support for the *Aquatic Life Use.* This is based on the good water quality data, the excellent survival of test organisms exposed to water collected from the Connecticut River in this segment, and the general lack of acute toxicity in the effluents of facilities discharging to this segment. This use is identified with an Alert Status due to the isolated occurrences of *Trapa natans* found in Cove Island Cove and at the mouth of the Mill River in Northampton and the risk that fish tissue contaminants pose to fish-eating wildlife.

FISH CONSUMPTION

The following site specific fish consumption advisory is recommended by MA DPH for the mainstem Connecticut River:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

DWM collected *E. coli* samples from the Connecticut River at Station 04A between April and November in 2003. The last three samples were collected as a transect across the river in order to determine if there was any variability in water quality conditions as a result of incomplete mixing. The geometric mean of all samples collected at Station 04A was 8 cfu/100ml. No significant differences in results were observed between the left, middle, and right transect locations. Bacteria samples were also collected at Station

04C, but it was only sampled three times and thus no geometric mean was calculated (Appendix B).

Metcalf & Eddy collected *E. coli* bacteria samples as part of the Connecticut River Bacteria Monitoring Project at Station RIV-1 (Connecticut River upstream boundary) in Holyoke/South Hadley within this segment (Metcalf & Eddy 2006). This project was funded to obtain river bacteria results upstream and downstream of combined sewer overflows during dry and wet weather conditions. Five samples were collected across a transect perpendicular to the river flow at this location. Up to six rounds of sampling were collected at each transect location within a one to three day period in order to capture both dry and wet weather bacteria levels. Samples were collected at this station during one dry weather (8 August 2001) and three wet weather periods (25-27 September 2001, 15-16 September 2002, and 16-18 October 2002). All valid samples collected at this location have been pooled to calculate a single geometric mean. The geometric mean of all samples collected during the primary contact recreation season (which excludes the 16-18 October sampling event) at Station RIV-1 was 25 cfu/100mL. The geometric mean of all samples collected was 25 cfu/100mL.

DWM personnel made field observations at Stations 04A and 04C during surveys conducted between April and October 2003. Station 04A was free from odors. Garbage was noted on shore during only one visit; pollen or dust blankets were noted as being present on the water surface on three occasions. Water clarity was recorded as highly turbid on two occasions, and often was noted as slightly turbid (MassDEP 2003). At Station 04C no objectionable deposits or water odors were recorded, but pollen or dust blankets were noted as being present on the water surface on three occasions. Water clarity was noted as clear or slightly turbid at this station (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support due to the acceptable bacteria counts and the general lack of objectionable conditions.

Connecticut River (Segment MA34-04) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		SUPPORT
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

* Alert Status, see details in use assessment

RECOMMENDATIONS

Didymosphenia geminata, otherwise known as Didymo or “rock snot”, is considered an invasive algae and has been found in the Connecticut River in Vermont and New Hampshire. Infestation and nuisance blooms of Didymo can produce thick mats that blanket stream and river substrates, causing a loss of habitat for fish and other aquatic organisms. Didymo blooms can make fishing, swimming, or boating undesirable or impossible (MA DCR 2008). Although it is currently not known if Didymo will colonize and/or bloom in the Massachusetts section of the Connecticut River, every effort should be made to prevent the spread of this nuisance algae in the mainstem Connecticut River and its tributaries. MA DCR recommends the Check-Clean-Dry protocol be followed when exiting waters that may be infested with Didymo. For more information visit: http://www.mass.gov/dcr/waterSupply/lakepond/hot_topic.htm.

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 users to the problem and their responsibility to prevent spreading these species.

The Montague Water Pollution Control Facility NPDES permit should be reissued. Based on the general lack of any acute whole effluent toxicity, the whole effluent toxicity testing requirements should be reduced to annually (testing required in August of each year).

With the exception of one test event (September 2005 LC_{50}=18.4%effluent), no acute whole effluent toxicity has been detected in the South Deerfield Wastewater Treatment Plant treated effluent. The whole effluent toxicity testing requirements could be reduced to annually if no further evidence of acute toxicity is detected.

Acute whole effluent toxicity tests have been conducted using *P. promelas* on the Sunderland Wastewater Treatment Plant treated effluent. With the exception of one test event there has been no evidence of acute whole effluent toxicity and the facility has consistently passed its LC_{50} limit. The whole effluent toxicity testing requirements should be reduced to annually (testing required in August of each year).

If the Amherst WWTP does not exhibit acute whole effluent toxicity, the requirements should be reduced to annually (testing required in September of each year).

Based on the lack of any evidence of acute whole effluent toxicity, the whole effluent toxicity testing requirements for the Hadley WWTP should be reduced to annually (testing required in August of each year).

The Northampton WWTP acute whole effluent toxicity testing requirements should be reduced to annually (testing required in August of each year) since the facility has consistently been in compliance with their LC_{50} permit limit.

A Toxicity Identification/Toxicity Reduction Evaluation (TIE/TRE) may be warranted for the Easthampton WWTP facility if acute whole effluent toxicity continues to be present in the effluent.

Review and evaluate submissions of data and reports required by 316a and 316b for the Mt. Tom Generating Company.

SAWMILL RIVER (SEGMENT MA34-40)
Location: Outlet of Lake Wyola, Shutesbury, to Dudleyville Road, Leverett
Segment Length: 2.0 miles.
Classification: Class B.

This segment is formerly part of MA34-26, which is on the 2006 Integrated List of Waters in "Category 3"-*No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG conducted electrofishing at one location in this segment of the Sawmill River slightly upstream from Dudleyville Road at North Leverett Road on 9 September 2003 (Site 939). A total of 93 fish were collected, representing four species. Blacknose dace and Atlantic salmon dominated the sample while longnose dace and a brown trout were also collected.

Too limited data are available so this segment of the Sawmill River is not assessed for the *Aquatic Life Use*.

Sawmill River (Segment MA34-40) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

SAWMILL RIVER (SEGMENT MA34-41)
Location: Dudleyville Road, Leverett, to the confluence with the Connecticut River, Montague.
Segment Length: 11.0 miles.
Classification: Class B, Cold Water Fishery.

This segment is formerly part of MA34-26, which is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

2003-02/604: An Ecosystem Approach to the Sawmill River Watershed Restoration. This project will provide a three-phase geomorphic approach for the lower portion of the Sawmill River Watershed. The assessments will use a state-of-the-art model to inventory and analyze river ecosystem health indicators.

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Turners Falls Fire District (9P10619201, 10619201)

NPDES (Appendix H, Table H2)
Red Wing Meadow Trout Hatchery (MA0027880) terminated by EPA in January 2005.

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
DWM biologists performed a habitat assessment of the Sawmill River upstream from South Ferry Road in Montague on 22 July 2003. This site received a total habitat score of 137 out of a possible 200 (Appendix D). Reductions in the habitat score were primarily due to abutting agricultural practices. The removal of trees to create pastureland, and the impact that livestock has had on the native vegetation contributed to low scores for Riparian Vegetative Zone Width and Bank Vegetative Protection.

Vanase Hangen Brustlin, Inc. outlined areas of excessive sediment deposition, bank erosion, and inadequate riparian buffer in the lower portion of this Sawmill River segment in a report prepared for the Franklin County Conservation District (VHB 2006). Priority reaches for restoration efforts were identified and prioritized, though restoration efforts have not yet been implemented.

Biology
DWM conducted benthic macroinvertebrate sampling in the Sawmill River at Station B0515, upstream from South Ferry Road in Montague on 22 July 2003. The benthic community collected did not reflect the habitat perturbation observed within the sample reach and appeared to be in good health. The total metric score is 90% comparable to the reference station, Amethyst Brook, resulting in an assessment score of "non-impacted" (Appendix C). Taxa Richness was the highest of all Connecticut watershed biomonitoring stations assessed, indicating a diverse community with good health and function.

MA DFG collected fish community data at seven different locations on the Sawmill River during sampling conducted during 2002, 2003, and 2005 (Richards 2006). Sampling was conducted at the following locations: slightly upstream from Dudleyville Road at North Leverett Road (Site 939), Rattlesnake Gutter Road (Site 938), at the North Leverett Road pullout off Route 63 (Site 1346), Route 47/63 junction (Site 937), North Street (Site 943), upstream from Meadow Street (Site 944), and Willis Ferry Road (Site 942). Blacknose dace, a pollution tolerant fluvial specialist species, was the most numerous fish collected at all but one station. However, most stations displayed a varied fish community with pollution intolerant cold water species present. Evidence of reproducing brown trout, a pollution intolerant cold water species, was found at 5 of the 7 stations. Anadromous sea lamprey were collected at 3 stations. Evidence of the Anadromous Fish Restoration Project's efforts can be found in the fact that Atlantic salmon were present at 6 of the 7 stations.

Chemistry - water
DWM conducted water quality sampling at South Ferry Road in Montague, Station 26A, on this segment of the Sawmill River between April and October 2003 (Appendix B). All measurements were indicative of good water quality conditions.

This segment of the Sawmill River is assessed as support for the *Aquatic Life Use*. This assessment is based primarily upon the non-impacted benthic macroinvertebrate community, the healthy and diverse fish communities, and the good water quality, though the low habitat score and problems in the lower reach outlined by Vanase Hangen Brustlin, Inc. are of concern.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

DWM collected *E. coli* samples from the Sawmill River at South Ferry Road in Montague (Station 26A) between April and October 2003 (Appendix B). The geometric mean of these samples was 61 cfu/100ml.

Bacteria samples were collected at 15 locations in the Sawmill river subwatershed during bacteria source tracking investigations conducted by DWM personnel in 2006 (Kurpaska and Poach 2006). Samples were collected at each station once in July during a wet weather event, and again in September during dry weather. Samples collected during wet weather conditions exhibited *E. coli* counts from 14.8 to 435.2 MPN per 100mL of sample. All counts were below the source tracking trigger of 2000 MPN/100mL for follow up investigation for wet weather conditions. Samples collected during dry weather conditions had *E. coli* counts that ranged from 0 to 275.1 MPN per 100mL of sample. All counts were below the source tracking trigger of 500 MPN/100mL for dry weather conditions. Due to the fact that each site was only sampled on two occasions, no geometric means have been calculated and these data are not used for assessment purposes.

MassDEP biologists observed the water quality in the Sawmill River upstream of South Ferry Road in Montague on July 22, 2003. The water was clear with no turbidity, odors, or surface oils. Cow manure was observed in the river and on its banks, and barbed wire stretching across the stream was noted (Appendix C).

DWM personnel made field observations at Station 26A during surveys conducted between April and October 2003. No objectionable deposits, scums or water odors were recorded and water clarity was generally noted as clear or slightly turbid (MassDEP 2003).

The *Primary* and *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support based upon bacteria counts that are acceptable for primary and secondary contact and the lack of objectionable conditions.

Sawmill River (Segment MA34-41) Use Summary Table

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

RECOMMENDATIONS

Investigate and address the cattle access to the stream in the area upstream from South Ferry Road. Determine if fencing or other cattle exclusion methods might be feasible to remedy this issue.

LONG PLAIN BROOK (SEGMENT MA34-09)
Location: Headwaters, Leverett/Sunderland town line, to confluence with Russellville Brook at Rt. 116, Sunderland.
Segment Length: 5.0 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Sunderland Water District (10628905)
Delta Sand And Gravel, Inc. (10628904)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data at Long Plain Brook at Site 999 (Station described by MA DFG as Russellville Brook) upstream from Bull Hill Road in 2004. Only two fish were collected, one golden shiner and one tessellated darter. Sampling comments also noted the presence of several juvenile bridle shiners. Comments described the area as "low gradient with occasional riffle…shocked a long way for almost no fish" (Richards 2006).

This segment of Long Plain Brook is not assessed for the *Aquatic Life Use* due to a general lack of data. The single fish sampling event by MA DFG in 2004 does not provide conclusive evidence for either support or impairment of the *Aquatic Life Use*.

Long Plain Brook (Segment MA34-09) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

CUSHMAN BROOK (SEGMENT MA34-34)
Location: Headwaters, outlet Atkins Reservoir, Shutesbury, to the inlet of Factory Hollow Pond, Amherst
Segment Length: 2.5 miles.
Classification: Class B.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 17 September 2003 DWM biologists conducted a habitat assessment of Cushman Brook at the south side of State Street in Amherst. Most of the habitat measures were found to be within the "optimal" range. The total habitat score arrived at for this fish population survey was 167/200 (Appendix D). DWM biologists also conducted a habitat assessment on Cushman Brook in conjunction with benthic macroinvertebrate sampling upstream from Factory Hollow Pond in Amherst in 2003. The total habitat score for Cushman Brook at that location was 154 / 200 (Appendix C).

Biology
DWM conducted benthic macroinvertebrate sampling in Cushman Brook at Station B0508, upstream from Factory Hollow Pond in Amherst on 22 July 2003. The total metric score for Cushman Brook is 86% comparable to the reference station (Amethyst Brook) in terms of community structure, resulting in an assessment of "non-impacted" (Appendix C).

DWM conducted fish population sampling in Cushman Brook, south side of State Street in Amherst on 17 September 2003 (Appendix D). Five fish species were collected from this station, including: 26 brown trout (multiple age classes), 13 blacknose dace, 1 brook trout, 1 white sucker, and 1 longnose dace. Pollution intolerant fluvial specialist/dependant species dominated the fish community.

This segment of Cushman Brook is assessed as support for the *Aquatic Life Use* based on the non-impacted benthic macroinvertebrate community and the fish community data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
No objectionable conditions were noted by the DWM biologists during the fish population or benthic macroinvertebrate surveys (Appendix C and Mitchell 2007).

Cushman Brook (Segment MA34-34) Use Summary Table

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

RECOMMENDATIONS
Conduct bacteria sampling to evaluate the Primary and Secondary Contact Recreation uses.

MILL RIVER-HADLEY (SEGMENT MA34-25)
Location: Outlet of Factory Hollow Pond, Amherst, to the inlet of Lake Warner, Hadley.
Segment Length: 5.2 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Sunderland National Salmon Station (10628901)

NPDES (Appendix H, Table H2)
Note: Although the Amherst WWTP is located along this segment, the actual discharge point is to the mainstem Connecticut River (Segment MA34-04).
Bioshelters, Inc. (MA0110281)

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
The total habitat score recorded by DWM fisheries biologists for the Mill River – Hadley site in 2003 was 112 out of a possible 200. This is the poorest score of all stations examined in the Connecticut watershed in 2003 (Appendix D). Habitat was most limited by the poor epifaunal substrate score (no riffles were present). Scores were also suboptimal for embeddedness, sediment deposition, and velocity-depth combinations. These conditions were considered to be naturally occurring; the reach is within the Connecticut River Valley floor, is of relatively low gradient, and has a sandy bottom.

Biology
DWM conducted fish population sampling in the Mill River - Hadley, East of Route 116 in Amherst on 17 September 2003. Only 15 fish were captured during the survey, representing eight species. However, electro-fishing efficiency was rated as "poor," and due to the depth and width of the stream some fish were not captured (Appendix D). The fish community was dominated by moderately pollution tolerant fluvial specialist/dependant species.

Chemistry - water
DWM conducted water quality sampling at Mill River Lane in Hadley, Station 25C, on this segment of the Mill River - Hadley between April and October 2003 (Appendix B and E). All measurements were indicative of good water quality conditions.

This segment of Mill River - Hadley is assessed as support for the *Aquatic Life Use* based on the good water quality data. The poor collection efficiency noted with the fish community data makes it difficult to determine if the low numbers of fish collected are truly representative of the fish community present at that location. The low habitat score is a concern but is naturally occurring and does not overrule the good water quality data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from the Mill River – Hadley at Mill River Lane in Hadley (Station 25C) between April and November 2003 (Appendix B). The geometric mean of these samples was 148 cfu/100ml.

DWM personnel made field observations at Station 25C during surveys conducted between April and October 2003. A methane odor was reported at this station on one occasion. No objectionable deposits were noted, and the water clarity was recorded as highly turbid on two occasions (MassDEP 2003).

The *Primary Contact Recreational Use* is assessed as impaired because of elevated *E. coli* bacteria counts, noted particularly during wet weather. The *Secondary Contact Recreation and Aesthetics* uses are assessed as support based upon bacteria counts that are acceptable for secondary contact and the general lack of objectionable conditions.

Mill River-Hadley (Segment MA34-25) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: *E. coli* bacteria Source: Unknown Suspected source: Agriculture, unspecified urban stormwater
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

RECOMMENDATIONS

Fish population surveys should be revisited during lower flows, at a more suitable location, or with different methods in order to sample the fish community more accurately than in 2003.

UNNAMED TRIBUTARY (SEGMENT MA34-31)
Location: Headwaters, outlet Lake Warner, Hadley, to the confluence with the Connecticut River, Hadley.
Segment Length: 0.5 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent quality-assured data are available for this unnamed tributary.

Unnamed Tributary (Segment MA34-31) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

BLOODY BROOK (SEGMENT MA34-36)
Location: From the railroad tracks north of North Main Street, Deerfield, to the confluence with Mill River - Hatfield, Whately
Segment Length: 3.7 miles.
Classification: Class B.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

USE ASSESSMENT
AQUATIC LIFE
Chemistry - water
DWM conducted water quality sampling at Whately Road in Deerfield, Station BB01, on this segment of Bloody Brook between April and October 2003 (Appendix B and E). Pre-dawn and early morning dissolved oxygen concentrations were generally low, ranging from 1.6 to 7.9 mg/L. Three of the six measurements were less than 4 mg/L. Total phosphorus concentrations were very high, ranging from 0.058 to 0.16 mg/L. Conductivity measurements also were elevated.

Bloody Brook is assessed as impaired for the *Aquatic Life Use* based on the low dissolved oxygen concentrations and the elevated total phosphorus.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from Bloody Brook at Whately Road in Deerfield (Station BB01) between April and November 2003 (Appendix B). The geometric mean of these samples was 251 cfu/100ml.

DWM personnel made field observations at Station BB01 on Bloody Brook during surveys conducted between April and October 2003. Aquatic weeds such as duckweed were recorded as objectionable deposits on one occasion. An oily sheen on the water surface was reported during one visit, and pollen blankets were visible on the water surface on two visits. A musty basement water odor was reported on one occasion. Water clarity was noted as highly turbid at this station on six occasions, with the water being slightly turbid during the other two visits (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as impaired based upon the chronic highly turbid conditions documented during water quality surveys. The *Primary Contact Recreational Use* is also impaired because of elevated *E. coli* bacteria counts.

Bloody Brook (Segment MA34-36) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Low dissolved oxygen, elevated total phosphorus Source: Unknown
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Objectionable turbidity and elevated *E. coli* bacteria Source: Unknown
Secondary Contact		IMPAIRED Cause: Objectionable turbidity Source: Unknown
Aesthetics		IMPAIRED Cause: Objectionable turbidity Source: Unknown

RECOMMENDATIONS
Investigate the causes of chronic turbidity, low dissolved oxygen, and elevated total phosphorus concentrations observed in Bloody Brook in 2003, and confirm that these issues are still problematic

within this segment. Field reconnaissance is recommended to begin to identify sources of the above-mentioned pollutants that have impaired Bloody Brook.

Evaluate whether this segment is a candidate for bacteria source tracking efforts to identify sources of bacteria contamination in this subwatershed.

MILL RIVER-HATFIELD (SEGMENT MA34-24)
Location: Headwaters, north of Route 116, Conway, to the confluence with the Connecticut River, Hatfield.
Segment Length: 24.6 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Aquatic Life* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

The Town of Whatley was awarded $3,000 for Riparian Planting along the Mill River. This buffer planting project was completed following the bioengineering work covered under a 319 grant. Local citizens were recruited and educated about the importance of buffer zones, and the volunteers assisted in the actual plantings in the fall (Riverways Program 2000).

A feasibility study for removing the Hatfield Dam was completed in 2007 (Donlon 2008). This dam is located in Hatfield on the Mill River – Hatfield.

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
South Deerfield Water Supply District (10607402)
Hatfield Water Department (10612702)
Northampton Department Of Public Works (9P210621401, 10621401)

NPDES (Appendix H, Table H2)
South Deerfield Water Supply District (MAG640005) discharges to an unnamed tributary to Mill River – Hatfield. It should be noted that one modified acute and chronic whole effluent toxicity test was conducted on the South Deerfield Water Supply effluent in November 2002. The discharge was acutely toxic to both *C. dubia* and *P. promelas* (LC_{50}=70% effluent for both species) and the CNOEC results were 50% effluent. Survival in river water used for diluent was $\geq$ 90%.

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 23 July 2003 MassDEP DWM biologists conducted a habitat assessment of Mill River approximately 20 meters upstream from Omasta Well at Mountain Rd. in Hatfield, below the confluence with West Brook (Station B0510). The overall habitat score for Mill River - Hatfield was 158 out of a possible 200, with all but four parameters scoring optimally (Appendix C).

The Instream Habitat Program, Department of Natural Resources, Cornell University and the Massachusetts Cooperative Extension, University of Massachusetts prepared a report in 2003 entitled "Measuring River Ecosystem Health in Western Massachusetts- The Mill River, Hatfield, MA" (Parasiewicz et al 2003). The analysis of benthic macroinvertebrates in this report indicated the presence of slight water quality impairments of some areas, especially within the lower portion of the river. The principal problems identified within the Mill River –Hatfield system were low flows that affect fish habitat and alter fish community structure, increased temperature, and sporadically impaired water quality that suppressed the abundance of fish and benthic invertebrates. Also, a temperature logger placed in the Mill River – Hatfield between May and August 2001 at Christian Lane in Whately revealed water temperatures that often approached and even exceeded the warm water temperature criteria. Raw data, QAPP, and SOP information were not acquired for this data source, so the elevated temperatures reported will only result in Alert Status of the *Aquatic Life Use*. It should be noted that data in this report generally corroborates data collected by MassDEP and MA DFG.

Biology
MA DFG collected fish community data at Mill River - Hadley at Site 1148 along Route 116 in Deerfield in 2005 (Richards 2006). Fish included: 49 blacknose dace, 23 Atlantic salmon, 6 brook trout, and 4 pumpkinseed. The sample was dominated by fluvial specialist species; two pollution intolerant species were present.

DWM conducted benthic macroinvertebrate sampling in the Mill River- Hatfield at Station B0510,

upstream from Mountain Drive in Hatfield on 23 July 2003. The Total Metric Score is 71% when compared to Amethyst Brook, the reference station. This results in an assessment of "slightly impacted" (Appendix C).

Chemistry - water

DWM conducted water quality sampling at Maple Street in Hatfield, Station 24B, on this segment of the Mill River - Hatfield between April and October 2003 (Appendix B and E). Most measurements were indicative of good water quality conditions. Total phosphorus was slightly elevated and ranged from 0.019 to 0.057 mg/L.

The Mill River - Hatfield is assessed as support for the *Aquatic Life Use* based on the macroinvertebrate and fish communities and the good water quality. An Alert Status is attached to this use based on the elevated water temperatures reported by Parasiewicz et al. at one location in 2003.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

DWM collected *E. coli* samples from the Mill River - Hatfield at Maple Street in Hatfield (Station 24B) between April and November 2003 (Appendix B). The geometric mean of these samples was 63 cfu/100ml.

Bacteria samples were collected at 31 locations in the Mill River – Hatfield watershed during Bacteria Source Tracking investigations conducted by DWM personnel in 2006 (Kurpaska and Poach 2006). Wet weather conditions exhibited *E coli* counts from 0 to 261.3 MPN per 100mL of sample. All counts were well below the source tracking trigger of 2000 MPN/100 mL for wet weather conditions, and no further sampling of this watershed was conducted. Due to the fact that each site was only sampled on one occasion, no geometric means have been calculated and these data are not used for assessment purposes.

MassDEP personnel observed the water quality at the Mill River – Hatfield Station B0510 on July 23, 2003. The water was clear to grey, slightly turbid, odorless, and without any surface oils.

DWM personnel made field observations at Station 24B on the Mill River during surveys conducted between April and October 2003. No objectionable deposits or scums were recorded. A septic odor was noted on one occasion and the water generally appeared slightly turbid. The water was highly turbid during one visit (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support due to the acceptable bacteria counts and the general lack of objectionable conditions.

Mill River-Hatfield (Segment MA34-24) Use Summary Table

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

*Alert Status, see details in use assessment

RECOMMENDATIONS

Temperature patterns should be monitored in the Mill River - Hatfield to study possible impairment due to thermal issues.

Poor survival of test organisms in the South Deerfield Water Supply effluent is of concern, due to the fact that drinking water effluent did fail toxicity testing conducted in 2002. However, the young age of the plant at the time of that test and sampling inconsistencies over what is required by 40 CFR 136 (Code of Federal Regulations) lend credible doubt about any negative impact the effluent may have on Roaring Brook. The Town is conducting additional tests in 2008. These tests should provide a better assessment of the potential impact the effluent will have on Roaring Brook.

AMETHYST BROOK (SEGMENT MA34-35)
Location: Headwaters, confluence of Buffum and Harris brooks, Pelham, to the confluence with Adams River (forming the headwaters of Fort River), Amherst
Segment Length: 2.1 miles.
Classification: Class B.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Amherst DPW Water Div., Amherst (9P10600801, 10600802)

NPDES (Appendix H, Table H2)
Amherst Centennial Water Treatment Plant (MAG640046) [Note: discharge to Harris Brook just upstream of this segment.]

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 22 July 2003 DWM biologists conducted a habitat assessment of Amethyst Brook at Station B0514, near Allen Mill Road in Amherst. The within-reach habitat conditions observed at Amethyst Brook were quite good, scoring a 157 out of a possible 200 (Appendix C).

Biology
DWM conducted benthic macroinvertebrate sampling in Amethyst Brook at Station B0514, near Allen Mill Road in Amherst on 22 July 2003. The dominant taxon collected was *Leuctra* sp., a highly sensitive stonefly. Amethyst Brook was chosen to represent the reference condition for wadeable streams within the Connecticut River Basin.

MA DFG collected fish community data in Amethyst Brook at Site 951 in the Allen Mill Road conservation area in Amherst in 2003 (Richards 2006). A total of 86 fish were collected, representing 8 species, including: 62 blacknose dace, 7 white sucker, 6 common shiner, 4 slimy sculpin, 3 longnose dace, 2 brown trout, one brook trout, and one chain pickerel.

Amethyst Brook is assessed as support for the *Aquatic Life Use* based on the macroinvertebrate community, fish community, and habitat data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
MassDEP personnel observed the water quality at Amethyst Brook in South Hadley on July 22, 2003. The water was clear with no turbidity, odorless, and had no surface oils. No obvious sources of non-point source pollution were noted, although it was noted that many dogs are walked along the trails that parallel the brook.

The *Aesthetics Use* is assessed as support based on the lack of objectionable conditions. The *Primary* and *Secondary Contact Recreational* uses are not assessed due to the lack of recent bacteria data.

Amethyst Brook (Segment MA34-35) Use Summary Table

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

RECOMMENDATIONS

A high total residual chlorine limit listed in the Amherst Centennial Water Treatment NPDES permit warrants that monitoring should be conducted to investigate any negative impacts to biota in Amethyst Brook.

Conduct bacteria sampling to evaluate Primary and Secondary Contact Recreation uses.

FORT RIVER (SEGMENT MA34-27)
Location: Headwaters (confluence of Adams and Amethyst Brooks), Amherst, to the confluence with the Connecticut River, Hadley.
Segment Length: 12.8 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Amherst DPW Water Div. (9P10600801)
Belchertown Water District (9P10602401)
Hickory Ridge Country Club (10600803)
Hadley Water Department (9P210611701, 10611702)

NPDES (Appendix H, Table H2)
University of Massachusetts Coal Storage and Handling Facility (MA0032689)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data at the Fort River at Site 948 upstream from South Maple Street in Hadley in 2003 (Richards 2006). Only four fish species, and five total fish were collected. However, sampling efficiency was rated at 50% and comments indicated that the current was very swift and that section should be sampled with a barge instead of backpack electroshocking equipment. Two rock bass, 1 longnose dace, 1 fallfish, and 1 chain pickerel were collected.

Toxicity
Effluent
Whole effluent toxicity tests were conducted on the Coal Storage and Handling Facility treated effluent. Between August 2000 and April 2005, 16 valid tests were conducted using both *C. dubia* and *P. promelas*. The LC_{50}s were all $\geq$100% effluent (n=16).

Chemistry - water
DWM conducted water quality sampling at Route 47 in Hadley, Station 27B, on this segment of the Fort River between April and October 2003 (Appendix B and E). Most measurements were indicative of good water quality conditions. Total phosphorus concentrations were elevated and ranged from 0.029 to 0.160 mg/L (half of the measurements exceeded 0.05 mg/L). It should be noted that on 6 August, a wet weather sampling date, TSS was 46 mg/L and turbidity was 8.9 NTU.

The Fort River is assessed as support for the *Aquatic Life Use* based on the good water quality data. Total phosphorus concentrations were frequently elevated and are of concern, and result in an Alert Status for this use.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from the Fort River at Route 47 in Hadley (Station 27B) between April and November 2003 (Appendix B). The geometric mean of these samples was 254 cfu/100ml.

DWM personnel made field observations at Station 27B during surveys conducted between April and October 2003. No objectionable deposits or water odors were recorded. White foam was recorded on one occasion and water clarity was recorded as highly turbid on three occasions (MassDEP 2003).

The *Primary Contact Recreational Use* is assessed as impaired because of elevated *E. coli* bacteria counts. The *Secondary Contact Recreation and Aesthetics* uses are assessed as support based upon bacteria counts that are acceptable for secondary contact and the general lack of objectionable conditions. These uses are identified with an Alert Status due to high TSS concentrations and high turbidity documented during wet weather sampling.

Fort River (Segment MA34-27) Use Summary Table

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

* Alert Status, see details in use assessment

RECOMMENDATIONS

Investigate the origin and pattern of highly turbid conditions noted on several occasions.

Consider this segment for bacteria source tracking work to investigate sources of elevated bacteria counts.

EAST BRANCH MILL RIVER (SEGMENT MA34-37)
Location: Headwaters, confluence of Bradford Brook, Williamsburg, to confluence with the West Branch Mill River (forming the headwaters of the Mill River), Williamsburg
Segment Length: 2.8 miles.
Classification: Class B, Cold Water Fishery.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 23 October 2003 MassDEP DWM biologists conducted a habitat assessment of the East Branch Mill River along Mill Road in Williamsburg. The total habitat score for the East Branch Mill River was 166 out of a possible 200 (Appendix D). The streambanks within this reach were observed to be moderately unstable, with ~50% of the bank displaying signs of erosion. The Riparian Vegetative Zone Width was rated as "suboptimal" due to the proximity of lawns.

Biology
MA DFG collected fish community data on the East Branch Mill River at Site 1344 along Williamsburg Valley Road in Williamsburg in 2005 (Richards 2006). Four pollution intolerant fluvial specialist fish species were collected in this sample. A total of 190 individual fish were collected, including: 74 blacknose dace, 44 longnose dace, 28 slimy sculpin, 26 Atlantic salmon, 16 brook trout (multiple age classes), 1 brown trout, and 1 common shiner. The presence of slimy sculpin and brook trout are indicative of a cold water fishery.

DWM conducted fish population sampling in the East Branch Mill River just upstream from the confluence with the West Branch mill River along Mill Road in Williamsburg on 23 October 2003 (Appendix D). Electro-fishing efficiency was rated as "excellent". Eight fish species were collected. The 60 individual fish collected during this survey were almost equally divided between pollution tolerant and intolerant species. Multiple age classes of brook trout, a pollution intolerant species, were collected in this sample. The presence of slimy sculpin and brook trout are indicative of a cold water fishery.

Chemistry - water
DWM conducted water quality sampling at East Main Street, Station EBMR01, on this segment of the East Branch Mill River between April and October 2003 (Appendix B). All measurements were indicative of excellent water quality conditions.

This segment of the East Branch Mill River is assessed as support for the *Aquatic Life Use* based on fish community data and the excellent water quality.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from the East Branch Mill River at East Main Street Williamsburg between April and November 2003 (Appendix B). The geometric mean of these samples was 42 cfu/100ml.

DWM personnel made field observations at Station EBMR01 during surveys conducted between April and October 2003. No objectionable deposits, scums or water odors were recorded and water clarity was always noted as clear (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support due to the acceptable bacteria counts and the general lack of objectionable conditions.

East Branch Mill River (Segment MA34-37) Use Summary Table

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

RECOMMENDATIONS

Conduct water quality monitoring to evaluate designated uses.

WEST BRANCH MILL RIVER (SEGMENT MA34-38)
Location: East Street, Goshen, to the confluence of Meekin Brook, Williamsburg
Segment Length: 5.9 miles.
Classification: Class B, Cold Water Fishery.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data at the Village Hill Road crossing in this segment of the West Branch Mill River in Williamsburg in 2004 and 2005 (Richards 2006). Site 965, sampled in 2004, was dominated by fluvial specialist species. A total of 214 fish were collected, representing 8 species, including: 69 Atlantic salmon, 57 blacknose dace, 44 longnose dace, 17 slimy sculpin, 11 brook trout (multiple age classes), 7 fallfish, 7 brown bullhead, and 2 white sucker. Site 1260, sampled in 2005, was also dominated by fluvial specialist species. A total of 327 fish were collected, represented by 14 species, including: 71 blacknose dace, 51 Atlantic salmon, 50 slimy sculpin, 46 longnose dace, 42 common shiner, 19 golden shiner, 14 pumpkinseed, 8 brook trout (multiple age classes), 7 brown trout (multiple age classes), 7 creek chubsucker, 5 brown bullhead, 4 bluegill, 2 white sucker, and 1 creek chub.

This segment of the West Branch Mill River is assessed as support for the *Aquatic Life Use* based on the diverse cold water fish community.

West Branch Mill River (Segment MA34-38) Use Summary Table

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

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

WEST BRANCH MILL RIVER (SEGMENT MA34-39)
Location: From the confluence of Meekin Brook, Williamsburg, to the confluence with the East Branch Mill River (forming the headwaters of the Mill River), Williamsburg
Segment Length: 0.6 miles.
Classification: Class B.

This is a new segment, and therefore it does not appear on the 2006 Integrated List.

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 23 October 2003 MassDEP DWM biologists conducted a habitat assessment of West Branch Mill River at the end of Mill Road in Williamsburg. The total habitat score was 162 out of a possible 200 (Appendix D).

Biology
DWM conducted fish population sampling in the West Branch Mill River at the end of Mill Road in Williamsburg on 23 October 2003 (Appendix D). Electro-fishing efficiency was rated as "excellent." A total of 31 fish were collected, including 6 fish species. Included in the sample were eight Atlantic salmon and one brook trout. The sample was comprised of fluvial specialist and dependent species, and three were pollution intolerant cold water species.

Chemistry – water
DWM conducted water quality sampling at Mill Street in Williamsburg, Station WBMR01, on this segment of the West Branch Mill River between April and October 2003 (Appendix B). All measurements were indicative of good water quality conditions.

This segment of the West Branch Mill River is assessed as support for the Aquatic Life Use based on the fish community and the good water quality conditions.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples at Mill Street in Williamsburg, Station WBMR01, on this segment of the West Branch Mill River between April and October 2003 (Appendix B). The geometric mean of these samples was 75 cfu/100ml.

DWM personnel made field observations at Station WBMR01 during surveys conducted between April and October 2003. No objectionable deposits, scums or water odors were recorded and water clarity was always noted as clear (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support due to the acceptable bacteria counts and the general lack of objectionable conditions.

West Branch Mill River (Segment MA34-39) Use Summary Table

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

MILL RIVER-NORTHAMPTON (SEGMENT MA34-28)
Location: Headwaters (confluence of East and West Branch Mill River), Williamsburg, to the inlet of Paradise Pond, Northampton.
Segment Length: 10.0 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

[Note: The section downstream from Paradise Pond, in the Mill River Diversion, is Segment MA34-32]

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Williamsburg Water Department (10634001)
Northampton Department Of Public Works (9P210621401, 10621401)

NPDES (Appendix H, Table H2)
Techalloy-Northampton (MA0004235) EPA list indicates permit terminated in August 2002.
Berkshire Electric Cable Co. (MA0032832)
Raytor Compounds Inc. (formerly Perstorp Compounds, Inc.) (MAG250960)
Pro Corporation – PMC of Florence (MAG250741)

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 23 July 2003 MassDEP DWM biologists conducted a habitat assessment of Mill River – Northampton about 300 meters upstream from USGS Gage 01171500 in Northampton (Station B0509). The overall habitat score was 149 out of a possible 200, with channel alteration and bank vegetative protection limiting the habitat score the most (Appendix C).

The USGS maintains a gage on the Mill River in Northampton, MA (Gage 01171500). The average annual discharge at this gage is 105.6 cfs (period of record 2000 to 2005). The maximum discharge at this gage occurred on 19 August 1955 (6,300 cfs). The minimum discharge occurred on 1 October 1950 (2.2 cfs)(period of record October 1938 to 2004) (Socolow et al. 2004).

Biology
DWM conducted benthic macroinvertebrate sampling in the Mill River- Northampton at Station B0509, upstream from USGS Gage 01171500 in Northampton on 23 July 2003. The Total Metric Score was 81% comparable to the reference condition, resulting in an assessment of "slightly impacted" (Appendix C).

MA DFG collected fish community data on the Mill River – Northampton at two sites (Richards 2006). Site 814 was sampled at Main Street in Northampton in 2002, while Site 941 was sampled at the Look Park picnic area in 2003. The fish community at Site 814 was dominated by fish species tolerant or moderately tolerant of pollution, although two species intolerant to pollution were present in very low numbers. A total of 342 fish were collected at Site 814, including: 146 common shiner, 100 blacknose dace, 37 longnose dace, 28 tesselated darter, 21 white sucker, 4 brown trout, 3 creek chub, 2 pumpkinseed, and 1 Atlantic salmon. The fish community at Site 941 was also dominated by fish species tolerant or moderately tolerant of pollution, although only one individual brown trout was collected that is considered pollution intolerant. A total of 249 fish were collected at Site 941, including: 187 blacknose dace, 44 longnose dace, 12 common shiner, 4 white sucker, 1 brown trout, and 1 brown bullhead.

Toxicity
Ambient
The Berkshire Electric Cable Co. staff collected water from the Mill River for use as dilution water in the facility's whole effluent toxicity tests. Survival of both *C. dubia* and *P. promelas* exposed (7-day) to the river water was >80% (n=1).

Effluent
One modified acute and chronic whole effluent toxicity test was conducted on the Berkshire Electric Cable Co. treated effluent in June 2004. The effluent did not exhibit any acute or chronic toxicity to either *C. dubia* or *P. promelas.*

Chemistry - water
DWM conducted water quality sampling one mile downstream from Clement Street, Station 28B, on this segment of the Mill River- Northampton between April and October 2003 (Appendix B). All measurements were indicative of good water quality conditions.

USGS collected water quality data on the Mill River in Northampton in the vicinity of Clement Street at USGS Gage # 01171500. These data were reported within an upper Connecticut River Basin total nitrogen report (Deacon et al 2006). Water quality parameters were measured monthly at this station on 43 occasions between December 2002 and September 2005. Summary statistics provided for this station showed that the minimum DO measurement collected at this location was 7.7 mg/L. The maximum water temperature reported was 22.6 deg C. TSS was generally low with a maximum of 17 mg/L. The maximum ammonia was 0.022 mg/L, though the median ammonia level was <0.005 mg/L. The mean and median pH was 7.2, though a minimum of 6.3 was reported.

This segment of the Mill River - Northampton is assessed as support for the *Aquatic Life Use* based on the benthic and fish communities, and the good water quality data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from the Mill River - Northampton one mile downstream from Clement Street (Station 02A) between April and November 2003 (Appendix B). The geometric mean of these samples was 133 cfu/100ml.

MassDEP biologists observed the water quality at the Mill River – Northampton monitoring station (B0509) on 23 July 2003. The water was clear, slightly turbid (likely due to heavy rain in the past 24 hours), odorless, and without any surface oils. This area is heavily used by dog-walkers (Appendix C).

DWM personnel made field observations at Station 28B during surveys conducted between April and October 2003. No objectionable deposits, scums or water odors were recorded and water clarity was generally noted as clear or slightly turbid (MassDEP 2003).

The *Primary Contact Recreational Use* is assessed as impaired because of elevated *E. coli* bacteria counts, noted particularly during wet weather. The *Secondary Contact Recreation and Aesthetics* uses are assessed as support based upon bacteria counts that are acceptable for secondary contact and the lack of objectionable conditions.

Mill River-Northampton (Segment MA34-28) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Elevated *E. coli* bacteria Source: Unknown
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

RECOMMENDATIONS

Conduct bacteria source tracking to determine the source(s) of elevated bacteria levels within this segment.

MILL RIVER DIVERSION (SEGMENT MA34-32)
Location: Headwaters, outlet Paradise Pond, Northampton, to the confluence with the Oxbow (east of Old Springfield Road), Northampton.
Segment Length: 2.5 miles.
Classification: Class B.

Hulberts Pond (MA34036) will no longer be reported on as an approximately 25 acre lake segment, it will be considered a run of the river impoundment (McVoy 2006). This decision is based on best professional judgement after review of the 2005 Mass GIS orthographic images of the area. Hulberts Pond is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to flow alteration (MassDEP 2007).

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

In Northampton the Mill River enters Paradise Pond and follows one of two paths. The interrupted/underground route (identified as the Mill River) appears on the eastern side of the railroad tracks and crosses under Route 5 and Route 91, ultimately discharging into the Connecticut River mainstem at the northern edge of the Oxbow. This interrupted section of the Mill River is currently not assessed in this report. The primary channel, the Mill River Diversion (MA34-32), flows generally south out of the Paradise Pond dam, crossing under Route 66 and Route 10 and flowing into Hulberts Pond. This pond then enters the western edge of the Oxbow.

USE ASSESSMENT
No recent data are available for the Mill River Diversion, thus all uses are not assessed.

Mill River Diversion (Segment MA34-32) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

MANHAN RIVER (SEGMENT MA34-10)
Location: Headwaters, (northeast of Norwich Pond) Huntington, to inlet Tighe Carmody Reservoir, Southampton.
Segment Length: 6.6 miles.
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

White Reservoir (MA34100) will no longer be reported on as a lake segment since the 1998 synoptic survey conducted by DWM indicated the lake had been "drawn down" and the 2005 Mass GIS orthographic images also confirm the lack of water in this formerly 89-acre public water supply. It will be considered a run of the river impoundment (McVoy 2006). White Reservoir, now part of this segment of the Manhan River, is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to flow alteration (MassDEP 2007).

USE ASSESSMENT
No recent data are available for this segment of the Manhan River, thus all uses are not assessed.

Manhan River (Segment MA34-10) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality and biological monitoring to evaluate designated uses.

BRICKYARD BROOK (SEGMENT MA34-13)
Location: Headwaters, Westfield, to confluence with Manhan River, Westfield.
Segment Length: 1.6 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Brickyard Brook, thus all uses are not assessed.

Brickyard Brook (Segment MA34-13) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

MOOSE BROOK (SEGMENT MA34-17)
Location: Headwaters, Westfield, to confluence with Manhan River, Southampton.
Segment Length: 2.6 miles.
Classification: Class B, Cold Water Fishery.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Southampton Country Club (10627602)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data at Moose Brook upstream from the Moose Brook Road crossing (Site 744) in Southampton in 2002 (Richards 2006). The sample was comprised solely of pollution intolerant fluvial specialist species. A total of 92 fish were collected at this station, including: 55 slimy sculpin, 26 brown trout (multiple age classes) and 16 brook trout (multiple age classes).

Moose Brook is assessed as support for the *Aquatic Life Use* based on the fish community data.

Moose Brook (Segment MA34-17) Use Summary Table

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

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

POTASH BROOK (SEGMENT MA34-12)
Location: Headwaters, Southampton, to confluence with Manhan River, Southampton.
Segment Length: 1.0 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Potash brook, thus all uses are not assessed.

Potash Brook (Segment MA34-12) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

TRIPPLE BROOK (SEGMENT MA34-16)
Location: Headwaters, Southampton, to confluence with Manhan River, Southampton.
Segment Length: 1.0 miles.
Classification: Class B, Cold Water Fishery.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
Biology
MA DFG collected fish community data at Tripple Brook upstream from East Street (Site 810) in Southampton in 2002 (Richards 2006). The sample was dominated by brook trout, a pollution intolerant fluvial specialist species. A total of 74 fish were collected at this station, including: 43 brook trout (multiple age classes) and 31 blacknose dace. Although this station is located in the headwaters of Tripple Brook, just upstream from the upper end of this 1.0 mile segment, the fish community was determined to be representative of the cold water conditions within this segment.

Tripple Brook is assessed as support for the *Aquatic Life Use* based on the fish community data.

Tripple Brook (Segment MA34-16) Use Summary Table

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

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

BROAD BROOK (SEGMENT MA34-18)
Location: Headwaters, Holyoke, to inlet Nashawannuck Pond, Easthampton.
Segment Length: 9.3 miles.
Classification: Class B, Cold Water Fishery.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

Baystate Environmental Consultants, Inc., in an "Assessment of Stormwater Management Systems" report for the City of Easthampton, identified one stormwater outfall close to Broad Brook in Easthampton that was considered priority level two due to the presence of detergents and elevated nitrite concentrations or elevated levels of ammonia-nitrogen. Additional follow up was recommended for the priority level two outfalls (Baystate 2004).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Holyoke Water Works (10613711)
Easthampton Water Department (9P210608701, 10608701)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Broad Brook at Site 958 at Hendrick Street Easthampton in 2003 (Richards 2006). Brook trout, a pollution intolerant fluvial specialist species, was the dominant fish observed. Seventy- two fish were collected in total, including: 43 brook trout (multiple age classes), 13 slimy sculpin, 9 bluegill, 3 pumpkinseed, 2 blacknose dace, 1 creek chub, and 1 white sucker.

Broad Brook is assessed as support for the *Aquatic Life Use* based on the fish community data.

Broad Brook (Segment MA34-18) Use Summary Table

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

RECOMMENDATIONS
Evaluate whether the presence of stormwater outfalls noted by Baystate within this segment may be candidates for monitoring by the bacteria source tracking team.

Conduct water quality monitoring to evaluate designated uses.

WHITE BROOK (SEGMENT MA34-14)
Location: Headwaters, Westfield, to inlet Nashawannuck Pond, Easthampton.
Segment Length: 1.8 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for White Brook, thus all uses are not assessed.

White Brook (Segment MA34-14) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

WILTON BROOK (SEGMENT MA34-15)
Location: Headwaters, Easthampton, to outlet Rubber Thread Pond, Easthampton.
Segment Length: 1.1 miles.
Classification: Class B, Warm Water Fishery.

Rubber Thread Pond (MA34105) will no longer be reported on as an approximately three acre lake segment. It will be considered a run of the river impoundment (McVoy 2006). This decision is based on review of depth and detention time data. Rubber Thread Pond, now part of this segment of Wilton Brook, is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants (MassDEP 2007). The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Rubber Thread Pond (Boettner 2007).

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

Baystate Environmental Consultants, Inc., in an "Assessment of Stormwater Management Systems" report for the City of Easthampton, identified two stormwater outfalls close to Wilton Brook in Easthampton that were considered priority level two due to the presence of detergents and elevated nitrite concentrations or elevated levels of ammonia-nitrogen. Additional follow up was recommended for the priority level two outfalls (Baystate 2004).

WITHDRAWALS AND DISCHARGES
NPDES (Appendix H, Table H2)
JPS Elastomerics (MA0001503)

USE ASSESSMENT
AQUATIC LIFE
Biology
The non-native aquatic macrophyte, *Trapa natans*, is present in Rubber Thread Pond (Boettner 2007).

Toxicity
Effluent
No acute or chronic whole effluent toxicity to *C. dubia* was detected in the three tests conducted between January 2006 and September 2007 on the JPS Elastomerics Company effluent.

The *Aquatic Life Use* is not assessed for the upper 0.7 miles of this segment. The lower 0.4 miles of this segment is assessed as impaired based on the presence of a non-native species.

Wilton Brook (Segment MA34-15) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED Upper 0.7 miles IMPAIRED Lower 0.4 miles Cause: Non-native aquatic macrophyte infestation Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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 users to the problem and their responsibility to prevent spreading these species.

Evaluate whether the presence of stormwater outfalls noted by Baystate within this segment may be candidates for monitoring by the bacteria source tracking team.

Conduct water quality monitoring to evaluate designated uses.

MANHAN RIVER (SEGMENT MA34-11)
Location: outlet Tighe Carmody Reservoir, Southampton, to confluence with Connecticut River, Easthampton.
Segment Length: 19.2 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Easthampton Water Department (9P210608701, 10608701)
Holyoke Water Works (10613711)
Southampton Water Department (9P210627601, 10627601)

NPDES (Appendix H, Table H2)
Easthampton WWTF (MA0101478)

USE ASSESSMENT
AQUATIC LIFE
Habitat
Currently, the Manhan Dam on the Manhan River in Easthampton blocks the upstream migration of anadromous fish. A project is underway to construct a fish ladder at the Manhan dam to enable anadromous fish to access spawning and nursery habitat upstream from the dam (USACOE 2007).

Biology
MA DFG collected fish community data at two sites on the Manhan River in Southampton in 2002 (Richards 2006). Site 784 was located upstream from Russelville/Manhan Roads, and Site 785 was located downstream from the Tripple Brook confluence. The fish community at Site 784 was dominated by fluvial specialist/dependant species that are tolerant or moderately tolerant to pollution. Twelve species were collected, including: 141 blacknose dace, 131 common shiner, 62 white sucker, 9 creek chub, 8 bluegill, 7 slimy sculpin, 6 brown trout (multiple age classes), 4 smallmouth bass, 3 golden shiner, 2 longnose dace, 1 fallfish, and 1 tessellated darter. The fish community at Site 785 was also dominated by fluvial specialist/dependant species that are tolerant or moderately tolerant to pollution. Eleven species were collected, including: 118 fallfish, 110 blacknose dace, 54 white sucker, 21 tessellated darter, 14 sea lamprey, 7 common shiner, 3 brook trout, 2 brown trout, 1 bluegill, 1 creek chub, and 1 redfin pickerel.

Chemistry - water
DWM conducted water quality sampling at two stations on this segment of the Manhan River between April and October 2003. Station 11A was located at Loudville Road in Easthampton, while Station 11C was located at Fort Hill Road in Easthampton (Appendix B and E). Water quality measurements at both stations generally met standards. Total phosphorus levels were slightly elevated at both stations, with a range of 0.018 to 0.061 mg/L observed at Station 11A and a range of 0.027 to 0.099 mg/L observed at 11C.

This segment of the Manhan River is assessed as support for the *Aquatic Life Use* based on the fish community and water quality data. Total phosphorus levels at the downstream station are high enough to be of concern, resulting in Alert Status for this use.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples at stations 11A and 11C on this segment of the Manhan River between April and November 2003 (Appendix B). The geometric mean of the samples collected at Station 11A was 99 cfu/100ml. The geometric mean of the samples collected at Station 11C was 157 cfu/100ml.

Baystate Environmental Consultants, Inc., in an "Assessment of Stormwater Management Systems" report for the City of Easthampton, identified two stormwater outfalls close to the Manhan River (in between the two DWM water quality stations) in Easthampton that were considered priority level one due

to the presence of detergents and the presence of elevated levels of ammonia or nitrite-nitrogen. Additional follow up was recommended for the priority level one outfalls (Baystate 2004).

DWM personnel made field observations at Station 11A and 11C during surveys conducted between April and October 2003. Station 11A was free from odors and scum during all visits, though trash was noted to be present on two surveys. The water clarity was recorded as highly turbid on one occasion (MassDEP 2003). Station 11C was free from odors during all visits, though trash was noted to be present on one survey and white foam was noted during another survey. Water clarity was reported as appearing highly turbid on two occasions, otherwise it was generally reported as clear (MassDEP 2003).

The upper 13.0 miles of this segment (upstream from Station 11A at Loudville Road in Easthampton) support the *Primary Contact Recreational Use.* However, the *Primary Contact Recreational Use* is assessed as impaired for the lower 6.2 miles (downstream from Station 11A) because of elevated *E. coli* bacteria counts. The *Secondary Contact Recreation and Aesthetics* uses are assessed as support based upon bacteria counts that are acceptable for secondary contact and the lack of objectionable conditions.

Manhan River (Segment MA34-11) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		NOT ASSESSED
Primary Contact		SUPPORT upper 13.0 miles IMPAIRED lower 6.2 miles Cause: Elevated *E. coli* bacteria Source: Unknown
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

* Alert Status, see details in use assessment

RECOMMENDATIONS

According to the permit issued in September 2007, the City of Easthampton will be required to conduct whole effluent toxicity tests on their secondary Outfall #002 to the Manhan River. Review these tests results when they are available.

Bacteria monitoring should be conducted to assess the *Primary* and *Secondary Contact Recreation* uses in the upper and lower sections of this segment. Bacteria monitoring in the lower section could show reduced bacteria counts since the Easthampton Water Department's NPDES permit was reissued in 2007. Additionally, evaluate whether the presence of stormwater outfalls noted by Baystate within this segment may be candidates for monitoring by the bacteria source tracking team.

LAMPSON BROOK (SEGMENT MA34-06)
Location: Belchertown WWTP, Belchertown, to confluence with Weston Brook, Belchertown.
Segment Length: 1.2 miles.
Classification: Class B Warm Water Fishery.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of unionized ammonia, nutrients and organic enrichment/low DO (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
NPDES (Appendix H, Table H2)
Belchertown Department of Public Works Water Reclamation Facility (MA0102148)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Lampson Brook at George Hannum Road at Site 786 in Belchertown in 2002 (Richards 2006). Blacknose dace, a pollution tolerant fluvial specialist species, dominated the sample. A total of 281 fish were collected, representing 4 species, including: 257 blacknose dace, 17 white sucker, 5 brook trout, and 2 pumpkinseed.

Toxicity
Ambient
The Belchertown Water Reclamation Facility staff collected water from the Lampson Brook approximately 100 yards above the outfall, before the culvert on George Hannum Street, for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and August 2007, survival of *C. dubia* exposed (approximately 7 days) to the Lampson Brook water was > 80% (n=32). Hardness ranged from 56 to 106 mg/L (n=32).

Effluent
Whole effluent toxicity tests have been conducted on the Belchertown Water Reclamation Facility treated effluent. Between August 2000 and August 2007, 32 modified acute and chronic tests were conducted using *C. dubia*. The LC_{50}s using *C. dubia* were all >100% effluent (n=32). The CNOEC results ranged from 25 to 100%, and were less than 94% in six tests (February and November 2001, November 2004, November 2005 and January and February 2006). It should be noted that the facility has been meeting the CNOEC permit limit since May 2006.

Chemistry – water
DWM conducted water quality sampling at George Hannum Street, approximately 50 feet downstream from the Belchertown WWTP in Belchertown (Station 06A) on this segment of Lampson Brook between April and October 2003 (Appendix B). Most water quality parameters were indicative of good water quality conditions. However, all total phosphorus concentrations were very high, ranging from 0.07 to 0.37 mg/L.

This segment of Lampson Brook is assessed as support for the *Aquatic Life Use* based on the generally good water quality conditions and the fish community data. However, due to the elevated phosphorus concentrations, this use is identified with an Alert Status.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from Lampson Brook at George Hannum Street in Belchertown between April and November 2003 (Appendix B). The geometric mean of these samples was 33 cfu/100ml.

DWM personnel made field observations at Station 06A during surveys conducted between April and October 2003. This station was free from objectionable deposits during all visits, and the water clarity was generally clear or sometimes slightly turbid. White foam was noted on the water surface on four occasions, and a septic odor was noted on two occasions (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support due to the acceptable bacteria counts and the general lack of objectionable conditions.

Lampson Brook (Segment MA34-06) Use Summary Table

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

* Alert Status, see details in use assessment

RECOMMENDATIONS

Continue water quality monitoring downstream of the WWTP discharge to confirm the improved water quality data observed in 2003 and to monitor total phosphorus concentrations. Use deployed dissolved oxygen probes to record the dissolved oxygen levels over a period of days to confirm that it is not an impairment.

Investigate whether the CNOEC's observed in several years in the month of November are representative of a recurrent problem that occurs during that time of year.

WESTON BROOK (SEGMENT MA34-23)
Location: Headwaters, Belchertown, to inlet Forge Pond, Granby.
Segment Length: 2.7 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of unionized ammonia, nutrients, organic enrichment/low DO and pathogens (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Weston Brook at Site 750 at the corner of Eskett and Boardman Streets in Belchertown in 2002 (Richards 2006). The community was dominated by species that are tolerant or moderately tolerant of pollution. A total of 253 fish were collected, representing 7 species, including: 114 white sucker, 86 pumpkinseed, 21 bluegill, 13 fallfish, 9 brook trout, 8 blacknose dace, and 2 brown bullhead.

Chemistry - water
DWM conducted water quality sampling at Rural Street in Belchertown (Station 23A) on this segment of Weston Brook between April and October 2003 (Appendix B). Most parameters measured were indicative of good water quality conditions, with the exception of total phosphorus. Phosphorus concentrations were elevated, though they were generally lower than concentrations measured upstream in Lampson Brook.

This segment of Weston Brook is assessed as support for the *Aquatic Life Use* based on the water quality conditions and the fish community data. Due to the elevated phosphorus concentrations this use is identified with an Alert Status.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
DWM collected *E. coli* samples from Weston Brook at Rural Street in Belchertown (Station 23A) between April and November 2003 (Appendix B). The geometric mean of these samples was 46 cfu/100ml.

DWM personnel made field observations at Station 23A during surveys conducted between April and October 2003. Station CT06 was free from water odors during all visits, and the water clarity was recorded as clear except for one visit where it was slightly turbid. White foam was often observed at this station, and some trash was noted in the water on two occasions (MassDEP 2003).

Weston Brook (Segment MA34-23) Use Summary Table

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

*Alert Status, see details in use assessment

RECOMMENDATIONS

Continue water quality monitoring in this segment to confirm the improved water quality data observed in 2003 and to monitor total phosphorus concentrations. Use deployed dissolved oxygen probes to record the dissolved oxygen levels over a period of days to confirm that it is not an impairment.

BACHELOR BROOK (SEGMENT MA34-07)
Location: Outlet Forge Pond, Granby, to confluence with Connecticut River, South Hadley.
Segment Length: 11.6 miles.
Classification: Class B, Warm Water Fishery.

Aldrich Lake [East Basin] (MA34002) and Aldrich Lake [West Basin] (MA34106) will no longer be reported on as approximately 20-acre and 12-acre lake segments, respectively, they will be considered run of the river impoundments (McVoy 2006). Both lakes are now assessed as part of Bachelor Brook, Segment 34-07. The retention time of these waterbodies was estimated at approximately 3 days for Aldrich Lake [East Basin] and less than 1 day for Aldrich Lake [West Basin]. The retention time estimates were based on the annual historical mean discharge from two stream gages (01171300 and 01181000) and the normal storage volume of the dams reported by MA DCR in their Massachusetts Dam Safety Program Database (Socolow *et al*. 1996, 2004 and MA DCR 2002).

Aldrich Lake East (formerly SEGMENT MA34002) is on the 2006 Integrated List of Waters in "Category 4a"-*TMDL is Completed* due to noxious aquatic plants (MassDEP 2007). The TMDL of phosphorus for selected Connecticut basin lakes states that phosphorus loads in Aldrich Lake East should be reduced from the current estimate loading of 1760 kg/year to a target load of 1342 kg/year (24% reduction) (MassDEP 2001). The proposed total phosphorus site- specific criteria for this water body is 0.030 mg/L (MassDEP 2006a).

Aldrich Lake West (formerly SEGMENT MA34106) is on the 2006 Integrated List of Waters in "Category 4a"- *TMDL is Completed* due to noxious aquatic plants (MassDEP 2007). The TMDL of phosphorus for selected Connecticut basin lakes states that phosphorus loads in Aldrich Lake West should be reduced from the current estimate loading of 1786 kg/year to a target load of 1393 kg/year (22% reduction) (MassDEP 2001). The proposed total phosphorus site- specific criteria for this water body is 0.030 mg/L (MassDEP 2006a).

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

Site specific criteria for copper (0.0257 and 0.0181 mg/L, acute and chronic, respectively) have been adopted into the Massachusetts Surface Water Quality Standards for this waterbody (MassDEP 2006a).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
South Hadley Fire District 2 Water Dept. (10627502)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data at Bachelor Brook upstream from Route 116 in South Hadley at Site 754 in August 2002 (Richards 2006). The fish community was comprised of fish tolerant or moderately tolerant to pollution, and four species are considered fluvial specialist/dependent. A total of 47 fish were collected, represented by 6 species, including: 30 tessellated darter, 4 common shiner, 4 white sucker, 3 longnose dace, 3 yellow bullhead, and 3 American eel.

Chemistry - water
DWM conducted water quality sampling at Hadley Street in South Hadley, Station 07A, on this segment of Bachelor Brook between April and October 2003 (Appendix B and E). Measurements were generally indicative of good water quality conditions. Total phosphorus concentrations were slightly elevated.

Bachelor Brook is assessed as support for the *Aquatic Life Use* based on the water quality data and the fish community data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

DWM collected *E. coli* samples from Bachelor Brook at Hadley Street in South Hadley (Station 07A) between April and November 2003 (Appendix B). The geometric mean of these samples was 51 cfu/100ml.

DWM personnel made field observations at Station 07A during surveys conducted between April and October 2003. A "musty basement" water odor was noted during one visit to this station, and trash along the bank was noted on another occasion. The water clarity was recorded as highly turbid on two occasions, and it was most often described as slightly turbid (MassDEP 2003).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as support due to the acceptable bacteria counts and the general lack of objectionable conditions.

Bachelor Brook (Segment MA34-07) Use Summary Table

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

RECOMMENDATIONS

Due to the presence of *Trapa natans* in Forge Pond (MA34024), this water body should be monitored for possible infestations in the future.

STONY BROOK (SEGMENT MA34-19)
Location: Headwaters, Granby, to confluence with Connecticut River, South Hadley.
Segment Length: 13.3 miles.
Classification: Class B, combined sewer overflow (Note: due to the elimination of the sole CSO discharge to this segment, the CSO designation should be removed from this segment during the next update of the water quality standards).

Upper Pond (MA340950) and Lower Pond (MA34049) will no longer be reported on as approximately 10-acre and 5-acre lake segments, respectively, since the retention time of these waterbodies was estimated at less than 1 day. They will be considered run of the river impoundments and assessed as part of this segment of Stony Brook (McVoy 2006). The retention time estimates were based on the annual historical mean discharge from two stream gages (01171300 and 01181000) and the normal storage volume of the dams reported by MA DCR in their Massachusetts Dam Safety Program Database (Socolow *et al*. 1996, 2004 and MA DCR 2002). Lower Pond is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants and exotic species (MassDEP 2007). Upper Pond is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to the presence of exotic (non-native) species (MassDEP 2007).

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Westover Municipal Golf Course (9P2010616101)

NPDES (Appendix H, Table H2)
Town of South Hadley Wastewater Treatment Plant (MA0100455). This CSO was eliminated in September of 2007 (Boisjolie 2007).

USE ASSESSMENT
AQUATIC LIFE
Habitat/Flow
On 22 July 2003 MassDEP DWM biologists conducted a habitat assessment of Stony Brook downstream from Route 116 in South Hadley (Station B0507). The overall habitat score was 160 out of a possible 200, (Appendix C). Habitat was most limited by in-stream cover for fish due to the lack of pools and refugia.

DWM fisheries biologists also conducted a habitat assessment of Stony Brook downstream of Route 116 on 23 October 2003. The overall habitat score was 151 out of a possible 200 (Appendix D).

Biology
A non-native species (*Trapa natans*) was observed in Upper Pond during the 1998 synoptic surveys (MassDEP 1998). The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in both Upper and Lower Ponds (Boettner 2007).

DWM conducted benthic macroinvertebrate sampling in Stony Brook at Station B0507, downstream from Route 116 in South Hadley on 22 July 2003 (Appendix C). Stony Brook was scored as 76% comparable to the reference station, Amethyst Brook, resulting in an assessment of "slightly impacted". The elevated biotic index score may indicate that the benthic community is dominated by species tolerant of organic pollution. The low species diversity at this station points towards a community with somewhat reduced health and function.

MA DFG collected fish community data in Stony Brook downstream of Route 116 at Station 758 in 2002 (Richards 2006). The fish community was comprised of fish species tolerant or moderately tolerant to pollution. A total of 113 fish were collected, represented by 12 species, including: 29 fallfish, 24 longnose dace, 15 white sucker, 14 bluegill, 11 smallmouth bass, 8 American eel, 4 tessellated darter, 2 brown bullhead, 2 largemouth bass, 2 rock bass, 1 chain pickerel, and 1 redbreast sunfish.

DWM conducted fish population sampling in Stony Brook at the same location as MA DFG (downstream of Route 116) on 23 October 2003 (Appendix D). Although electro-fishing efficiency was rated as "good", it is possible that some fish escaped capture due to the width of the stream. The total number of fish collected was lower than the MA DFG sample from 2002 (n = 20) although 11 species were captured. The fish community was comprised of fish species tolerant or moderately tolerant to pollution, although one pollution intolerant species, Atlantic salmon, was present in this sample (n =2).

Chemistry – water

DWM conducted water quality sampling at Route 116 in South Hadley, Station 19A, on this segment of Stony Brook between April and October 2003 (Appendix B). Measurements were generally indicative of good water quality conditions, although total phosphorus was slightly elevated. Total phosphorus concentrations ranged from 0.019 to 0.079 mg/L.

Stony Brook is assessed as support for the *Aquatic Life Use* based on benthic macroinvertebrate community, the water quality data, and the fish community. The downstream location from which these data were collected likely integrates the sum of the water quality influences along this lengthy segment, and allows the entire segment to be assessed as a whole for the *Aquatic Life Use*. However, this use is identified with an Alert Status because of low diversity within the benthic community, the elevated total phosphorus concentrations, and the pollution tolerance of the fish community. The *Aquatic Life Use* is assessed as impaired for the 0.5-mile length of this segment that runs through Upper and Lower Ponds because of the *T. natans* infestation.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

DWM collected *E. coli* samples from Stony Brook in South Hadley (Station 19A) between April and November 2003 (Appendix B). The geometric mean of these samples was 290 cfu/100ml.

DWM personnel made field observations at Station 19A during surveys conducted between April and October 2003. This station was free from odors and objectionable deposits during all visits, although the water clarity was recorded as highly turbid on four occasions. White foam on the water surface was commonly noted at this station (MassDEP 2003).

MassDEP personnel observed the water quality at Stony Brook in South Hadley on July 23, 2003. The water was tan and grey in color, slightly turbid, had a musty basement odor almost like sewage, and was without any surface oils. In-stream deposits of garbage were noted, including tires (Appendix C).

The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as impaired for the lower 3.5 miles of this segment, downstream of the outlet of Lower Pond, based upon the chronic highly turbid conditions documented during water quality surveys and presence of garbage and tires. The *Primary Contact Recreational Use* in this lower section is also impaired because of elevated *E. coli* bacteria counts. The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are not assessed for the upper 9.8 miles of this segment upstream from the outlet of Lower Pond due to a lack of available data.

Stony Brook (Segment MA34-19) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT* 12.8 miles IMPAIRED 0.5 mile length through Upper and Lower Ponds Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED upper 9.8 miles IMPAIRED lower 3.5 miles Cause: Objectionable turbidity and elevated *E. coli* bacteria Source: Unknown
Secondary Contact		NOT ASSESSED upper 9.8 miles IMPAIRED lower 3.5 miles Cause: Objectionable turbidity Source: Unknown
Aesthetics		NOT ASSESSED upper 9.8 miles IMPAIRED lower 3.5 miles Cause: Objectionable turbidity Source: Unknown

* Alert Status, see details in use assessment

RECOMMENDATIONS

Evaluate whether this segment is a candidate for bacteria source tracking efforts to identify sources of bacteria contamination in this subwatershed.

Conduct further monitoring in the upper 9.8 mile portion of this segment in order to assess its designated uses.

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.

Due to the elimination of the sole CSO discharge to this segment, the CSO designation attached to this segment should be removed during the next update of the water quality standards.

CONNECTICUT RIVER (SEGMENT MA34-05)
Location: Holyoke Dam, Holyoke/South Hadley, to Connecticut state line, Longmeadow/Agawam.
Segment Length: 15.9 miles.
Classification: Class B, warm water fishery, combined sewer overflow.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics, pathogens and suspended solids (MassDEP 2007).

At the upper end of this segment, some flow from the Connecticut River is diverted into the Holyoke Hydroelectric Project three level canal system. This canal system is utilized to generate power (see FERC summary), and receives wastewater from several permittees (see NPDES wastewater discharge summary). Water quality conditions in the canal system itself are not assessed in this report.

The Gas Works in Holyoke manufactured combustible gas from coal and oil for residential, commercial, and industrial heating and lighting from 1852 to 1951. The former Gas Works once occupied a 2-acre peninsula on the Connecticut River 1500 feet downstream from the Holyoke Dam. Historic operations resulted in large releases of tar and oil to soil, groundwater, sediment, and surface water (Appendix I). Hard and soft tar patches found in the river contain high concentrations of polynuclear aromatic hydrocarbons (PAH), which are known to cause reproductive and teratogencic effects in a range of fish species (Kocan 1993). Federally endangered Shortnose sturgeon (*Acipenser brevirostrum*) and two state protected mussel species are known to use the habitat affected by the coal tar deposits. Remediation of coal tar patches was carried out between 2002 and 2006, but as many as 30 additional acres of tar may be present (Jones 2007). Additional information concerning this topic is provided in Appendix I.

Since 2002 the following projects on the Connecticut River have been completed, eliminating a total of 459 million gallons of CSO discharge per year (Boisjolie 2007)
Holyoke
1. Holyoke-CSO #21 - Green Brook Separation. This project reduced annual CSO discharge by approximately 30 MG/yr (from 58MG/yr to 28 MG/yr). It was completed late in 2001/early 2002.
2. CSO #014- Mosher Street Sewer Separation. This project eliminated CSO #014 (approximately 31 MG/yr). It was completed in 2005.
3. CSO #09- Berkshire Street CSO Screening and Disinfection Facility This was the largest CSO discharge to the Connecticut River (estimated 290 MG/yr). It was completed in October 2007.

Chicopee
1. CSO #09 -Paderewski Street. This project reduced CSO discharge by 5 MG/yr. It was completed late in 2006.
2. WWTP Bypass Disinfection Facility. This was located at the same location as the Chicopee Wastewater Treatment Plant. This project was completed in mid-2006 (43 MG/yr).

Springfield
1. Mill River project. This project was completed in December 2003 (60 MG/yr).

The following major CSO projects on the Connecticut River are presently in construction or design (Boisjolie 2007)
1. Chicopee CSO #01 - Fairview sewer separation. This project is in construction and it is scheduled to be completed in 2009 (32 MG/yr).
2. Chicopee CSO #07 - Jones Ferry. This is the second largest CSO discharge (173 MG/yr) to the Connecticut River. This project is in construction and it is scheduled to be completed in 2009.
3. Springfield CSO 07 & 049 - North End sewer separation. This project is in design and it is scheduled to be completed in 2011(65 MG/yr).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Intelicoat Technologies, LLC (10627501)
Open Square Properties (9P10613701)
Sonoco Products Company (10613706)
Holyoke Gas & Electric Department (10613708)
Hazen Paper Company (10613701)
Fountain Plating Co, Inc. (10632501)

Crestview Country Club (10600502)

NPDES (Appendix H, Table H2)
Intelicoat Technologies, LLC in South Hadley is authorized (MAG250968)
The City of Holyoke (MA0101630) Effluent and CSO discharges
Holyoke Gas and Electric Department (HG&E) (MA0035882, MA0035874, MA0035564, and MA0035866)
[Note: there are two additional stations (Skinner and Beebe-Holbrook) with unpermitted waterwheels which then go through the Riverside Station]
Holyoke Gas and Electric Department (HG&E) (MA0001520)
Hazen Paper Company (MAG250872)
Omniglow Corporation (MAG250010)
Town of South Hadley Wastewater Treatment Plant (MA0100455)
Atlas Copco Compressors (MAG250929) no longer discharges non-contact cooling water (closed loop), terminated by EPA in of July 2002
Hampden Papers, Inc. (MAG 250881)
Hercules, Inc. (MAG250848)
Chicopee Water Pollution Control Facility (MA0101508) Effluent and CSO discharges
Agri-Mark, Inc. (MA0029327)
Consolidated Edison Energy Massachusetts, Inc. (CEEMI) (MA0004707)
Springfield Water and Sewer Commission Regional Wastewater Treatment Facility (MA0101613)
Springfield Water and Sewer Commission (MA0103331) CSO discharges
Town of West Springfield (MA0101389) terminated by EPA in September 2000
Town of Agawam Department of Public Works (MA0101320) terminated September 2000.
Danaher Tool, Springfield (MAG250951) ceased operation so terminated by EPA in February 2006

FEDERAL ENERGY REGULATORY COMMISSION (FERC)

Project Name	Owner	Project #	Issue Date	Expiration Date	River	Kilowatts
Holyoke	City of Holyoke (HG&E)	2004	20 August 1999	31 August 2039	Connecticut River	45,675
Holyoke No. 1	City of Holyoke (HG&E)	2386	28 February 1989	31 January 2019	Holyoke Canal	1,056
Holyoke No. 2	City of Holyoke (HG&E)	2387	28 September 1988	31 August 2018	Holyoke Canal	800
Holyoke No. 3	City of Holyoke (HG&E)	2388	28 September 1988	31 May 2020	Holyoke Canal	450
Holyoke No. 4	City of Holyoke (HG&E)	7758	15 August 2006	31 August 2039	Holyoke Canal System	760
Station No. 5	Holyoke Economic Dev & Indl Corp.	10806	29 June 1990	31 May 2030	Connecticut River	790
Mt Tom Mill	Harris Energy & Realty Corp.	2497	29 June 1989	28 February 2021	Holyoke Canal	500
Crocker Mill A/B	Harris Energy & Realty Corp.	2758	29 June 1989	28 February 2021	Holyoke Canal	350
Albion Mill (D Wheel)	Harris Energy & Realty Corp.	2766	29 June 1989	28 February 2021	Holyoke Canal	500

Project Name	Owner	Project #	Issue Date	Expiration Date	River	Kilowatts
Albion Mill (A Wheel)	Harris Energy & Realty Corp.	2768	29 June 1989	28 February 2021	Holyoke Canal	312
Crocker Mill (C Wheel)	Harris Energy & Realty Corp.	2770	29 June 1989	28 February 2021	Holyoke Canal	300
Linweave Warehouse (A Wheel)	Harris Energy & Realty Corp.	2772	29 June 1989	28 February 2021	Holyoke Canal	450
Linweave Warehouse (D Wheel)	Harris Energy & Realty Corp.	2775	29 June 1989	28 February 2021	Holyoke Canal	450
Nonotuck Mill	Harris Energy & Realty Corp.	2771	29 June 1989	28 February 2021	Holyoke Canal	500

USE ASSESSMENT

AQUATIC LIFE

Habitat/Flow

The USGS maintains a streamflow gage on the Connecticut River at the Interstate 391 bridge in Holyoke, MA (Gage 01172010). The average annual discharge at this gage is 15,820 cfs (period of record 2002 to 2004). The maximum discharge at this gage occurred on 2 April 2004 (91,700 cfs). The minimum discharge at this gage occurred on 10 July 2003 (1,960 cfs). From December 1983 to September 2002, a gage was located at a site 1 mi upstream from the current location. The discharge record is not equivalent because diversion through canal was not included (Socolow et al. 2004).

Biology

The Shortnose sturgeon (*Acipenser brevirostrum*), a federally endangered freshwater fish, is present in this section of the Connecticut River. This fish utilizes discrete habitats within this system for feeding and spawning. Historically, adult Shortnose sturgeon would spawn in the late spring near the confluence of the Deerfield and Connecticut Rivers and then migrate downstream to foraging areas as far downstream as Long Island Sound. At present, it is believed that the Holyoke Dam divides the Connecticut River Sturgeon into two separate populations (UMass 2007).

As part of the CEEMI permit requirements, macroinvertebrate sampling was conducted to assess potential biological impacts from the facility's thermal discharge (Kleinschmidt 2006a, 2007, and 2008). Benthic grab samples were collected on 28 August 2005 at three sites immediately upstream from the discharge and three sites just downstream from the discharge within the thermal mixing zone. Grab sampling was repeated in August 2006 and 2007. Sediment samples were collected with a shallow water bottom dredge concurrent with the benthic grab samples and were analyzed for percent gravel, sand, silt, and clay. In addition to the 2006 and 2007 grab sampling efforts, macroinvertebrate sampling using Hester-Dendy multiplates was conducted at ten sites upstream from the thermal discharge and at ten sites within and downstream from the thermal plume (Kleinschmidt 2006b). At this time results are inconclusive.

The CEEMI permit also required fish impingement and entrainment monitoring to evaluate potential biological impacts at the facility's intake (Kleinschmidt 2006a, 2007, and 2008). A two year impingement monitoring program was conducted between May 2005 and May 2007. Impingement samples were collected 3 times per week (only when cooling pumps were being operated). Approximately equal numbers of samples were collected during morning, afternoon, and night sampling time periods for the duration of the study. During the first year of the study (2005-2006), a total of 203 fish, representing 17 species, were collected. Bluegill was the most frequently impinged species. Based on actual impingement rates, annual projected impingement for year one was 7,749 fish. During the second year of the study (2006-2007), a total of 42 fish, representing 13 species, were collected. Again, bluegill was the

most frequently impinged species. Projected annual year-two impingement was 754 fish. No threatened or endangered species were collected during impingement sampling efforts.

Entrainment monitoring was conducted at the facility between May 2005 and May 2006. Samples were collected from a single fixed tap into the intake pipe at the facility. At the same time, egg and larvae collections were made using plankton nets at three set points across the river just upstream and in front of the cooling water intake structure. No fish eggs were reported entrained. Fish larvae entrainment monitoring for that time period indicated an estimated annual total entrainment of 591,401 larvae. Entrained fish larvae represented 10 taxa, and the total Adult equivalent loss calculation for the year was 24 adult fish (17 white sucker, 2 common carp, 2 shiner species, and 3 yellow perch). On May 24, 2005, a single shortnose sturgeon larvae (estimated to be 2-3 weeks old) was identified from an offshore ichthyoplankton sample collected in the middle of the Connecticut River in the location of the Memorial Bridge in West Springfield.

Toxicity

Ambient

The South Hadley Wastewater Treatment Facility staff collected water from the Connecticut River approximately ½ mile upstream from the outfall, at the playground over the South Hadley border, for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48-hours) to the Connecticut River water was $\geq$ 95% (n=15). River water hardness ranged from 20 to 48mg/L (n=15).

The Chicopee Water Pollution Control Facility staff collected water from the Connecticut River approximately 100 yards upstream from the discharge at the boat ramp (just south of Route 90 Bridge) in Chicopee, for use as dilution water in the facility's whole effluent toxicity tests. Survival of *C. dubia* exposed (48 hours) to the Connecticut River water in August 2004 was 100% (n=1). Survival of *P. promelas* exposed (48 hours) to the Connecticut River water between August 2000 and September 2007 was $\geq$88% (n=33). River water hardness ranged from 24 to 64 mg/L (n=33).

The Springfield Regional Wastewater Treatment Facility staff collected water from the Connecticut River at the North End Bridge for use as dilution water in the facility's whole effluent toxicity tests. Between August 2000 and September 2007, survival of *C. dubia* exposed (48 hours) to the Connecticut River has been 100% (n=28). River water hardness ranged from 22 mg/L to 136 mg/L (n=28).

Effluent

Between August 2000 and September 2007, 15 acute whole effluent toxicity tests were conducted on the South Hadley WWTP effluent using *C. dubia*. With the exception of three test events (September 2004 LC_{50}=79.4% effluent, June 2005 LC_{50}=70.7% effluent, and September 2006 LC_{50}=70.7% effluent), no acute whole effluent toxicity has been detected. The facility has consistently passed its whole effluent toxicity testing limits.

Acute whole effluent toxicity tests have been conducted on the Holyoke Department of Public Works treated effluent. Between August 2000 and September 2007, 30 valid tests were conducted using *C. dubia*. The LC_{50}s were all $\geq$100% effluent (n=30) with the exception of two test events (December 2000 and June 2005 LC_{50}s= 63.7 and 31.9% effluent, respectively).

Acute whole effluent toxicity tests have been conducted on the Chicopee WPCF treated effluent. Between August 2000 and September 2007, 31 valid tests were conducted using *P. promelas*. The LC_{50}s were all >100% effluent with the exception of three test events (May 2004, August and September 2007 with LC_{50}s =94, 78.1, and 73.4 % effluent, respectively). No acute toxicity to *C. dubia* was detected in the August 2004 test event. It should also be noted that in August 2006 an acute whole effluent toxicity test was conducted on the "secondary bypass." This discharge was acutely toxic to *P. promelas* (LC_{50}=71.7% effluent).

Acute whole effluent toxicity tests have been conducted on the Springfield Regional Waste Water Treatment Facility treated effluent. Between August 2000 and September 2007, no acute whole effluent toxicity to *C. dubia* has been detected (LC50 >100% effluent, n= 28).

Chemistry – water

DWM conducted water quality sampling at two stations on this segment of the Connecticut River between April and November 2003 (Appendix B and E). Station 05A was located at Route 90 in West Springfield/Chicopee and Station CT00 was located at USGS Gage 01197500 downstream of Route 190 in Suffield/Enfield Connecticut. Most measurements were indicative of good water quality conditions. Some elevated temperature measurements were recorded but did not exceed the warm water standard of 28.3°C. Total phosphorus was slightly elevated at Station CT00 and ranged from 0.029 to 0.058 mg/L.

USGS collected water quality data on the Connecticut River in Thompsonville, CT at USGS Gage 01184000 (Deacon et al 2006). Water quality parameters were measured monthly at this station on 43 occasions between December 2002 and September 2005. Summary statistics provided for this station showed that the minimum DO measurement collected at this location was 6.7 mg/L. The maximum water temperature reported was 27.0 deg C. TSS was generally low with a median value of 3 mg/L, however a maximum measurement of 135 mg/L was recorded at the maximum sampled flow. The maximum ammonia was 0.227 mg/L, and the median ammonia level was .041 mg/L. The mean and median pH was 7.4, and a minimum pH of 6.7 was recorded. Concentrations of total nitrogen ranged from 0.44 to 1.0 mg/L. Concentrations of total phosphorus ranged from 0.021 to 0.122 mg/L. The maximum concentration of total phosphorus was observed at the maximum streamflow at which samples were collected.

Chemistry- fish tissue

The Connecticut River Fish Tissue Contaminant Study (2000) was a collaborative federal and multi-state project designed to provide a baseline of tissue contaminant data from several fish species and learn what threat eating these fish poses to other mammals, birds, and fish (Hellyer 2006). This study reached the following conclusions: mercury poses a risk to fish-eating wildlife, DDT homologs (chemical physical, and biological breakdown products of the parent compound) pose a risk to fish-eating birds, coplanar PCBs pose a risk to fish-eating mammals and fish-eating birds, and dioxin constituted a risk to fish-eating wildlife.

This segment of the Connecticut River is assessed as support for the *Aquatic Life Use* based on the good survival of test organisms in ambient water, the generally lack of acute whole effluent toxicity, and the good water quality. However, this use is identified with an Alert Status due to the extent, potential toxicity and habitat impacts of the coal tar deposits and the risk that fish tissue contaminants pose to fish-eating wildlife.

FISH CONSUMPTION

The following site specific fish consumption advisory is recommended by MA DPH for the mainstem Connecticut River:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES

Metcalf & Eddy collected *E. coli* bacteria samples as part of the Connecticut River Bacteria Monitoring Project at seven stations within this segment (Metcalf & Eddy 2006). This project was funded to obtain river bacteria results upstream and downstream of combined sewer overflows during dry and wet weather conditions. Five samples were collected across a transect perpendicular to the river flow at these locations. Up to six rounds of sampling was performed at each transect location within a one to three day period in order to capture both dry and wet weather bacteria levels. Samples were collected at these locations during one dry weather (8 August 2001) and three wet weather periods (25-27 September 2001, 15-16 September 2002, and 16-18 October 2002). All valid samples collected at a single location have been pooled to calculate a single geometric mean. The geometric mean of all samples, and all samples collected during the primary contact recreation season (which excludes the 16-18 October sampling

event) at each location are presented below. Values exceeding the water quality standards appear in bold font.

Location	Description	Samples Collected during Primary Contact Recreation season	All samples (Secondary Contact Recreation)
		Geometric mean	**Geometric mean**
RIV-2	Connecticut River-Old County Bridge (Route 116)	**136**	116
RIV-3	Connecticut River-downstream of Holyoke WWTP	**244**	217
RIV-4	Connecticut River-downstream of Jones Ferry	**270**	225
RIV-5	Connecticut River-upstream of I-91	114	125
RIV-6	Connecticut River-Memorial Bridge	93	108
RIV-7	Connecticut River-South End Bridge	**244**	284
RIV-8	Connecticut River-downstream boundary	85	103

Metcalf & Eddy also collected *E. coli* bacteria samples at five CSO storm drain locations as part of the Connecticut River Bacteria Monitoring Project (Metcalf & Eddy 2006). These storm drains were sampled during one dry weather (8 August 2001) and two wet weather periods (25-27 September 2001, 15-16 September 2002) (Location SD-B not sampled in August 2001). Each location was sampled a maximum of two times, so no geometric mean has been calculated and they are not used for assessment. However, the data are presented below to document bacteria levels at these locations. Ranges of *E.coli* bacteria values for each station are presented below:

Location	Description	***E. coli* range (cfu 100m/L)**
SD-A	Michigan Ave./Superior Ave.intersection-Holyoke	256-28,000
SD-B	Jones Ferry drain-Chicopee	150-2,900
SD-C	Ingleside Mall drain-Holyoke	170- 34,400
SD-D	Forest Park drain-Springfield	34-1,300
SD-E	Liberty St./Boylston St. intersection-Springfield	50-16,900

DWM collected *E. coli* samples from the Connecticut River at Station CT00 in 2003. Single grab samples were collected on five occasions at Station CT00 between April and November. The geometric mean of these samples was 21 cfu/100ml. Bacteria samples were only collected on three occasions at Station 05A, thus no geometric mean has been calculated (Appendix B).

DWM personnel made field observations at Station CT00 and 05A during surveys conducted between April and October 2003. At Station CT00, trash along the bank was noted on one occasion, a sulfide (rotten egg) smell was noted on one occasion, and the water was highly turbid during one visit (MassDEP 2003). At Station 05A, trash along the bank was noted on one occasion, but there were no other objectionable deposits, scums or water odors recorded and water clarity was noted as clear or slightly turbid (MassDEP 2003).

The *Primary Contact Recreational Use* is assessed as impaired because of elevated *E. coli* bacteria counts, noted particularly during wet weather periods. The *Secondary Contact Recreation and Aesthetics* uses are assessed as support based upon bacteria counts that are acceptable for secondary contact and the general lack of objectionable conditions.

Connecticut River (Segment MA34-05) Use Summary Table

Designated Uses		Status
Aquatic Life		SUPPORT*
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		IMPAIRED Cause: Elevated *E. coli* bacteria Source: Wet weather discharges, combined sewer overflows
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

* Alert Status, see details in use assessment

RECOMMENDATIONS

Didymosphenia geminata, otherwise known as Didymo or “rock snot”, is considered an invasive algae and has been found in the Connecticut River in Vermont and New Hampshire. Infestation and nuisance blooms of Didymo can produce thick mats that blanket stream and river substrates, causing a loss of habitat for fish and other aquatic organisms. Didymo blooms can make fishing, swimming, or boating undesirable or impossible (MA DCR 2008). Although it is currently not known if Didymo will colonize and/or bloom in the Massachusetts section of the Connecticut River, every effort should be made to prevent the spread of this nuisance algae in the mainstem Connecticut River and its tributaries. MA DCR recommends the Check-Clean-Dry protocol be followed when exiting waters that may be infested with Didymo. For more information visit: http://www.mass.gov/dcr/waterSupply/lakepond/hot_topic.htm.

Continue to monitor acute toxicity in the South Hadley, Holyoke, and Chicopee waste water treatment plant effluent.

Continue to monitor ambient bacteria levels, particularly during wet weather events, to evaluate progress made due to CSO cleanup activities.

Review and evaluate submissions of data and reports required by 316a and 316b for CEEMI’s West Springfield Station.

MILL RIVER-SPRINGFIELD (SEGMENT MA34-29)
Location: Outlet of Watershops Pond, Springfield, to confluence with the Connecticut River, Springfield (interrupted stream).
Segment Length: 1.3 miles.
Classification: Class B, combined sewer overflow.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

A CSO elimination project on the Mill River – Springfield was completed in December 2003 (Boisjolie 2007). This project eliminated an estimated 60 MG/yr of CSO discharge.

WITHDRAWALS AND DISCHARGES
NPDES (Appendix H, Table H2)
Springfield Water and Sewer Commission (MA0103331) seven CSO outfalls.

USE ASSESSMENT
PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
Metcalf & Eddy collected *E. coli* bacteria samples as part of the Connecticut River Bacteria Monitoring Project at Station RIV-10 (Mill-Mill Pond at Walnut Street) in Springfield within this segment (Metcalf & Eddy 2006). This project was funded to obtain river bacteria results upstream and downstream of combined sewer overflows during dry and wet weather conditions. Up to six rounds of sampling was performed at each location within a one to three day period in order to capture both dry and wet weather bacteria levels. Samples were collected at this station during one dry weather (8 August 2001) and three wet weather periods (25-27 September 2001, 15-16 September 2002, and 16-18 October 2002). All valid samples collected at this location have been pooled to calculate a single geometric mean. The geometric mean of all samples collected during the primary contact recreation season (which excludes the 16-18 October sampling event) at Station RIV-10 was 1,253 cfu/100mL. The geometric mean of all samples collected was 1,071 cfu/100mL. It should be noted that all three dry weather bacteria samples collected were greater than the primary contact criteria for *E. coli*.

The *Primary* and *Secondary Contact Recreational* uses are assessed as impaired because of elevated *E. coli* bacteria counts. The *Aesthetics Use* is not assessed due to a lack of data.

Mill River-Springfield (Segment MA34-29) Use Summary Table

Designated Uses		Status
Aquatic Life		NOT ASSESSED
Fish Consumption		NOT ASSESSED
Primary Contact		IMPAIRED Cause: Elevated *E. coli* bacteria Source: Wet weather discharges and unknown
Secondary Contact		IMPAIRED Cause: Elevated *E. coli* bacteria Source: Wet weather discharges and unknown
Aesthetics		NOT ASSESSED

RECOMMENDATIONS
Conduct monitoring to evaluate water quality improvements in this segment since CSO abatement measures were implemented in 2003.

COOLEY BROOK (SEGMENT MA34-20)
Location: Headwaters, Longmeadow, to confluence with Connecticut River, Longmeadow.
Segment Length: 1.4 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Cooley Brook at Site 779 downstream from Route 5 in Longmeadow in 2002 (Richards 2006). The sample was comprised of 180 blacknose dace, a pollution tolerant fluvial specialist species, and one individual American eel.

Cooley Brook is not assessed for the *Aquatic Life Use* due to too limited data.

Cooley Brook (Segment MA34-20) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

LONGMEADOW BROOK (SEGMENT MA34-21)
Location: Headwaters, Longmeadow, to confluence with Connecticut River, Longmeadow.
Segment Length: 4.5 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Longmeadow Country Club (10615902)
Twin Hills Country Club (10615901)

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Longmeadow Brook at Site 772 at Merriweather Road in Longmeadow in 2002 (Richards 2006). Four brook trout, a pollution intolerant fluvial specialist species, were collected in this sample (multiple age classes).

Longmeadow Brook is not assessed for the *Aquatic Life Use* based on the limited data. Although the presence of brook trout, a pollution intolerant species, is a good sign, 4 individual fish collected is insufficient data to assess the *Aquatic Life Use*.

Longmeadow Brook (Segment MA34-21) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

RASPBERRY BROOK (SEGMENT MA34-22)
Location: from Connecticut state line to confluence with Connecticut River, Longmeadow
Segment Length: 1.8 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Raspberry Brook at Site 781 downstream of Route 5 in Longmeadow in 2002 (Richards 2006). The fish sample was comprised of 6 redfin pickerel, a macrohabitat generalist species that is moderately tolerant of pollution. Sampling efficiency was noted as 100%.

Too limited data are available, thus the *Aquatic Life Use* for Raspberry Brook is not assessed.

Raspberry Brook (Segment MA34-22) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

TEMPLE BROOK (SEGMENT MA34-08)
Location: Headwaters (outlet Bradley Pond), Monson, to confluence with Scantic River, Hampden.
Segment Length: 3.7 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data in Temple Brook at Site 767 at Scantic Road in Hampden in 2002 (Richards 2006). The fish community was dominated by fluvial specialist species, and a pollution intolerant species, brook trout, was the most frequently observed. A total of 197 fish, represented by six species, were collected, including: 85 brook trout (multiple age classes) 82 blacknose dace, 25 longnose dace, 2 tessellated darter, 2 pumpkinseed, and 1 American eel.

Temple Brook is assessed as support for the *Aquatic Life Use* based on the fish community data.

Temple Brook (Segment MA34-08) Use Summary Table

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

RECOMMENDATIONS
Fish community data collected in 2002 indicate that Temple Brook merits consideration to be designated as a cold water fishery. The appropriate fish community and temperature data should be collected to validate the designation of Temple Brook as a cold water fishery.

Conduct water quality monitoring to evaluate designated uses.

SCANTIC RIVER (SEGMENT MA34-30)
Location: From the Massachusetts/Connecticut border, Monson, to the MA/CT border, Hampden.
Segment Length: 9.6 miles.
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
New Hampden Country Club (9P210612001) in tributary (Watchaug Brook) subwatershed

USE ASSESSMENT
AQUATIC LIFE
Biology
MA DFG collected fish community data at two stations in Hampden on the Scantic River in July 2002. Site 759 was located at Hancock Road, and Site 777 was located downstream from Mill Road (Richards 2006). Both stations were dominated by fluvial specialist fish species. A total of 159 fish were collected at site 759, represented by nine species, including: 108 brook trout (multiple age classes), 31 tessellated darter, 4 common shiner, 4 white sucker, 3 longnose dace, 3 yellow bullhead, 3 American eel, 2 blacknose dace, and 1 brown bullhead. A total of 107 fish were collected at Site 777, represented by nine species, including: 26 blacknose dace, 25 brook trout (multiple age classes), 15 tessellated darter, 13 fallfish, 9 brown trout (multiple age classes), 8 longnose dace, 7 white sucker, 2 American eel, and 2 redfin pickerel.

The Scantic River is assessed as support for the *Aquatic Life Use* based on the fish community data.

Scantic River (Segment MA34-30) Use Summary Table

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

RECOMMENDATIONS
Fish community data collected in 2002 indicate that the Scantic River merits consideration to be designated as a cold water fishery. The appropriate fish community and temperature data should be collected to validate the designation of the Scantic River as a cold water fishery.

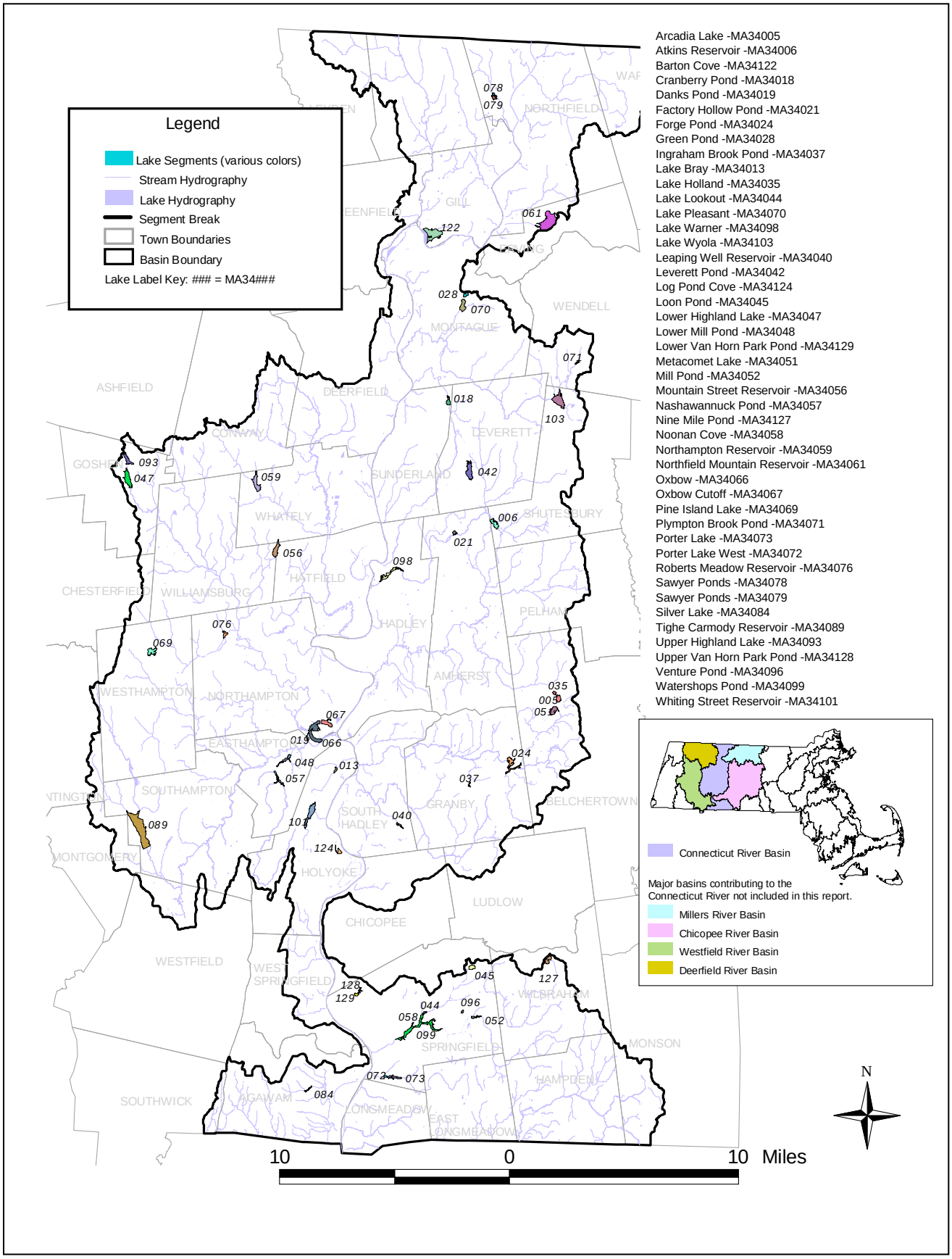
Conduct water quality monitoring to evaluate designated uses.

CONNECTICUT RIVER WATERSHED – LAKE SEGMENTS ASSESSED

Currently there is uncertainty associated with the accurate reporting of freshwater beach closure information to MA 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 these waterbodies. Bathing beaches located in this watershed are listed in their respective lake segments.

The City of Springfield received a grant to monitor the water quality of the lakes and ponds within the city limits, and monitoring was conducted during 2001 and 2002 (Godfrey 2007). A QAPP was submitted and approved in 2003 to document data collection methods. However, no additional data collection took place after 2002 under the direction of that QAPP (Connors 2007), thus these data are not used to make assessment decisions. Clear violations of criteria noted in these data have been described in the appropriate segment and may result in an Alert Status for the appropriate use.

Figure 8. Lake segments in the Connecticut River Watershed included in this report



ARCADIA LAKE (SEGMENT MA34005)
Location: Belchertown
Length/area: 32 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of nutrients, noxious aquatic plants and exotic species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
Two non-native species (*Myriophyllum heterophyllum, Cabomba caroliniana*) were observed in Arcadia Lake during the 1998 synoptic surveys (MassDEP 1998).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There is one beach along the shoreline of Arcadia Lake: Lake Arcadia Beach.

Arcadia Lake (SEGMENT MA34005) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native Macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

ATKINS RESERVOIR (SEGMENT MA34006)
Location: Shutesbury
Length/area: 46 acres
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Amherst DPW Water Division (9P10600801, 10600802)

USE ASSESSMENT
No recent data are available for Atkins Reservoir, thus all uses are not assessed.

Atkins Reservoir (SEGMENT MA34006) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS

Conduct water quality monitoring to evaluate designated uses.

BARTON COVE (SEGMENT MA34122)
Location: (CT River) Gil
Length/area: 160 acres
Classification: Class B.

This waterbody is a cove of the Connecticut River.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics and exotic species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
Three non-native species (*Myriophyllum spicatum, Cabomba caroliniana,* and *Potamogeton crispus*) have been observed on surveys and are known to occur in Barton Cove (MA DCR 2005).

Note: The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported isolated patches of this non-native aquatic macrophyte in the mainstem Connecticut River (MA34-02) along the shoreline upstream from Barton Cove near the end of Barton Cove Road and near the Turners Falls Rod and Gun club (Boettner 2007).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of non-native species.

FISH CONSUMPTION
Because Barton Cove is attached to the mainstem Connecticut River, the following site specific fish consumption advisory is recommended by MA DPH for the Connecticut River is also applicable to this water body:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

Barton Cove (SEGMENT MA34122)

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of Non-Native Macrophyte
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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 confirmed presence of *Trapa natans* immediately upstream means that it is a threat to colonize Barton Cove. This waterbody should be monitored for the presence of this invasive species so that action can be taken to remove it before it becomes established.

Conduct water quality monitoring to evaluate designated uses, particularly bacteria monitoring to assess the *Primary* and *Secondary Contact Recreation* uses observed in Barton Cove.

CRANBERRY POND (SEGMENT MA34018)
Location: Sunderland
Length/area: 28 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to the presence of exotic (non-native) species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
A non-native species (*Myriophyllum spicatum*) was observed in Cranberry Pond during the 1998 synoptic surveys (MassDEP 1998).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

Cranberry Pond (SEGMENT MA34018) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

DANKS POND (SEGMENT MA34019)
Location: Northampton/Easthampton
Length/area: 3 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Danks Pond, thus all uses are not assessed.

Danks Pond (SEGMENT MA34019) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

FACTORY HOLLOW POND (SEGMENT MA34021)
Location: Amherst
Length/area: 12 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Atkins Reservoir, thus all uses are not assessed.

Factory Hollow Pond (SEGMENT MA34021) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

FORGE POND (SEGMENT MA34024)
Location: Granby
Length/area: 72 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of nutrients, noxious aquatic plants and exotic species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of a substantial population of this non-native aquatic macrophyte in Forge Pond (Boettner 2007).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

Forge Pond (SEGMENT MA34024) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

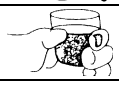
GREEN POND (SEGMENT MA34028)
Location: Montague
Length/area: 15 acres
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Turners Falls Fire District (9P10619201, 10619201)

USE ASSESSMENT
No recent data are available for Green Pond, thus all uses are not assessed.

Green Pond (SEGMENT MA34028) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

INGRAHAM BROOK POND (SEGMENT MA34037)
Location: Granby
Length/area: 5 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Ingraham Brook Pond (Boettner 2007).

Ingraham Brook Pond (SEGMENT MA34037) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

LAKE BRAY (SEGMENT MA34013)
Location: Holyoke
Length/area: 10 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to the presence of exotic (non-native) species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
A non-native species (*Potamogeton crispus*) was observed in Lake Bray during the 1998 synoptic surveys (MassDEP 1998). The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Lake Bray (Boettner 2007).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

Lake Bray (SEGMENT MA34013) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

LAKE HOLLAND (SEGMENT MA34035)
Location: Belchertown
Length/area: 11 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to the presence of exotic (non-native) species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
Two non-native species (*Cabomba caroliniana, Myriohyllum heterophyllum*) were observed in Lake Holland during the 1998 synoptic surveys (MassDEP 1998).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

Lake Holland (SEGMENT MA34035) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

LAKE LOOKOUT (SEGMENT MA34044)
Location: Springfield
Length/area: 7 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants and turbidity (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Lake Lookout, thus all uses are not assessed.

Lake Lookout (SEGMENT MA34044) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

LAKE PLEASANT (SEGMENT MA34070)
Location: Montague
Length/area: 54 acres
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Turners Falls Fire District (9P10619201, 10619201)

USE ASSESSMENT
No recent data are available for Lake Pleasant, thus all uses are not assessed.

Lake Pleasant (SEGMENT MA34070) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

LAKE WARNER (SEGMENT MA34098)
Location: Hadley
Length/area: 65 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to nutrients, organic enrichment/low DO, noxious aquatic plants, turbidity [note: the TMDL for these pollutants was completed and approved by EPA in April 2002] and the presence of exotic (non-native) species (MassDEP 2007).

The TMDL of phosphorus for selected Connecticut basin lakes states that phosphorus loads in Lake Warner should be reduced from the current estimate loading of 7150 kg/year to a target load of 1790 kg/year (75% reduction) (MassDEP 2001).

There is a proposed site-specific total phosphorus criterion of 0.030 mg/L for this water body (MassDEP 2006a).

USE ASSESSMENT
AQUATIC LIFE
Biology
A non-native species (*Trapa natans*) was observed in Lake Warner during the 1998 synoptic surveys (MassDEP 1998). The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of a substantial population of this non-native aquatic macrophyte in Lake Warner (Boettner 2007). Volunteers conducting a plant survey on Lake Warner identified *Cabomba caroliniana* in the lake in 2003 and had the finding confirmed by Dr. Paul Joseph Godfrey (Schoen 2004).

Volunteers from the Mill River/ Lake Warner study group conducted a monitoring program on Lake Warner in 2003 and 2004 (Schoen 2004, 2005). A QAPP for this project was submitted and approved by MassDEP prior to the start of monitoring. Parameters measured included DO, Secchi disk depths, and total phosphorus. Each parameter was measured at least five times each year. Total phosphorus data were analyzed at the Umass Environmental Analytical Laboratory. Total phosphorus results generated by the Umass Environmental Analytical Laboratory in 2003 and 2004 are thought to be subject to significant uncertainty due to a settling step contained in the analytical procedure at that time. Because of this uncertainty, EAL Lake Warner TP data from 2003 and 2004 have not been used for assessment. DO concentrations and Secchi depth are considered valid and are considered here for assessment.

Secchi disk depths ranged from 0.69 to 2.13 m (n = 11), with only one measurement less than 1.2 meters. Dissolved oxygen concentrations measured at depth ranged from 4.6 to 9.9 mg/L (n =9), with only one measurement less than 5.0 mg/L. It should be noted that the report states that DO measurements were generally made between 10AM and 2PM, and thus they likely do not represent the worst-case scenario.

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
Due to the good water clarity, as measured by Secchi disk depth, the *Secondary Contact Use* is supported. Due to a general lack of objectionable deposits or conditions, the *Aesthetics Use* is also supported. The *Primary Contact Recreation* is not assessed due to too limited data.

Lake Warner (SEGMENT MA34098) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		SUPPORT
Aesthetics		SUPPORT

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.

Conduct water quality monitoring to evaluate designated uses.

LAKE WYOLA (SEGMENT MA34103)
Location: Shutesbury
Length/area: 126 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4a"- *TMDL is Completed* due to nutrients, organic enrichment/low DO and noxious aquatic plants (MassDEP 2007). The TMDL was completed and approved by EPA in April 2002.

There is a proposed site-specific total phosphorus criterion of 0.015 mg/L for this water body (MassDEP 2006a).

The TMDL of phosphorus for selected Connecticut basin lakes states that phosphorus loads in Lake Wyola should be reduced from the current estimate loading of 395 kg/year to a target load of 282 kg/year (29% reduction) (MassDEP 2001).

The Lake Wyola TMDL Implementation Project (00-16/319) implemented selected recommendations from the Lake Wyola Management Plan and Lake Wyola TMDL. Goals of this project included implementing residential and roadway BMPs to control erosion and sedimentation, and implementation of a comprehensive septic system management plan.

USE ASSESSMENT
PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There are two beaches along the shoreline of Lake Wyola: Lake Wyola State Park Beach and a town beach.

No recent data are available for Lake Wyola, thus all uses are not assessed.

Lake Wyola (SEGMENT MA34103) Use Summary Table

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

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses, particularly bacteria monitoring to assess the *Primary* and *Secondary Contact Recreation* uses observed in Lake Wyola.

LEAPING WELL RESERVOIR (SEGMENT MA34040)
Location: South Hadley
Length/area: 9 acres
Classification: Class B

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Leaping Well Reservoir, thus all uses are not assessed.

Leaping Well Reservoir (SEGMENT MA34040) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

LEVERETT POND (SEGMENT MA34042)
Location: Leverett
Length/area: 91 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to noxious aquatic plants, turbidity [note: the TMDL for these pollutants was completed and approved by EPA in April 2002] and the presence of exotic (non-native) species (MassDEP 2007).

There is a proposed site-specific total phosphorus criterion of 0.015 mg/L for this water body (MassDEP 2006a).

The TMDL of phosphorus for selected Connecticut basin lakes states that phosphorus loads in Leverett Pond should be reduced from the current estimate loading of 107 kg/year to a target load of 80 kg/year (25% reduction) (MassDEP 2001).

USE ASSESSMENT
AQUATIC LIFE
Biology
Two non-native species (*Myriophyllum spicatum and Najas minor*) were documented in Leverett Pond in 1998 (MassDEP 1998).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of non-native species.

Leverett Pond (SEGMENT MA34042) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

LOG POND COVE (SEGMENT MA34124)
Location: Holyoke
Length/area: 19 acres
Classification: Class B.

This waterbody is a cove of the Connecticut River.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of priority organics and exotic species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported that Log Pond Cove is severely infested with this non-native aquatic macrophyte (Boettner 2007). Herbicide applications have been used in an attempt to control *Trapas natans* infestations in Log Pond Cove (2002-2006) (MassDEP 2006b).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

FISH CONSUMPTION
Because Log Pond Cove is attached to the mainstem Connecticut River, the following site specific fish consumption advisory is recommended by MA DPH for the Connecticut River is also applicable to this water body:

> *"(All towns between Northfield and Longmeadow)…Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from the Connecticut River and the general public should not consume channel catfish, white catfish, American eel, or yellow perch because of elevated levels of PCB"* (MA DPH 2007).

Because of the site-specific fish consumption advisory for the Connecticut River due to PCB contamination, the *Fish Consumption Use* is assessed as impaired.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
The *Primary Contact Recreation*, *Secondary Contact Recreation* and *Aesthetics* uses are assessed as impaired due to the severe *Trapa natans* infestation.

Log Pond Cove (SEGMENT MA34124) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		IMPAIRED Cause: PCB in fish tissue Source: Unknown
Primary Contact		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Secondary Contact		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Aesthetics		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte

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.

Conduct water quality monitoring to evaluate designated uses.

LOON POND (SEGMENT MA34045)
Location: Springfield
Length/area: 25 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 4a"- *TMDL is Completed* for nutrients and noxious aquatic plants (MassDEP 2007). The TMDL's were completed and approved by EPA in April 2002.

There is a proposed site-specific total phosphorus criterion of 0.030 mg/L for this water body (MassDEP 2006a).

The TMDL of phosphorus for selected Connecticut basin lakes states that phosphorus loads in Loon Pond should be reduced from the current estimate loading of 47 kg/year to a target load of 41 kg/year (13% reduction) (MassDEP 2001).

USE ASSESSMENT
PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There is one beach along the shoreline of Loon Pond: Jam's Beach.

No recent data are available for Loon Pond, thus all uses are not assessed.

Loon Pond (SEGMENT MA34045) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

LOWER HIGHLAND LAKE (SEGMENT MA34047)
Location: Goshen
Length/area: 91 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

USE ASSESSMENT
PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There is one beach along the shoreline of Lower Highland Lake: Camp Howe Beach.

No recent data are available for Lower Highland Lake, thus all uses are not assessed.

Lower Highland Lake (SEGMENT MA34047) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

LOWER MILL POND (SEGMENT MA34048)
Location: Easthampton
Length/area: 30 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Lower Mill Pond (Boettner 2007).

The *Aquatic Life Use* for Lower Mill Pond is impaired based on the presence of a non-native species.

FISH CONSUMPTION
MassDEP biologists collected fish from Lower Mill Pond in East Hampton in June 2002. Mercury concentrations were well below the MA DPH trigger level of 0.5 mg/kg in the four samples analyzed. It should be noted that this included largemouth bass, a predatory species. Arsenic, lead, and cadmium levels were all below minimum detection limits. Selenium concentrations were low and are not of concern, ranging from 0.14 to 0.34 mg/kg. Trace concentrations of PCB Congeners, Arochlors, DDE and chlordane were well below MDPH or USFDA criteria (Appendix G).

MA DPH did not issue a site-specific advisory for Lower Mill Pond, so the Fish Consumption Use is currently not assessed.

Lower Mill Pond (SEGMENT MA34048) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

LOWER VAN HORN PARK POND (SEGMENT MA34129)
Location: Springfield
Length/area: 11 acres
Classification: Class B.

This is a new segment and therefore is not on the 2006 Integrated List of Waters.

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Lower Van Horn Park Pond (Boettner 2007).

The *Aquatic Life Use* for Lower Van Horn Park Pond is impaired based on the presence of a non-native species.

Lower Van Horn Park Pond (SEGMENT MA34129) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

METACOMET LAKE (SEGMENT MA34051)
Location: Belchertown
Length/area: 51 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of organic enrichment/low DO and exotic species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
Two non-native species (*Cabomba caroliniana, Myriohyllum heterophyllum*) were observed in Metacomet Lake during the 1998 synoptic surveys (MassDEP 1998).

Water Chemistry
An *in-situ* profile was taken by DWM at the deep hole of Metacomet Lake on 9 July 2003. Dissolved oxygen concentrations ranged from 8.0 to 0.4 mg/L; percent saturations ranged from 104 to 4% (Appendix F). Low dissolved oxygen levels were measured in the bottom water at depths of 2.0 meters or greater. This corresponds to an approximate area equal to 34% of the total area of the waterbody. The depth integrated chlorophyll *a* concentration was 11.9 mg/m^3. The Secchi disk depth was 2.1 m.

The *Aquatic Life Use* is assessed as impaired for Metacomet Lake since approximately 34% of the lake area had low dissolved oxygen levels. Additionally, the Aquatic Life Use is also impaired due to the presence of two invasive non-native macrophytes.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
Due to too limited data, the *Primary* and *Secondary Contact Uses* are not assessed. The Aesthetics Use is assessed as support based upon the lack of objectionable deposits or conditions and the good Secchi disk depth.

Metacomet Lake (SEGMENT MA34051) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s), low dissolved oxygen Source: Unknown, introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
Aesthetics		SUPPORT

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.

Conduct water quality monitoring to evaluate designated uses.

MILL POND (SEGMENT MA34052)
Location: Springfield
Length/area: 13 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of taste, odor, and color and noxious aquatic plants (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Wilbraham Water Department (9P210633901)

USE ASSESSMENT
No recent data are available for Mill Pond, thus all uses are not assessed.

Mill Pond (SEGMENT MA34052) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

MOUNTAIN LAKE (FORMERLY SEGMENT MA34055)

This water body in Chicopee is no longer reported on as a lake segment. Due to a dam breach in 2005 Mountain Lake no longer exists as a lake; the area has reverted to Willamansett Brook and wetland (Kurpaska 2007). No water quality data are available for Willamansett Brook; it is currently not a segment and has never been assessed.

MOUNTAIN STREET RESERVOIR (SEGMENT MA34056)
Location: Williamsburg/Hatfield/Whately
Length/area: 67 acres
Classification: Class A.

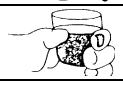
This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Northampton Department Of Public Works (9P210621401, 10621401)

NPDES (Appendix H, Table H2)
Northampton Water Treatment Plant (MAG640032)

USE ASSESSMENT
No recent data are available for Mountain Street Reservoir, thus all uses are not assessed.

Mountain Street Reservoir (SEGMENT MA34056) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS
EPA and MassDEP are developing a revised general permit for water treatment plant discharges. Since the City of Northampton's permit MAG640032 is expired but has been administratively continued, the city should submit an application for the new general permit as soon as it is available.

Conduct water quality monitoring to evaluate designated uses.

NASHAWANNUCK POND (SEGMENT MA34057)
Location: Easthampton
Length/area: 30 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of nutrients, noxious aquatic plants, organic enrichment/low DO and turbidity (MassDEP 2007).

As part of a 319 grant awarded in 2001 (Nashawannuck Pond Restoration, Phase II), stormwater BMPs were implemented on Broad Brook to reduce sediment and nutrient loads to Nashawannuck Pond.

Plans and specifications have recently been completed for a restoration (i.e., dredging) effort of Nashawannuck Pond. It has been determined that removal of pond sediments would improve/restore the open water habitat for fish and waterfowl resources. Pending the issuance of State and local permits, construction can commence during the spring of 2008 (USACOE 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported the presence of this non-native aquatic macrophyte in Nashawannuck Pond (Boettner 2007).

MA DFG collected fish community data in Nashawannuck Pond in Easthampton at Sites 613 and 614 in July 2002 (Richards 2006). A total of 670 fish were collected between the two stations, represented by 11 species, including: 352 largemouth bass, 154 bluegill, 80 pumpkinseed, 40 white sucker, 20 yellow perch, 8 rainbow trout, 4 brown bullhead, 4 brown trout, 4 bowfin, 2 chain pickerel, and 2 hybrid bluegill/pumpkinseed.

The *Aquatic Life Use* for Nashawannuck Pond is impaired based on the presence of a non-native species.

Nashawannuck Pond (SEGMENT MA34057) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

NINE MILE POND (SEGMENT MA34127)
Location: Wilbraham
Length/area: 33 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

USE ASSESSMENT
PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There is one beach along the shoreline of Nine Mile Pond: Nine Mile Pond Beach.

No recent data are available for Nine Mile Pond, thus all uses are not assessed.

Nine Mile Pond (SEGMENT MA34127) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

NOONAN COVE (SEGMENT MA34058)
Location: Springfield
Length/area: 3 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants and turbidity (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Noonan Cove, thus all uses are not assessed.

Noonan Cove (SEGMENT MA34058) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

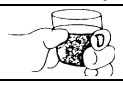
NORTHAMPTON RESERVOIR (SEGMENT MA34059)
Location: Whately
Length/area: 80 acres
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007). This waterbody is also referred to as Francis Ryan Reservoir and Ryan Reservoir.

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Northampton Department of Public Works (9P210621401, 10621401)

USE ASSESSMENT
No recent data are available for Northampton Reservoir, thus all uses are not assessed.

Northampton Reservoir (SEGMENT MA34059) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

NORTHFIELD MOUNTAIN RESERVOIR (SEGMENT MA34061)
Location: Erving
Length/area: 237 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

Public access to this waterbody is completely restricted.

USE ASSESSMENT
No recent data are available for Northfield Mountain Reservoir, thus all uses are not assessed.

Northfield Mountain Reservoir (SEGMENT MA34061) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

OXBOW (SEGMENT MA34066)
Description: The waterbody west of Route 91 (bounded on the northeast by Route 91, the southeast by the Manhan River, and the west by Old Springfield Road), Northampton/Easthampton (excluding the delineated segment; Danks Pond).
Length/area: 148 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of turbidity (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported a substantial population of this non-native aquatic macrophyte in the Oxbow (Boettner 2007).

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

Oxbow (SEGMENT MA34066) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses, particularly bacteria monitoring to assess the *Primary* and *Secondary Contact Recreation* uses observed in the Oxbow.

OXBOW CUTOFF (SEGMENT MA34067)
Description: The waterbody north of Island Road and south of Oxbow Road (between Routes 91and 5), Northampton.
Length/area: 49 acres
Classification: Class B.

This is a new segment and therefore does not appear on the 2006 Integrated List of Waters (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
The Silvio O. Conte National Fish and Wildlife Refuge has led an effort to control *Trapa natans* populations in the Connecticut River Watershed. They have reported a substantial population of this non-native aquatic macrophyte in Oxbow Cutoff (Boettner 2007).

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

Oxbow Cutoff (SEGMENT MA34067) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

PINE ISLAND LAKE (SEGMENT MA34069)
Location: Westhampton
Length/area: 55 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
There is a report of *Myriophyllum* sp. in Pine Island Lake, but it is unknown if it is a native or non-native species (MassDEP 1998).

The *Aquatic Life Use* for Pine Island Lake is not assessed due to a lack of data, however it is identified with an Alert Status.

Pine Island Lake (SEGMENT MA34069) Use Summary Table

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

* Alert Status, see details in use assessment

RECOMMENDATIONS
Conduct aquatic plant surveys in Pine Island Lake to identify which *Myriophyllum* species and any other non-native plant species present in this waterbody.

Conduct water quality monitoring to evaluate designated uses.

PLYMPTON BROOK POND (SEGMENT MA34071)
Location: Wendell
Length/area: 5 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Plympton Brook Pond, thus all uses are not assessed.

Plympton Brook Pond (SEGMENT MA34071) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

PORTER LAKE (SEGMENT MA34073)
Location: Springfield
Length/area: 28 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants and exotic species (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Veterans & Franconia Golf Courses (9P210628101)

USE ASSESSMENT
AQUATIC LIFE
Biology
A non-native species, American Lotus (*Nelumbo lutea*), was observed in Porter Lake during the 1998 synoptic surveys (MassDEP 1998). There is an unconfirmed report of *P. crispus* in Porter Lake, and this water body has had repeated herbicide applications over the last four years (MassDEP 2006b).

Dissolved oxygen levels measured at depth by the Springfield Surface Water Action Monitoring Program in 2001 were observed at levels below 5 mg/L on four occasions (Godfrey 2007).

The *Aquatic Life Use* for Porter Lake is impaired based on the presence of a non-native species. An additional concern is the low dissolved oxygen levels recorded in 2001.

Porter Lake (SEGMENT MA34073) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct aquatic plant surveys to confirm the presence of *P. crispus.*

Conduct water quality monitoring to evaluate designated uses and the extent of low dissolved oxygen levels.

PORTER LAKE WEST (SEGMENT MA34072)
Location: Springfield
Length/area: 5 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants and exotic species (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Biology
A non-native species (*Nelumbo lutea*) was observed in Porter Lake West during the 1998 synoptic surveys (MassDEP 1998).

The *Aquatic Life Use* for Porter Lake West is impaired based on the presence of a non-native species.

Porter Lake West (SEGMENT MA34072) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

ROBERTS MEADOW RESERVOIR (SEGMENT MA34076)
Location: Northampton
Length/area: 22 acres
Classification: Class A.

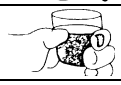
This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Northampton Department Of Public Works (9P210621401, 10621401)

USE ASSESSMENT
PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There is one beach along the shoreline of Roberts Meadow Reservoir: Musante Beach.

No recent data are available for Roberts Meadow Reservoir, thus all uses are not assessed.

Roberts Meadow Reservoir (SEGMENT MA34076) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

SAWYER PONDS (SEGMENT MA34078)
Location: [North Basin] Northfield
Length/area: 9 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Sawyer Ponds (North basin), thus all uses are not assessed.

Sawyer Ponds (SEGMENT MA34078) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

SAWYER PONDS (SEGMENT MA34079)
Location: [South Basin] Northfield
Length/area: 12 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Sawyer Ponds (South basin), thus all uses are not assessed.

Sawyer Ponds (SEGMENT MA34079) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

SILVER LAKE (SEGMENT MA34084)
Location: Agawam
Length/area: 9 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 3"- *No Uses Assessed* (MassDEP 2007).

USE ASSESSMENT
No recent data are available for Silver Lake, thus all uses are not assessed.

Silver Lake (SEGMENT MA34084) Use Summary Table

Aquatic Life	Fish Consumption	Primary Contact	Secondary Contact	Aesthetics
				
NOT ASSESSED				

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

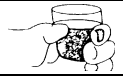
TIGHE CARMODY RESERVOIR (SEGMENT MA34089)
Location: Southampton
Length/area: 353 acres
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Holyoke Water Works (10613711)

USE ASSESSMENT
No recent data are available for Tighe Carmody Reservoir, thus all uses are not assessed.

Tighe Carmody Reservoir (SEGMENT MA34089) Use Summary Table

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

**The MassDEP Drinking Water Program maintains current drinking water supply data.

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

UPPER HIGHLAND LAKE (SEGMENT MA34093)
Location: Goshen
Length/area: 51 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 2"- *Attaining Some Uses* (*Secondary Contact Recreation* and *Aesthetics*); Others Not Assessed (MassDEP 2007).

USE ASSESSMENT
AQUATIC LIFE
Water Chemistry
DWM conducted water quality sampling in Upper Highland Lake at the deep hole station in September 2003 (Appendix F). There was no evidence of oxygen depletion at depth. Secchi disk depth was 3.5 m. Total phosphorus and chlorophyll *a* concentrations were low. All measurements were indicative of good water quality conditions.

Upper Highland Lake is assessed a support for the *Aquatic Life Use* based upon the water quality data.

PRIMARY AND SECONDARY CONTACT RECREATION AND AESTHETICS USES
There are two beaches along the shoreline of Upper Highland Lake: Campers Beach and Day-use Area Beach.

Due to too limited data, the *Primary* and *Secondary Contact Uses* are not assessed. The Aesthetics Use is assessed as support based upon the lack of objectionable deposits or conditions and the good Secchi disk depth.

Upper Highland Lake (SEGMENT MA34093) Use Summary Table

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

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses, particularly bacteria monitoring to assess the *Primary* and *Secondary Contact Recreation* uses observed in Upper Highland Lake.

UPPER VAN HORN PARK POND (SEGMENT MA34128)
Location: Springfield
Length/area: 8 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of nutrients, noxious aquatic plants and turbidity (MassDEP 2007).

USE ASSESSMENT
Dissolved oxygen levels measured at depth by the Springfield Surface Water Action Monitoring Program in 2001 were observed at levels below 5 mg/L on four occasions, thus the *Aquatic Life Use* is assessed with an Alert Status (Godfrey 2007).

No recent quality assured data are available for Upper Van Horn Park Pond, thus all uses are not assessed.

Upper Van Horn Park Pond (SEGMENT MA34128) Use Summary Table

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

* Alert Status, see details in use assessment

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

VENTURE POND (SEGMENT MA34096)
Location: Springfield
Length/area: 7 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of nutrients, noxious aquatic plants, organic enrichment/low DO and turbidity (MassDEP 2007).

USE ASSESSMENT
Dissolved oxygen levels measured at depth by the Springfield Surface Water Action Monitoring Program in 2001 were observed at levels below 5 mg/L on three occasions, thus the *Aquatic Life Use* is assessed with an Alert Status (Godfrey 2007).

No recent quality assured data are available for Venture Pond, thus all uses are not assessed.

Venture Pond (SEGMENT MA34096) Use Summary Table

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

* Alert Status, see details in use assessment

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

WATERSHOPS POND (SEGMENT MA34099)
Location: Springfield
Length/area: 162 acres
Classification: Class B.

This segment is on the 2006 Integrated List of Waters in "Category 5"- *Waters Requiring a TMDL* because of noxious aquatic plants and turbidity (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Veterans & Franconia Golf Courses (9P210628101)

USE ASSESSMENT
Secchi disk depths measured by the Springfield Surface Water Action Monitoring Program in 2001 were observed to be less than 1.2m on three occasions, thus the *Primary* and *Secondary Contact Recreation* and *Aesthetics* uses are identified with Alert Status (Godfrey 2007).

No recent quality assured data are available for Watershops Pond, thus all uses are not assessed.

Watershops Pond (SEGMENT MA34099) Use Summary Table

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

* Alert Status, see details in use assessment

RECOMMENDATIONS
Conduct water quality monitoring to evaluate designated uses.

WHITING STREET RESERVOIR (SEGMENT MA34101)
Location: Holyoke
Length/area: 102 acres
Classification: Class A.

This segment is on the 2006 Integrated List of Waters in "Category 4c"- *Impairment Not Caused by a Pollutant* due to the presence of exotic (non-native) species (MassDEP 2007).

WITHDRAWALS AND DISCHARGES
WMA (Appendix H, Table H1)
Holyoke Water Works (10613711)

USE ASSESSMENT
AQUATIC LIFE
Biology
The non-native species (*Myriophyllum spicatum*) was observed in Whiting Street Reservoir during the 1998 synoptic surveys (MassDEP 1998).

The *Aquatic Life Use* for this segment is assessed as impaired based on the presence of a non-native species.

Whiting Street Reservoir (SEGMENT MA34101) Use Summary Table

Designated Uses		Status
Aquatic Life		IMPAIRED Cause: Non-native macrophyte(s) Source: Introduction of non-native macrophyte
Fish Consumption		NOT ASSESSED
Primary Contact		NOT ASSESSED
Secondary Contact		NOT ASSESSED
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.

Conduct water quality monitoring to evaluate designated uses.

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