SUASCO WATERSHED LAKE ASSESSMENTS

A total of 125 lakes, ponds or impoundments (the term "lakes" will hereafter be used to include all) have been identified and assigned Pond and Lake Information System (PALIS) code numbers in the SuAsCo River Watershed (Ackerman 1989 and MA DEP 2002b). The total surface area of the SuAsCo River Watershed lakes is 7,147 acres. They range in size from <1 to 1,178 acres. Eighty-seven lakes are less than 50 acres and 18 are greater than 100 acres. Seven are greater than 200 acres, two are greater than 500 acres, and one is greater than 1000 acres. This report presents information on 62 of these lakes that are in the WBS database. The 62 lakes assessed in this report represent 6,586 acres or 92% of the acreage in the SuAsCo River Watershed (Figure 10). They lie wholly or partly within 25 of the basin's 36 communities (Figure 10). Five of the lakes are public water supplies (i.e., designated Class A/PWS in the MA SWQS). Three additional lakes are designated public water supplies, but they are considered by the MA DEP Drinking Water Program to be emergency public water supplies. These eight designated water supplies account for 30% (or 1176 acres) of the assessed acreage. Sixty-three lakes, which total 559 acres, are unassessed; they are not currently included as segments in the WBS database.

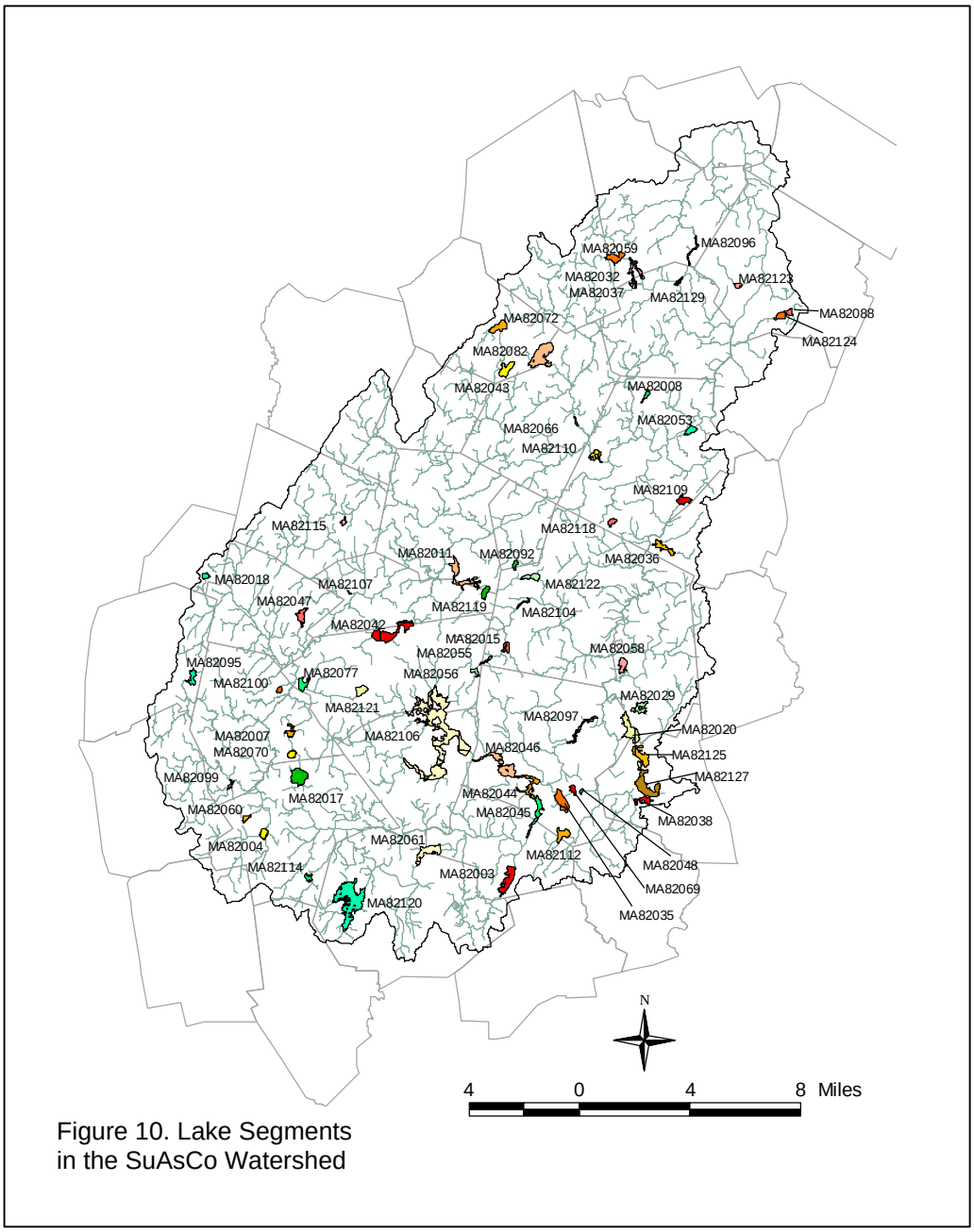

Figure 10. Lake Segments in the SuAsCo Watershed

In 2000 the Town of Littleton was awarded a s. 319 grant to remove nuisance plants from Long Pond (MA82072) via hydroraking and the installation of bottom barrier material (Appendix I). In 2002 the Town of Littleton and the Long Lake Neighborhood Association were awarded a MA DCR Lake and Pond Demonstration Restoration and Protection Project grant to demonstrate how Low Impact Development (LID) projects can reduce storm water and nutrients to lakes with large residential areas and extensive storm water collection systems. The project continues through 2005. The project will result in, among other things, the installation of grass-lined and vegetated drainage swales, the promotion of the useage of low phosphorous lawn fertilizers and natural lawn care products by offering rebates to purchase low phosphorous fertilizers, the development of a Quality Assurance Project Plan (QAPP) for pre-, during and post- Best Management Practice (BMP) implementation monitoring, and the design and implementation of effectiveness monitoring to document pre- and post-construction conditions for sharing with other communities interested in Low Impact Development (Monnelly 2004).

MA DEP awarded grants for projects on Lake Cochituate (604b and 319 grant programs) and Lake Boon (319 grant program). Additional information is available in Appendix I.

WMA (APPENDIX E, TABLE E5)

Lake Williams and White Pond (Hudson) are listed in the MA SWQS as public water supplies, but they are not currently listed in MA DEP's Water Quality Tracking System (WQTS) database or the Water Management Act database. It is unclear as to the status of these surface waters as water supplies. It should be noted that if they are emergency supplies they can only be used if the supplier requests that MA DEP impose an Emergency Declaration (Kickham 2004).

Sudbury Reservoir and Framingham Reservoir #3 are emergency backup water supplies for Wachusett Reservoir. There are three possible scenarios where the Sudbury Reservoir would be utilized: 1) Wachusett Reservoir is declared non-potable, 2) the inability to convey water from the Wachusett Reservoir to the MWRA system (e.g. failure of the Hultman Aqueduct, Sudbury Tunnel, or the City Tunnel), and 3) serious drought. In these scenarios the Sudbury Reservoir would either be used as a primary source, a pass-through of Wachusett water, or as a supplemental source. Additional information is available in the Summary of Existing Conditions and Perceived Problems section.

The following summarizes direct surface waterwithdrawals from lakes within the SuAsCo Watershed. See Appendix E for additional information.

Facility	**WMA Permit Number**	**WMA Registration Number**	**Source (S = surface)**	**Authorized Withdrawal (MGD)** system wide
Concord Water Dept.	9P31406701	31406704	3067000-01S **Nagog Pond**	2.1 (registered) 0.42 (permitted) 2.52
Marlborough DPW Water Division	9P21417001	2147001	2170000-01S **Milham Reservoir**	0.58 (reg) 1.19 (perm) 1.77
			2170000-02S **Williams Lake**	
Westborough Water Dept.	9P42132801	21432804	2328000-01S **Westborough Reservoir (Sandra Pond)**	1.92 (reg) 1.18 (perm) 3.1
Hudson Water Dept.	9P21414102	21414102	2141000-01S **Gates Pond**	2 (reg) 0.95 (perm) 2.95

The Natick Springvale Wellfield (see segment MA82A-22 and Appendix E for more information) is located along the South Basin of Lake Cochituate and consists of four sources (Friesz and Church 2001). A new well was scheduled to be drilled in 2000. Friesz and Church (2001) conducted a study to determine the potential for water from the South Basin to infiltrate the aquifer and to determine how pumping at the wells may affect water levels in the South Basin. Friesz and Church (2001) estimated that 64% $\pm$ 15% of the water withdrawn from the wells was derived from the lake water and that 1.6 MGD of lake water infiltrated the aquifer and 1.0 MGD was discharged to the wellfield.

The following WMA user is authorized to withdraw water for a pump and treat remediation project.

Facility	WMA Permit Number	WMA Registration Number	Source (S = surface)	Authorized Withdrawal (MGD) system wide
US Army Soldier Systems Center	9P31419801		Monitoring Well 15B Monitoring Well 90B (shores of Lake Cochituate- MA82127)	0.14

NPDES (APPENDIX E, TABLES E1-E4)

Lake Cochituate (MA82127)

The US Army Natick Research and Development Command (MA0001724) is permitted (17 April 1979) to discharge storm water via four outfalls (Appendix D, Table D1) to Lake Cochituate. The permit expired on 1 July 1983. This site is currently on the EPA National Priority List (Superfund Site) and is undergoing remediation. The Army has requested that the permit remain open even though they are not currently discharging (Ahsan 2003).

The DeBlois Oil Company (MA0034576) was permitted to discharge to Lake Cochituate. EPA terminated the permit in September 2002 as the facility went out of business.

Hocomonco Pond (MA82060)

The Westborough Department of Public Works (MAG640007) is permitted (28 June 2001) to discharge 0.264 MGD of effluent from the Westborough Water Purification Facility to Hocomonco Pond. This permit will expire in 2006.

Hopkinton Reservoir (MA82061)

The Ashland Howe Street Water Treatment Plant (MAG640049) is permitted (26 March 2002) to discharge an average of 0.8 MGD of treatment plant backwash to Hopkinton Reservoir. This permit will expire in 2007.

Earth Tech/Town of Ashland (MAG070104) was permitted (9 January 2001) to discharge construction dewatering for the Howe Street Water Treatment Plant to Hopkinton Reservoir. The construction has been completed and the permit has been terminated/closed.

Nutting Lake (MA82124)

Aerodyne Research Inc. (MAG250970) is permitted (13 June 2001) to discharge 0.001 MGD (1,440 gpd) of NCCW to a wetland adjacent to Nutting Lake. This permit will expire in 2006. The general permit requires that Aerodyne monitor TRC concentrations. Aerodyne's individual permit (MA0027804) was closed.

Sudbury Reservoir (MA82106)

MWRA (MA0103373) is permitted (15 August 2002) to discharge flows from the Wachusett Aqueduct Forebay via outfall 001 to the Wachusett Aqueduct Open Channel and Sudbury Reservoir. This permit will expire in 2007. The permit includes a turbidity limit of 30 NTU.

Superior Printing Ink Company (MAG250016) is permitted (5 April 2002) to discharge 0.002 MGD of NCCW to an unnamed tributary to Sudbury Reservoir. This permit will expire in 2007. The facility's individual permit (MA0029513) was closed.

Gotham Ink of New England Incorporated (MAG250830) is permitted (7 August 2001) to discharge 0.003 MGD of NCCW to Mowry Brook, a tributary to Sudbury Reservoir. This permit will expire in 2006.

Tripp Pond (MA82107)

The Town of Hudson was issued a permit (MAG640014) in September 1995 for the Gates Pond Water Treatment Plant. The permit authorizes the facility to discharge 0.084 MGD of treatment plant backwash to a tributary to Hog Brook, which flows into Tripps Pond and eventually to the Assabet

River. This permit expired in 2000. The facility is reapplying for general permit coverage (Keohane 2004). The individual permit (MA01033220) was closed.

SUPERFUND SITES

The 23-acre **Hocomonco Pond** (Segment MA82060) site is contaminated with creosotes, carcinogenic compounds, and heavy metals including arsenic and chromium. The Kettle Pond area, Hocomonco Pond, and a discharge stream were dredged and contaminated sediments were disposed of in an on-site lined landfill. Additional information is available in the Summary of Existing Conditions and Perceived Problems section of this report.

The Fort Devens-Sudbury Training Annex is a former U.S. Army military installation in the towns of Maynard, Stow, Hudson, and Sudbury near **Puffer Pond**, Taylor Brook, and the Assabet River. Contaminants at the site included VOCs, PCBs, pesticides, and inorganic compounds. All areas have been cleaned up. This site was deleted from the NPL on January 29, 2002. Most of the site (2205 acres) is now the US Fish and Wildlife Service Assabet River Wildlife Refuge, which is scheduled to open to the public in 2005. Additional information is available in the Summary of Existing Conditions and Perceived Problems.

The Natick Laboratory Army Research, Development, and Engineering Center (Natick Laboratory) is a 78-acre facility located in Natick on the eastern shore of **Lake Cochituate** (Segment MA82127). During its operation the Army used a variety of substances including the volatile organic compounds (VOCs), tetrachloroethene, trichloroethene, carbon disulfide, benzene, chloroform, and acetone; "standard laboratory chemicals;" mineral spirits/turpentine; paints; inks; lubricants; gasoline; tetraethyl lead, a gasoline additive; pesticides; and metal dusts. In addition, radioactive materials and chemical agents were used for food irradiation, tracer studies and clothing absorption tests, respectively. Other potential sources of contamination have been identified near the laboratory include automotive garages and laundromats. The Army is currently upgrading their treatment system to more fully contain contaminated groundwater on the facility. A report was submitted that described the low risks to the sediment-based aquatic food chain. The Army has identified several other areas of possible contamination at the site as part of their Master Environmental Plan and Installation Action Plan. Investigations are scheduled to be performed at some of these areas to determine the full extent of contamination. Additional information is available in the Summary of Existing Conditions and Perceived Problems section of this report.

AQUATIC LIFE

Habitat and Flow

Washakum Pond

As part of a diagnostic/feasibility (D/F) study of Washakum Pond ESS noted that the outlet is controlled by a large concrete spillway that discharges to Beaver Dam Brook. At the time of the ESS survey in November 2001 the water level was approximately three feet below the level of the spillway. Additionally, the maximum depth of the pond was 47 feet. In a 1988 D/F study the maximum depth was 52 feet. The reduction in depth is attributed to ongoing sedimentation. Sediment deposition in the southern portion of the pond may be transported by an unnamed tributary (ESS 2001).

Biology

Lake Boon

ESS conducted plant biomass mapping in Lake Boon on 14 August 1998. The dominant communities in Lake Boon included the non-native fanwort (*Cabomba caroliniana*) and variable water milfoil (*Myriophyllum heterophyllum*) with duckweed, white water lily, watershield, lakeweed, yellow water lily, bladderwort, bushy lakeweed, coontail, and watermeal also present. Additionally, filamentous green algae and blue-greens were found at several locations in "basins 2 and 3". Plant coverage was greater than 75% in most areas of basins 2 and 3. Plant biomass was greater than 75% in basin 3. Basin 1 is partially to wholly open water (ESS 1999). A TMDL was completed for Lake Boon in 2002. A MA DCR Lake and Pond Grant was awarded to the Lake Boon Association in 2002 to develop a watershed management plan to reduce total phosphorus loading by ~112 kg/yr, as recommended in the TMDL.

Hager Pond, Grist Millpond, Carding Millpond, and Stearns Millpond

On 4-6 August 1999 ENSR estimated the distribution of macrophytes and biovolume in Hager Pond, Grist Millpond, Carding Millpond, and Stearns Millpond. For the purposes of the ENSR survey macrophytes included algal mats. Only 23% of the total pond area of Hager Pond had macrophyte coverage greater than 50%. Eighty-three percent of the total pond area of Grist Millpond had coverage greater than 50%. Carding Millpond had 38% of the total pond area coverage greater than 50% and Stearns Millpond had 47%. The non-native *Potamogeten crispus* (curly-leaf pondweed) was found in Hager Pond, Grist Millpond, and Carding Millpond and the non-native *Trapa natans (*water chestnut) was found in Grist Millpond, Carding Millpond, and Stearns Millpond. The macrophyte survey of Carding Millpond occurred between harvesting activities. Extensive growths of watermeal (Wolffia *columbiana*) and duckweed (*Lemna minor*) were present in all impoundments. The aquatic plant community of Carding Millpond was dominated by *T. natans* and *Elodea canadensis* (waterweed) while Stearns Millpond, Grist Millpond, and Hager Pond were dominated by waterweed and filamentous green algae (mainly *Hydrodictyon* sp., *Spirogyra* sp., and *Rhizoclonium* sp.) (ENSR 2000).

Farm Pond

Fish population sampling was conducted at Farm Pond by MDFW using electrofishing in the spring of 2000 and gillnetting and shoreline seining in the fall for the Lakes Survey for TMDL Development (Appendix F Project 99-06/104). Using the three techniques a total of 1756 fish (11 species) were collected, of which 1691 were caught by electrofishing. The species listed in order of their abundance include 1343 bluegill, 199 pumpkinseed, 71 largemouth bass, 48 yellow perch, 33 chain pickerel, 24 yellow bullhead, 24 black crappie, eight American eel, four brown bullhead, one white perch, and one golden shiner (Hartley 2003). *Potomageton crispus* (non-native), *Lobelia sp*., and *Vallisneria americana* were identified as the dominant species of aquatic plants during the 2001 MDFW macrophyte survey. Density of all plants was 54.68% and biovolume was 15.66%, the lowest of all ponds sampled.

Heard Pond

Heard Pond was sampled by MDFW in 2000 as part of the same project (Appendix F Project 99-06/104) using electrofishing and gillnetting. Seining was not used as a technique on Heard Pond because of unsuitable habitat. There were13 species sampled and a total of 524 fish caught, of which 339 were collected by electrofishing. The species include the following, in order of their abundance: 269 bluegill, 82 white perch, 52 yellow perch, 44 pumpkinseed, 38 largemouth bass, 12 black crappie, seven chain pickerel, five carp, four American eel, four Alewife, three white sucker, three brown bullhead, and one yellow bullhead (Hartley 2003). *Pontederia cordata* and *Trapa natans* (non-native) were identified as the dominant aquatic plants during the 2001 MDFW macrophyte survey. Density of all plants was 42.9% and biovolume was 26.5%.

Washakum Pond

ESS conducted aquatic plant mapping in Washakum Pond on 5 October 2001. (Note: This is not an optimal time of year to show maximum cover.) Two major plant beds in the northwest cove, near Bethany Road and Cove Avenue, and the southwest cove, near the inlet and boat launch, account for the majority of plant cover in the pond. The southwest cove population is comprised of white water lily, muskgrass, variable milfoil, Robbin's pondweed, clasping leaf pondweed, broadleaf cattail, and common bladderwort. The northwest cove assemblage contains white water lily, muskgrass, variable milfoil, watershield, and bladderwort. Duckweed was also observed. Percent cover in these areas ranged from between 1 and 25% to between 76 and 100%. The majority of the coverage was in the 76-100% category (ESS 2001).

Willis Pond

MDFW also conducted fish sampling on Willis Pond in 2000 as part of the Lakes Survey for TMDL Development (Appendix F Project 99-06/104). In this survey electrofishing and gillnetting were used as sampling techniques. Eight species (a total of 626 fish) were collected as a result. In order of their abundance the species included: 318 bluegills, 152 yellow perch, 79 black crappie, 57 largemouth bass, 13 pumpkinseed, and one brown bullhead (Hartley 2003). *P. cordata, Nymphaea sp*, and *Typha sp*. were identified as the dominant aquatic plants observed during the MDFW 2001 macrophyte

survey. Plant cover in Willis Pond was 33.05%, the lowest of all lakes sampled. Biovolume was 23.42 %.

MDFW also conducted additional fish population sampling in the SuAsCo Watershed in 2001 using boat electroshocking and gillnets (Richards 2003a and Hartley 2003). Results are presented in Table 6.

Table 6. MDFW fish population sampling data from Sudbury Reservoir and Bartlett, Farm, Heard, Hocomonco, Nagog, and Willis ponds (Richards 2003a and Hartley 2003).

Species	Sampling Location									
	Bartlett Pond, Northborough (MA82007) 13 July 2001 (boat)	Farm Pond, Framingham (MA82035) 9 May 2001 (boat)	Farm Pond, Framingham (MA82035) 17 October 2001 (gillnet)	Heard Pond, Wayland (MA82058) 15 May 2001 (boat)	Heard Pond, Wayland (MA82058) 19 October 2001 (gillnet)	Hocomonco Pond, Westborough (MA82060) 21 August 2001 (boat)	Nagog Pond, Littleton/Acton (MA82082) 16 August 2001 (boat)	Sudbury Reservoir, Southborough (MA82106) 14 August 2001 (boat)	Willis Pond, Sudbury (MA82122) 2 May 2001 (boat)	Willis Pond, Sudbury (MA82122) 22 October 2001 (gillnet)
Alewife	--	--	--	4	1	--	--	--	--	--
American eel	--	8	--	4	--	7	--	--	1	--
Banded sunfish	--	--	--	--	--	--	1	--	--	--
Black crappie	11	24	--	12	6	5	--	7	79	3
Bluegill	238	1,343	4	269	5	111	2	66	318	3
Brown bullhead	4	4	8	3	18	3	--	--	1	4
Chain pickerel	76	33	6	7	4	52	--	8	--	1
Common carp	--	--	--	5	4	--	--	--	--	--
Golden shiner	32	1	--	--	74	5	--	--	--	--
Largemouth bass	42	71	--	38	8	57	9	40	57	--
Northern pike	--	--	--	--	6	--	--	--	--	--
Pumpkinseed	20	199	2	44	--	37	1	25	13	--
Redbreast sunfish								8	--	--
Redfin pickerel	--	--	--	--	--	1	--	--	--	--
Smallmouth bass								5	--	--
White perch	1	1	1	82	134	--	--	4	--	--
White sucker	--	--	--	3	--	5	--	--	--	--
Yellow bullhead	1	24	2	1	16	5	--	4	5	4
Yellow perch	--	48	17	52	29	8	1	74	152	18

Chemistry-water

Five lakes were surveyed in the SuAsCo Watershed by DWM to provide data for developing TMDLs. Lake monitoring included the preparation of a bathymetric map (if not already available), mapping of aquatic vegetation, Secchi disc readings, *in situ* water quality profile measurements (i.e., temperature, dissolved oxygen, pH, conductance) at one or more stations, water quality sampling for phosphorus analysis, and chlorophyll *a* determinations. Each of the following lakes was sampled on three separate occasions. (Ponds marked with an asterisk were sampled by MDFW.) Data from these surveys are presented in Appendix C, Tables C2 and C3.

LAKE	*MUNICIPALITY*
Assabet River Reservoir (A-1 site)	Westborough
Whitehall Reservoir	Hopkinton
Willis Pond*	Sudbury
Farm Pond*	Framingham
Heard Pond*	Wayland

Forty lakes statewide were sampled once each by DWM in 2003 to provide data in support of the DWM nutrient criteria derivation effort (MA DEP 2003b). Lake monitoring included: *in situ* water quality profile measurements (i.e., temperature, dissolved oxygen, pH, specific conductance), Secchi disk readings, water quality sampling for phosphorus analysis, aquatic vegetation mapping, chlorophyll *a* determinations, and the analysis of apparent color. In the SuAsCo Watershed Farm Pond, Whitehall Reservoir, and Lake Cochituate were sampled, but data are still provisional and not used in this assessment report.

Assabet River Reservoir

DWM baseline lake sampling during the summer of 2001 indicated oxygen depletion in the Assabet River Reservoir occurred below 2.5 m. Additionally, the water was found to be super-saturated and had high pH, noth of which are indicative of enrichment (Appendix C, Table C2). Total phosphorus concentrations were low. However, the deep-water samples showed evidence of phosphorus release due to the anoxic conditions (Appendix C, Table C3). The non-native aquatic macrophyte species *Myriophyllum spicatum* was documented in the lake and field sheets noted that it was "everywhere" (Mattson and Haque 2004).

Whitehall Reservoir

DWM baseline lake sampling indicated that low DO/saturation occurred at depths greater than 3 meters. Evidence was presented that total phosphorus was being released from anoxic sediments. The non-native macrophyte *Cabomba carioliana* was noted as the most dominant macrophyte and *Myriophyllum heterophyllum* was abundant in most shallow areas (Mattson and Haque 2004).

Willis Pond

Low DO/saturation was documented in the August 2001 survey at depths greater than 1.5 m and in-lake total phosphorus concentrations were low. It should be noted that data from two of the three surveys were censored. No non-native aquatic macrophytes were identified in the pond.

Farm Pond

Low dissolved oxygen occurred at depths greater than 3.5 meters and phosphorus release from anoxic sediments were evidenced. Data from two of the three surveys were censored. The non-native *Potmogeton crispus* was documented in the pond in 2001. It should be noted that two other species of non-natives (*Myriophyllum spicatum and Cabomba caroliana*) have also been documented in the pond (DeCesare 2004).

Heard Pond

In-lake total phosphorus concentrations were moderately high with evidence of release from the sediments. Two non-native aquatic macrophytes were identified *(Trapa natans* and *C. caroliana*).

Lake Boon

In 1998 ESS conducted a study of Lake Boon to "accurately assess the hydrologic and nutrient budgets, water clarity, and aquatic plant growth". Water quality monitoring was conducted at two in-lake stations in July, August, and September. Parameters analyzed included: total phosphorus, ammonia-nitrogen, Total KN, total alkalinity, total suspended solids, turbidity, pH, conductivity, dissolved oxygen, and temperature. These data did not meet MA DEP minimum acceptance criteria for external data sources and cannot be used for assessment purposes

Hager Pond, Grist Millpond, Carding Millpond, and Stearns Millpond

Water samples from the deep holes of Hager Pond, Grist Millpond, Carding Millpond, and Stearns Millpond were collected by ENSR on 2 August, 31 August, and 2 October 1999. *In situ* measurements included temperature, DO, conductivity, and pH. Grab samples were analyzed for total phosphorus, TSS, ammonia-nitrogen, and chlorophyll *a* (ENSR 2000). *In situ* measurements from 2 August were not utilized for assessment due to documented problems with QA/QC.

Hager Pond

DO concentrations in the surface waters of Hager Pond were 20.7 mg/L (244.5% saturation) and 12.3 mg/L (123.1% saturation). The DO concentrations in the bottom water of Hager Pond were 9.6 mg/L (101.1% saturation) and 7.5 (81.6% saturation). pH ranged from a low of 7.9 SU in the bottom waters to a high of 9.8 in the surface water (n=4). Conductivity readings throughout the water column ranged from 461 to 589 µS/cm. Total phosphorus concentrations in the surface waters of Hager Pond ranged from 0.22 to 0.25 mg/L. In the bottom waters of Hager Pond the total phosphorus concentration was 0.24 mg/L. The ammonia-nitrogen concentration of surface waters ranged between 0.03 and 0.21 mg/L; the bottom concentration was 0.66 mg/L. On 2 August TSS concentrations in the surface water ranged from 6 to 9 mg/L; the TSS concentration was 33 mg/L in the bottom water (ENSR 2000).

Grist Millpond

DO concentrations in the surface waters of Grist Millpond were 10.4 mg/L (120.4%) and 7.5 mg/L (70.5%). The DO concentrations in the bottom water of Grist Millpond were 5.7 mg/L (65%) and 7.8 (73.3%). pH ranged from 8 SU to 8.7 SU. Conductivity readings throughout the water column ranged from 398 to 580 µS/cm. Total phosphorus concentrations in the surface waters of Hager Pond ranged from 0.11 to 0.58 mg/L (n=3). In the bottom waters of Grist Millpond, the total phosphorus concentrations were 0.11 and 0.58 mg/L. The ammonia-nitrogen concentration of surface waters ranged between 0.03 and 0.21 mg/L; the bottom concentration was 0.66 mg/L. TSS concentrations in the surface water ranged from 6 to 9 mg/L; the TSS concentration was 33 mg/L in the bottom water on 2 August (ENSR 2000).

Carding Millpond

DO concentrations in the surface waters of Carding Millpond were 17.5 mg/L (205.2%) and 8.2 mg/L (79.3%). The DO concentrations in the bottom water of Carding Millpond were 9.3 mg/L (93.1%) and 8 (72.8%). pH ranged from 7.5 SU to 9.1 SU. Conductivity readings ranged from 364 to 569 µS/cm. Total phosphorus concentrations in the surface waters of Carding Millpond were 0.11 and 0.71 mg/L. In the bottom waters the total phosphorus concentrations ranged from 0.15 to 0.85 mg/L. The ammonia-nitrogen concentrations of surface waters ranged between 0.02 and 0.14 mg/L; the bottom concentrations ranged between 0.05 and 0.12 mg/L. TSS concentrations ranged from 11 to 56 mg/L (n=4) (ENSR 2000).

The outlet to Carding Millpond was also sampled by ENSR. Dissolved oxygen concentrations were 8.4 mg/L (95.1%) and 9.25 mg/L (90.7%). Conductivity readings were 568 and 370 µS/cm. pH values were 8.2 and 7.49 SU. The temperature of the water at the outlet was 21.7° C on 31 August. Total phosphorus concentrations ranged between 0.12 and 2.01 mg/L. Ammonia - nitrogen concentrations ranged between 0.05 and 0.22 mg/L. TSS concentrations ranged between 8 and 252 (mg/L). It should be noted that the highest concentrations of total phosphorus, ammonia-nitrogen, and TSS were recorded during wet weather sampling. Flows at the outlet of Carding Millpond ranged from 2.57 to 4.91 cfs (n=3).

Stearns Millpond

Stearns Millpond is the shallowest of the four ponds in the Hop Brook watershed (3 feet maximum depth). DO concentrations in Stearns Millpond ranged from 12.4 to 18.1 mg/L and percent saturations ranged from 116.5% to 209.4% (n=4). pH ranged from 7.8 SU to 9.2 SU. Conductivity readings ranged from 272 to 494 µS/cm. Total phosphorus concentrations ranged between 0.08 and 0.55 (n=4). The ammonia-nitrogen concentrations in Stearns Millpond ranged between 0.01 and 0.09 (n=3) mg/L. TSS concentrations ranged from 1 to 28 mg/L (n=3) (ENSR 2000).

The outlet to Stearns Millpond was also sampled by ENSR. Dissolved oxygen concentrations were 6.9 mg/L (75.6%) and 10.99 mg/L (107.7%). Conductivity readings were 467 and 273µS/cm. pH values were 7.8 and 7.22 SU. The temperatures were 19.7° C and 14.14°C. Total phosphorus concentrations ranged between 0.03 and 0.38 mg/L (n=3). Ammonia-nitrogen concentrations were all 0.03 mg/L (n=3). TSS concentrations ranged between 1 and 16 mg/L (N=3). Flows at the outlet ranged from 3.34 to 8.38 cfs (n=3).

Dudley Pond

Dudley Pond was sampled monthly by the MWRA between 2000 and 2002. Profiles of dissolved oxygen, percent saturation, pH, and conductivity were measured at one foot intervals. Grab samples were also collected and analyzed for alkalinity, ammonia-nitrogen, total phosphorus, TSS, and turbidity (White 2004). Oxygen depletion was measured at depths greater than 3.3 meters, and area equivalent to approximately 20% of the surface area of the lake.

Washakum Pond

In November 2001 as part of a diagnostic/feasibility study of Washakum Pond in Ashland ESS conducted water quality sampling at the two deepest stations. Parameters measured included: temperature, dissolved oxygen, conductivity, pH, turbidity, and total phosphorus (ESS 2001). Even in November the pond was found to be stratified, with the thermocline occurring at approximately 11 meters. DO concentrations above the thermocline were greater than 5 mg/L, while bottom concentrations were less than 2 mg/L. In-lake total phosphorus concentrations were 0.004 and 0.06 mg/L, while sediment total phosphorus concentrations were 0.03 and 0.86 mg/L.

Walden Pond

From April 1997 to July 2000 USGS examined the trophic ecology and groundwater contributing area of Walden Pond (Colman and Friesz 2001). The study determined that Walden Pond, a glacial kettle-hole lake with no inlets or outlets, gains water from the aquifer along its eastern perimeter and loses it to the aquifer along its western perimeter. Colman and Friesz (2001) determined that Walden Pond is a mesotrophic lake and that the entire hypolimnion becomes devoid of dissolved oxygen before fall circulation in late November. The residence time of water in Walden Pond was estimated to be five years. Walden Pond is part of the Walden Pond State Reservation and has high public use. Sources of nutrients to the pond are groundwater, atmospheric deposition, birds, stocked fish, swimmers, runoff from parking lots and road runoff, and the septic leach field (Colman and Friesz 2001). In-lake profiles for pH, DO, conductance, and temperature were collected bi-weekly during temperature stratification and occasionally from March 1997 to July 1999 at the deep-hole station. They were also measured monthly at the east basin in 1997 and 1998. Nutrient and chlorophyll *a* samples were also collected monthly. The thermocline in Walden Pond was determined to be around 6 m. The average chlorophyll *a* concentration in the epilimnion was 1.2 µg/L in 1997 and 1.6 µg/L in 1998. The average concentration in the metalimnion was 2.4 µg/L. DO concentrations in the epilimnion ranged from 8 mg/L to 12 mg/L. Conductivity ranged between 83 and 92 µS. pH varied from 6.5 to 8.5 SU. Total phosphorus concentrations ranged from approximately 0.002 mg/L in the epilimnion to 0.052 mg/L in the hypolimnion (Colman and Friesz 2001).

DWM also conducted water quality sampling in Walden Pond in 1996 (Appendix G).

Chemistry- sediment

USGS collected reservoir sediment cores from the deep hole and a littoral site in Whitehall Reservoir (reference site) in August 1994 and from Framingham Reservoir No. 2 in August 1994 and May 1995 as part of a study to evaluate the potential for transport of total mercury and methylmercury from the

reservoir sediments to the water column (Colman *et al.* 1999). The Sudbury River, including Reservoir No.2, was contaminated with mercury from the Nyanza chemical waste dump site (see Summary of Existing Conditions and Perceived Problems for more information). Mercury concentrations in sediments were "typically greatest in impoundments and slow flowing reaches, with peak values exceeding 50 µg/g dry weight $^{-1}$ in Reservoir No. 2 (Weiner and Shields 2000). The most contaminated sediments in Reservoir No. 2 were 6-12 cm deep and Weiner and Shields (2000) believe that the gradual burial of the sediments is decreasing the amount of inorganic mercury available for methylation. EPA excavated and capped the highly contaminated sediments at the Nyanza site in 1991. Results of mercury transport modeling indicate that very little contaminated bed sediments are mobilized and transported downstream from Reservoirs 1 and 2 (Weiner and Shields 2000).

Chemistry-tissue

USGS caged mussel studies (Beckvar *et al*. 2000) found accumulation of mercury in caged mussels was greatest within Framingham Reservoir No. 2.

The United States Fish and Wildlife Service conducted a study of contaminant levels in the Sudbury River from 1986-1989 to determine the risks of pollution affecting the Great Meadows National Wildlife Refuge. In 1986 fish were collected by gillnetting from Heard Pond, Great Meadows Pond #3 and North Great Meadows Pond and in 1987 from Framingham Reservoir #1. Ten similar sized whole body composite samples of each species (yellow perch, white perch, black crappie) were analyzed for heavy metals, PCBs, PAHs (1987 only) and organochlorine pesticides (Eaton and Carr 1991). It is important to note that Eaton and Carr compared whole fish concentrations to the FDA action level of 2.0 ppm for edible portions. Eaton and Carr concluded, "Only the fish in the refuge impoundments appeared to be relatively free of PCB contamination." Heard Pond black crappie, yellow perch, white perch, and black bullhead had total PCB concentrations ranging from a low of 2.57 ppm (black crappie) to a high of 6.62 ppm (white perch). This study helped to determine that Raytheon was a source of contamination to this area. Mercury concentrations were less than 0.5 ppm in most samples taken in 1986 and 87 (Eaton and Carr 1991). The USFWS conducted similar sampling in the Sudbury Watershed in 2003. Data are not yet available from this recent sampling (Sprague 2004).

The *Aquatic Life Use* is assessed as support for Willis Pond and Walden Pond. However, the *Aquatic Life Use* for Walden Pond is identified with an Alert Status because ~35% of the lake area is affected by oxygen depletion (depths greater than 15 meters).

The *Aquatic Life Use* is assessed as impaired for the Assabet River Reservoir and Whitehall Reservoir due to the presence of non-native aquatic macrophytes, low dissolved oxygen, and oxygen saturation.

Due to the presence of non-native macrophytes identified during the 2001 baseline surveys Farm Pond and Heard Pond are assessed as impaired.

The lakes in the Hop Brook subwatershed (Carding Millpond, Stearns Millpond, Grist Mill Pond, and Hager Pond) are assessed as impaired due to the presence of non-native macrophytes, high dissolved oxygen superaturation, and high total phosphorus.

Additionally, Ashland Reservoir, Bartlett Pond, Batemans Pond, Boons Pond, Chauncy Lake, Lake Cochituate Middle Basin, Lake Cochituate Carding Basin, Lake Cochituate South Basin, Fisk Pond, Fort Meadow Reservoir, Framingham Reservoir #1, Framingham Reservoir #3, Great Meadows Pond #3, Hopkinton Reservoir, Little Chauncy Pond, Meadow Pond, North Great Meadows Pond, Nutting Lake East Basin, Rocky Pond, Russell Millpond, Saxonville Pond, Warners Pond and Willing Pond are assessed as impaired due to the presence of non-native macrophyte species observed during synoptic surveys in 1995/1996.

FISH CONSUMPTION

MDPH's statewide advisory encompasses all freshwaters in Massachusetts and, therefore, the *Fish Consumption Use* for lakes in the Concord River Watershed cannot be assessed as support or partial support. The advisory does not include fish stocked by the state Division of Fisheries and Wildlife or

farm-raised fish sold commercially. The MDPH fish consumption advisory list contains the status of each waterbody for which an advisory has been issued. If a waterbody is not on the list, it may be because either an advisory was not warranted or the waterbody has not been sampled. MDPH's most current Fish Consumption Advisory list is available online at http://www.state.ma.us/dph/beha/fishlist.htm.]

In 1985 the Department of Environmental Quality Engineering, Division of Water Pollution Control (now DWM), conducted fish toxics screening of fish from six sites for aluminum, copper, chromium, cadmium, iron, lead, zinc, and mercury. The sites were: upstream of the Nyanza site, Framingham Reservoir #2, Reservoir #3, north of the Mass Pike in Framingham, Fairhaven Bay (Sudbury River), and upstream of the confluence with the Assabet River in Concord. The data from Framingham Reservoir #3 indicated elevated concentrations of mercury in three individual chain pickerel samples, while Reservoir #2 white perch had elevated levels of mercury (Jonasch 1985). Additional sampling was conducted throughout the Sudbury River Watershed in subsequent years (see below, Appendix B, and Maietta 2002). No site-specific advisory was issued for Reservoir #3 and it is not included in the Sudbury River advisory. MDPH will not issue advisories based on individual fish. It is unclear why MDPH did not issue an advisory, however, it could be because the samples were individuals. Additional sampling should be conducted in Reservoir #3 to obtain additional data and allow MDPH to determine if a site-specific advisory is warranted.

DWM conducted fish toxics monitoring at three sites in the SuAsCo River Watershed: Heard Pond (1987), Hocomonco Pond (1986), and the Sudbury River (multiple years). MDPH issued fish consumption advisories for the following waterbodies.

Heard Pond (mercury):

1. The general public should not consume any fish from this waterbody.

Hocomonco Pond (PAHs):

1. The general public should not consume any fish from this waterbody.

Sudbury River, in Ashland to the confluence with the Assabet and Concord Rivers, including Stern and Bracket Reservoirs in Framingham (mercury):

1. The general public should not consume any fish from this waterbody. This also includes Saxonville Pond/Impoundment in Framingham

In 1989 a DWM fish toxics monitoring survey at Walden Pond in Concord resulted in MDPH issuing the following fish consumption advisory due to elevated levels of mercury:

1. Children younger than 12 years, pregnant women, and nursing mothers should not eat any of the affected fish species (largemouth bass and smallmouth bass) from this waterbody.
2. The general public should limit consumption of affected fish species (largemouth bass and smallmouth bass) to two meals per month.

DWM conducted fish toxics monitoring in the Assabet River Reservoir (A1 Site) in 1993. MDPH issued a fish consumption advisory for "Mill Pond" above the GH Nichols Dam in Westborough due to elevated concentrations of mercury. The advisory states the following.

1. Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish species from this waterbody.
2. The general public should not consume any large mouth bass from this waterbody.

DWM conducted fish toxics monitoring in Lake Cochituate in July 1995 as part of a public request survey. Three largemouth bass, three black crappie, three yellow perch, three American eel, one pumpkinseed, two bluegill, and one yellow bullhead were collected and sent to WES for metals, PCB and % lipids analysis. Mercury concentrations ranged from 0.049 mg/kg in a composite of American eel to 0.411 mg/kg in a composite of largemouth bass. Organic scan analysis resulted in the detection of PCB Arochlor 1254 in four of the six samples analyzed. Concentrations ranged from none detected in composite samples of black crappie and yellow perch to 3.2 mg/kg in a composite of American eel. Composite samples of largemouth bass and sunfish as well as the individual yellow bullhead also had detectable concentrations of PCB Arochlor 1254 (Appendix B). As a result MDPH

issued the following fish consumption advisory for the Lake Cochituate due to elevated levels of PCBs in fish tissue.

1. Children younger than 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody.
2. The general public should not eat any of the affected fish species (American Eel) from this waterbody.

DWM conducted fish toxics monitoring at Boons Pond in 1983 and again in 1996. Electrofishing at Lake Boon in 1996 resulted in the collection of three largemouth bass, two black crappie, three yellow perch, three white perch, three bluegill, and three American eel. Additional species that were observed/collected, but not analyzed, included: golden shiner, pumpkinseed, brown bullhead, and chain pickerel. One brown bullhead was noted having a large melanoma. Due to elevated levels of mercury in black crappie and largemouth bass MPDH issued the following fish consumption advisory for Boons Pond.

1. Children younger than 12 years, pregnant women, and nursing mothers should not eat any of the affected fish (largemouth bass and black crappie) from this waterbody.
2. The general public should limit consumption of affected fish species (largemouth bass and black crappie) from this waterbody to two meals per month.

In July 1996 DWM also conducted fish toxics monitoring in Whitehall Reservoir. Electrofishing resulted in the collection of a number of largemouth bass that were slightly shorter than the 12-inch minimum size limit, however, three bass were retained for analysis. In addition to largemouth bass, composites of black crappie, yellow perch, and bluegill were also prepared for analysis. Additional fish sampling was conducted using trotlines on 15 August 1996 resulting in the collection of yellow bullhead and white catfish. Composite samples of largemouth bass, black crappie, yellow bullhead, white catfish, and bluegill contained mercury concentrations that exceeded the MDPH trigger level of 0.5 mg/kg. As a result, MDPH issued the following fish consumption advisory.

1. Children younger than 12, pregnant women, and nursing mothers should not eat any fish from this waterbody.
2. The general public should not consume any yellow bullhead from this waterbody.
3. The general public should limit consumption of all fish from this waterbody to two meals per month.

In September 1997 DWM fish toxics monitoring at Warner's Pond in Concord resulted in the collection of three largemouth bass, three black crappie, three yellow perch, three bluegill, and three yellow bullhead. Mercury was slightly elevated in the composite sample of largemouth bass. While the concentration (0.52 mg/kg) is consistent with data from similar waterbodies, it does exceed the MDPH's "trigger level" for mercury (Appendix B). On February 6, 1998 MDPH issued the following fish consumption advisory.

1. Children younger than 12 years, pregnant women, and nursing mothers should not eat largemouth bass from this waterbody.
2. The general public should limit consumption of largemouth bass to two meals per month.

DWM fish toxics monitoring in Nutting Lake in Billerica in August 2000 resulted in the collection of three chain pickerel, three bluegill, and three yellow bullhead. Additional species observed included: largemouth bass, American eel, black crappie, pumpkinseed, golden shiner, and yellow perch. Mercury exceeded the MDPH "trigger level" (0.5 mg/kg) in chain pickerel and yellow bullhead composite samples (Appendix B). As a result MDPH issued the following fish consumption advisory.

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

Electrofishing at Hocomonco Pond in Westborough on 21 August 2001 resulted in the collection of three largemouth bass, three yellow bullhead, three pumpkinseed, three chain pickerel, and three bluegill. Additional species observed included chain pickerel, golden shiner, brown bullhead, white sucker, redfin pickerel, American eel, and yellow perch (Appendix B). Mercury was well below the

MDPH trigger level (0.5 mg/kg) in all samples analyzed. PCBs and organochlorine pesticides were below method detection limits (MDLs). Although one of the historic contaminants of concern at the site was PAHs they were not analyzed for in 2001. (WES was unable to analyze fish tissue samples for PAHs (VOCs/SVOCs) on the gas chromatograph/mass spectrometer system.) Historic data from Hocomonco Pond and many other studies indicate that semi-volatile organic compounds such as PAHs do not bioaccumulate in fish tissue (Jonasch 1986).

Fish toxics monitoring of Sudbury Reservoir during 1987 revealed mercury concentrations in largemouth bass ranging from 0.26 to 0.50 mg/kg (n=3). Electrofishing at Sudbury Reservoir in Marlborough/Southborough on 14 August 2001 resulted in the collection of three largemouth bass, three black crappie, three yellow perch, three white perch, and three yellow bullhead. Additional species observed included pumpkinseed, chain pickerel, bluegill, redbreast sunfish, and smallmouth bass. Mercury was below the MDPH trigger level in all five samples analyzed in 2001, but the bass were smaller than those sampled in 1987 (Appendix B). Due to elevated mercury concentrations MDPH issued the following advisory.

1. Children under 12 years, pregnant women, and nursing mothers should not eat any fish from this waterbody.
2. The general public should not consume any of the affected fish species (Bass) from this waterbody.

The US Army issued a fish consumption for Puffer's Pond, Fort Devens Sudbury Training Annex, Maynard due to elevated concentrations of mercury in fish tissue (MDPH 2004). The advisory recommends the following:

1. The general public should not consume any fish from this waterbody.

Based on the above site-specific advisories the *Fish Consumption Use* is assessed as impaired for Puffer's Pond, Sudbury Reservoir, Hocomonco Pond, Heard Pond, Walden Pond, Nutting Lake (3 basins), Warner's Pond, Whitehall Reservoir, Boon's Pond, Lake Cochituate (4 basins), Assabet River Reservoir, Framingham Reservoir #1 and #2, and Saxonville Pond.

PRIMARY AND SECONDARY CONTACT RECREATION & AESTHETICS

Assabet River Reservoir

Secchi disk transparencies from the Assabet River Reservoir did not violate the bathing beach guidance of 1.2 m on any of the three water quality surveys conducted by DWM during the summer of 2001 (Appendix C, Table C3). However, the aquatic macrophyte survey found that the lake was heavily infested with the non-native *Myriophyllum spicatum* (Mattson and Haque 2004). Due to the overabundant growth/dominance of the non-native macrophyte species the *Recreational* and *Aesthetics* uses are assessed as impaired for the Assabet River Reservoir.

Heard Pond

Secchi disk transparencies in Heard Pond were 1.2 meters or less (Appendix C, Table C3) and chlorophyll *a* concentrations were elevated indicating excessive algal growths. Heard Pond is assessed as impaired for the *Recreational* and *Aesthetics* uses due to low Secchi disk transparency and excess algal growth.

Whitehall Reservoir

Secchi disk transparencies from the Whitehall Reservoir did not violate the bathing beach guidance of 1.2 m on any of the three water quality surveys conducted by DWM during the summer of 2001 (Appendix C, Table C3). However, the aquatic macrophyte survey found that the lake was heavily infested with the non-natives *C. caroliana* and *M. heterophyllum* (Mattson and Haque 2004). Due to the overabundant growth/dominance of the non-native macrophyte species the *Recreational* and *Aesthetics* uses are assessed as impaired for Whitehall Reservoir.

Lake Boon

The Lake Boon Association and the Lake Boon Commission in conjunction with the Riverways Program conducted a watershed survey of Lake Boon in Hudson and Stow in November 2002 (Riverways 2002). The survey found that the lack of storm water control and erosion control were

major issues. There is a public beach in the north end of Lake Boon. Storm drains discharge directly to Lake Boon. Foam was observed in the stream annexing the lake. Further investigation identified this foam as most likely coming from the washing of vehicles upstream. Clogged catch basins around the lake are of concern as they may overflow directly into the lake. Moderate amounts of trash and debris were noted along the roads adjacent to the shoreline. It should be noted that the Lake Boon Association conducts annual roadside cleanups. Pet wastes were also noted to be of concern especially in the vicinity of North Shore Drive and during the winter months when the lake is frozen. The Towns of Stow and Hudson were awarded a s. 319 grant for storm water mitigation projects in 2002.

A Lake Boon study by ESS in 1999 showed near 100% plant coverage in basins 2, 3, and 4. The study indicated the lake was treated with SONAR in the summer of 2002 (highly contested by some landowners). Algal blooms were noted in the lake in the fall of 2002 (ESS 1999).

ESS water quality monitoring in Lake Boon in July, August, and September 1998 included fecal coliform bacteria sampling and Secchi disk depths. In-lake fecal coliform bacteria levels were all less than 10 cfu/100mL. Secchi depths in the "north basin" ranged from 2.3 to 3.7 m and in the "south basin" were 1.5 m. ESS also conducted plant biomass mapping in Lake Boon on 14 August 1998. The dominant communities in Lake Boon included fanwort (*Cabomba caroliniana*) and water milfoil (*Myriophyllum heterophyllum*). Additionally, filamentous green algae and blue-greens were found at several locations in "basins 2 and 3". Plant coverage was greater than 75% in most areas of basins 2 and 3. Plant biovolume was greater than 75% in basin 3. Basin 1 is partially to wholly open water.

The Stow Board of Health collected weekly *E. coli* samples from the bathing beach on Lake Boon. The beach has only been closed once in three years (Cole 2004).

Although the beach was open for the majority of the bathing season, the *Recreational* and *Aesthetics* uses are assessed as impaired due to the density of the non-native macrophytes and algal blooms.

Hager Pond, Grist Mill Pond, Carding Millpond, and *Stearns Millpond*

In 1999 ENSR (2000) conducted sampling in the ponds within the Hop Brook subwatershed as part of a nutrient loading evaluation. The ponds were covered with filamentous green algae and infested with non-native plant species (See details in the *Aquatic Life Use* section under the Biology heading). Carding Millpond, Grist Mill Pond, Hager Pond, and Stearns Millpond are assessed as impaired for the *Recreational* and *Aesthetics* uses due to excessive algal growth.

Washakum Pond

Secchi disk depths measured in Washakum Pond as part of a D/F study conducted by ESS in November 2001 ranged from 1.4 to 1.9 meters. (Note: this is not the optimal time of year to measure Secchi transparency.) ESS conducted aquatic plant mapping in Washakum Pond on 5 October 2001. Two major plant beds in the northwest cove, near Bethany Road and Cove Avenue, and the southwest cove, near the inlet and boat launch, account for the majority of plant cover in the pond. The southwest cove is dominated by white water lily, muskgrass, variable milfoil, Robbin's pondweed, clasping leaf pondweed, broadleaf cattail, and common bladderwort. The northwest cove is dominated by white water lily, muskgrass, variable milfoil, watershield, and bladderwort. Duckweed was also observed. Percent cover in these areas ranged from between 1 and 25% to between 76 and 100%. The majority of the coverage was in the 76-100% category (ESS 2001). Since 1994 a management plan for Washakum Pond has included the use of herbicides and algaecides.

Under the Massachusetts Beach Bill, enacted in 2001, bacteria testing is required at public and semi-public beaches throughout the Commonwealth. In the SuAsCo Watershed the *Primary Contact Recreation Use* was assessed at ten bathing beaches where information on beach closures was available from MDPH, MA DCR (formerly MA DEM) or local boards of health. These include: Ashland Reservoir (support), Chauncy Lake (support), Lake Cochituate North Basin (support), Lake Cochituate Middle Basin (impaired), Fort Meadow Reservoir (support), Heart Pond (impaired), Hopkinton Reservoir (support), Long Pond (support), Nutting Lake East Basin (impaired), Walden Pond (support), and West Pond (support).

RECOMMENDATIONS

- Work with the Lake Boon Association, Lake Boon Commission, Stow Recreation, and other interested parties to implement their action plan including improving storm water management, educating residents about affordable BMPs for homeowners, and developing a volunteer water quality monitoring program.

- Work with the Town of Ashland and interested parties to implement the management options identified in the D/F study for Washakum Pond including conducting a watershed survey to identify sources of nutrients, using best management practices to control sedimentation problems, continuing to control aquatic plant growth, and developing a water quality monitoring program.

- Work with the Metropolitan Area Planning Council, Ashland, Framingham, Natick, Sherborn, and Wayland to implement the recommendations from the *Lake Cochituate Nonpoint Source Pollution Water Quality Management Plan* (MAPC 2004) including implementation of erosion controls and catch basin maintenance and adoption of local bylaws.

- Work with interested parties to protect the core habitats and critical supporting watersheds identified in the *Living Waters* report (NHESP 2003) including Whitehall Reservoir, White Pond, Walden Pond, and Clamshell Pond, through land conservation measures and management practices.

- In light of remediation of the Hocomonco Pond Superfund site, additional fish toxics monitoring for PAHs should be conducted in Hocomonco Pond. MDPH issued a fish consumption advisory for Hocomonco Pond. MDPH could then reevaluate the need for the current advisory.

- Additional fish toxics data should be collected from Framingham Reservoir #3. In 1985 three individual chain pickerel had mercury tissue concentrations above the FDA and MDPH trigger level of 1 mg/kg. MDPH could reevaluate the need for a site-specific advisory for Reservoir #3.

- Determine the status of Lake Williams and Williams Pond as public water supplies. If they are no longer sources the public water supply designation should be removed from the Massachusetts Surface Water Quality Standards.

- Work with the Dudley Pond Association and Water Quality Study Committee continue protecting water quality of Dudley Pond. Review the results of s. 319 grant project when available. Pre- and post project water quality monitoring could be useful to assess the *Aquatic Life Use*.

WATERSHED WIDE LAKE RECOMMENDATIONS

- Coordinate with MA DCR and/or other groups that conduct lake surveys to generate quality-assured lake data. Conduct more intensive lake surveys to better determine the lake trophic and use support status and identify causes and sources of impairment. As sources are identified within lake watersheds they should be eliminated or, at least, minimized through the application of appropriate point or non-point source control techniques.

- Work with MDPH and local municipalities to collect quality-assured data under the "Beaches Bill," which requires water quality testing (bacteria sampling) at all formal bathing beaches. When available, review data and beach closure information to assess the status of the recreational uses.

- Review the MA DEP Drinking Water Program SWAP evaluations when they are completed to develop and implement recommendations for the protection of Class A lakes in the SuAsCo Watershed.

- Work with the MA DCR Weed Watchers Program to monitor ponds in the SuAsCo Watershed for the presence of exotic invasive species and to develop a removal plan if an infestation is found. Additional information may be obtained from the MA DEM website: http://www.mass.gov/dcr/waterSupply/lakepond/lakepond.htm.

- Quick action is necessary to manage non-native aquatic or wetland plant species that are isolated in one or a few location(s) in order to alleviate the need for costly and potentially fruitless efforts to do so in the future. Two courses of action should be pursued concurrently. More extensive surveys need to be conducted, particularly downstream from recorded locations (Table 7) to determine the extent of the infestation. And, "spot" treatments [refer to the Generic Environmental Impact Report (GEIR) for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al.* 2004) for advantages and disadvantages of each] should be undertaken to control populations at these sites. These treatments may include careful hand-pulling of individual plants in small areas. In larger areas other techniques, such as selective herbicide application, may be necessary. In either case, the treatments should be undertaken prior to fruit formation and with a minimum of fragmentation of the individual plants. These actions will minimize the spreading of the populations. This GEIR (Mattson *et al.* 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic or wetland plant species.

- Where non-native plant infestations are more extensive conduct additional monitoring to determine the extent of the problem. The Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts (Mattson *et al* 2004) should be consulted prior to the development of any lake management plan to control non-native aquatic plant species. Plant control options can be selected from several techniques (i.e., bottom barriers, drawdown, herbicides, etc.) each of which has advantages and disadvantages that need to be addressed for the specific site. However, methods that result in fragmentation (such as cutting or raking) should be discouraged because of the propensity for some invasive species to reproduce and spread vegetatively (from cuttings).

- Prevent spreading of non-native 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 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 transport mechanisms and their ability/responsibility to reduce the spread of these species.

- Implement recommendations identified in TMDLs and lake diagnostic/feasibility studies, including lake watershed surveys, to identify sources of impairment. The single draft TMDL report for total phosphorus, which is being developed for the eight lakes sampled by DWM in 2001 has been delayed (Mattson 2004).

Table 7. SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Ashland Reservoir, Ashland	MA82003	168	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	SUPPORT	SUPPORT	SUPPORT
There is a concrete boat ramp that is maintained by MA DCR that allows fishing access to Ashland Reservoir (PAB 2003).A non-native aquatic macrophyte species (*M. heterophyllum*) was identified in the 1996 synoptic survey (Appendix C, Table C1). Since the reservoir is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. Ashland Reservoir in Ashland State Park was closed to swimming between 26 June and 3 July 2001 (7 days) and 16 August to 17 August 2001 (MDPH 2002b). In 2002 Ashland Reservoir was also closed to swimming for two days (between 30 May and 1 June and 20 and 21 June) (MDPH 2002b). Since the beach was open for the majority of the 2001 and 2002 bathing season the *Recreational* and *Aesthetic* uses are assessed as support. Ashland Reservoir is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							
Assabet River Reservoir, Westborough	MA82004	338	IMPAIRED (Non-native aquatic plants, dissolved oxygen saturation, dissolved oxygen)	IMPAIRED (Mercury)	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Non-native aquatic plants)
In 2001 DWM surveyed the lake three times. Low DO/saturation occurred at depths greater than 2.5 m during the 2001 survey. High pH and supersaturation were documented during the three surveys (Appendix C, Table C2). These conditions are indicative of an enriched lake system. In-lake total phosphorus concentrations were not high, but there was evidence of phosphorus release from anoxic sediments. A non-native aquatic macrophyte species (*M. spicatum*) was identified in the 1996 synoptic survey (Appendix C, Table C1). The *Aquatic Life Use* is assessed as impaired because of low DO/saturation and the presence of the non-native aquatic macrophyte species. Fish toxics monitoring in Assabet River Reservoir was conducted by DWM in 1993 (Maietta 2002). Since MDPH issued a site-specific fish consumption advisory due to mercury for "Mill Pond" above the GH Nichols Dam in Westborough the *Fish Consumption Use* is assessed as impaired. There is no formal bathing beach on the Assabet River Reservoir (McNulty 2004). None of the Secchi disk depth measurements taken during the 2001 DWM surveys violated the bathing beach guidance of four feet (Appendix C, Table C3). Because of the high percentage of biovolume occupied by aquatic macrophytes, including a non-native aquatic plant, in the Assabet River Reservoir, the *Primary* and *Secondary Contact Recreational* and *Aesthetics* uses are assessed as impaired. The Assabet River Reservoir is on the 2002 Integrated List of Waters in Category 5 because of metals, noxious aquatic plants, turbidity, and exotic species (MA DEP 2003a).							
Bartlett Pond, Northborough	MA82007	52	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
There is a concrete boat ramp, maintained by Northborough Conservation Commission, that allows fishing access to Bartlett Pond (PAB 2003). Three non-native aquatic macrophyte species (*C. caroliana, M. spicatum, P. crispus*) were identified in the 1996 synoptic surveys (Appendix C, Table C1). Since the pond is infested with three non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. There are no bathing beaches on Bartlett Pond (Kent 2004). Bartlett Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a). There is a 1986 D/F Study of Bartlett Pond.							
Batemans Pond, Concord	MA82008	26	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic macrophyte species (*Marsilea quadrifolia*) was identified during the 1996 synoptic survey (Appendix C, Table C1). Since the pond is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. Batemans Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Boons Pond, Stow/Hudson (A.k.a. Lake Boon)	MA82011	173	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Mercury)	IMPAIRED (Non-native aquatic plants and excess algal growth)	IMPAIRED (Non-native aquatic plants and excess algal growth)	IMPAIRED (Non-native aquatic plants and excess algal growth)
Two non-native aquatic species (*C. caroliana* and *M. heterophyllum*) were identified during the 1996 synoptic survey (Appendix C, Table C1). Since the pond is infested with two non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. DWM conducted fish toxics monitoring in Lake Boon in 1983 and 1996. MDPH issued a site-specific fish consumption advisory for Lake Boon so the *Fish Consumption Use* is assessed as impaired. There is a formal bathing beach on Lake Boon in the Town of Stow. The Stow Board of Health collects weekly *E. coli* samples from Lake Boon. The beach has been closed only once in three years due to elevated bacteria counts (Cole 2004). Algal blooms were noted in the lake during the ESS 1998 survey and blue-green species dominated the assemblage (ESS 1999). Additionally, algal blooms were also mentioned as occurring in the fall of 2002 (Riverways 2002). Although the beach was open for the majority of the 2001, 2002, and 2003 bathing seasons the *Recreational* and *Aesthetic* uses are assessed as impaired because of the density of the non-native macrophytes, particularly in the shallow southeast basin and the reported algal blooms. Boons Pond is on the 2002 Integrated List of Waters in Category 5 because of metals, noxious aquatic plants, and exotic species (MA DEP 2003a). The TMDL of Phosphorus for this pond is to be reduced from the current estimated loading of 366 kg/year to a target load of 254 kg/year (MA DEP 2002a). The Riverways Lake Watershed Program selected Lake Boon as pilot project for conducting a watershed survey. MA DEP awarded a s. 319 grant to implement the recommendations from the TMDL report. In 2002 the pond was treated with the herbicide SONAR.							
Carding Mill Pond, Sudbury	MA82015	40	IMPAIRED (Non-native aquatic plants, dissolved oxygen saturation, and total phosphorus)	NOT ASSESSED	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)
DWM conducted a synoptic survey of Carding Mill Pond in 1996 (Appendix C, Table C1). Carding Mill Pond was sampled as part of the ENSR Hop Brook Study (ENSR 2000). Two non-native aquatic macrophyte species, *Potamogeten crispus* (curly-leaf pondweed) and *Trapa natans (*water chestnut), were documented in the pond in July 1999 (ENSR 2000). Elevated concentrations of total phosphorus, supersaturation of dissolved oxygen, and a very dense cover of filamentous algae and macrophytes (e.g., duckweed) were also documented. Because of these conditions the *Aquatic Life, Primary and Secondary Contact Recreational* and *Aesthetics* uses are assessed as impaired. The major source of phosphorus to the Hop Brook system is the Marlborough East Wastewater Treatment Facility discharge. Carding Mill Pond is on the 2002 Integrated List of Waters in Category 5 because of nutrients and noxious aquatic plants (MA DEP 2003a).							
Chauncy Lake, Westborough	MA82017	173	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	SUPPORT	SUPPORT	SUPPORT
A non-native aquatic species (*M. s*picatum) was identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Since the pond is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. There are two public beaches on Chauncy Lake. One beach is at the Westborough State Hospital and is not tested by the Board of Health. At the other beach the Board collects weekly *E. coli* samples during the swimming season, which is June 19 to August 15. The beach has never been closed (McNulty 2004). Since the beach was open for the majority of the 2001, 2002, and 2003 bathing seasons the *Recreational* and *Aesthetic* uses are assessed as support. Chauncy Lake is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a). A 1996 D/F study of Chauncy Lake was prepared by Whitman and Howard Inc (MA DEP 2005).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Clamshell Pond, Clinton	MA82018	24	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Clamshell Pond (Appendix C, Table C1). Clamshell Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a). There is no formal public beach on Clamshell Pond (Clinton BOH 2004).							
Lake Cochituate (North Basin), Framingham/ Natick/ Wayland	MA82020	195	IMPAIRED (Non-native aquatic plants)	IMPAIRED (PCBs)	SUPPORT	SUPPORT	Not Assessed
There is a cartop boat access, maintained by MA DCR, that allows recreational access to this basin of Lake Cochituate in Wayland (PAB 2003). In 1996 DWM conducted a synoptic survey of Lake Cochituate (Appendix C, Table C1). Eurasian milfoil (*M. spicatum*) was identified in Lake Cochituate in June 2003 by MA DCR. In 2003 DWM conducted monitoring in Lake Cochituate for nutrient criteria development. Due to the presence of the non-native aquatic macrophyte species, the *Aquatic Life Use* is assessed as impaired. In 1995 DWM conducted fish toxics monitoring in the South Basin of Lake Cochituate. MDPH issued a site-specific fish consumption advisory for all of Lake Cochituate due to elevated concentrations of PCBs. Because of the site-specific advisory the *Fish Consumption Use* is assessed as impaired. The Framingham Board of Health conducted weekly bacteria sampling from mid-June to September of 2001 and 2002 in Lake Cochituate. The Wayland Board of Health also conducted weekly bacteria sampling at the Wayland Town Beach on Lake Cochituate between Memorial Day and Labor Day 2001 and 2002. The Wayland Town Beach was closed only once on 7 June 2002. The Wayland Board of Health believes that Canada geese and other waterfowl are the main source of bacteria (Calichman 2004). Because the beaches were open for the vast majority of the 2001 and 2002 bathing seasons the recreational uses are assessed as support. A s. 319 grant was awarded in 2001 (01-01/319) to install BMPs to reduce sediment and nutrient loads entering the lake from Snake Brook. Lake Cochituate (North Basin) is on the 2002 Integrated List of Waters in Category 5 because of priority organics and organic enrichment/low DO (MA DEP 2003a). The MAPC (2004) *Lake Cochituate Nonpoint Source Pollution Water Quality Management Plan* provides recommendations to improve water quality degradation associated with storm water runoff throughout the Lake Cochituate watershed.							
Lake Cochituate Middle Basin, Natick/ Wayland	MA82125	135	IMPAIRED (Non-native aquatic plants)	IMPAIRED (PCBs)	IMPAIRED *Enterococci*	Not Assessed	Not Assessed
There is a concrete boat ramp, maintained by MA DCR, that allows recreational access to Lake Cochituate in Wayland (PAB 2003). In 1996 DWM conducted a synoptic survey of Lake Cochituate (Appendix C, Table C1). Three non-native aquatic species (*M. spicatum, M. heterophyllum, P. crispus*) were identified in the Middle Basin of Lake Cochituate by MA DCR (Straub 2004). In 2003 DWM conducted monitoring in Lake Cochituate for nutrient criteria development. The *Aquatic Life Use* is assessed as impaired because of the presence of the non-native aquatic macrophyte species. DWM conducted fish toxics monitoring in the South Basin of Lake Cochituate in 1995. MDPH issued a site-specific fish consumption advisory for all of Lake Cochituate due to elevated concentrations of PCBs in fish tissue. The MA DCR Lake Cochituate Beach in Natick near Route 30 was closed to swimming in 2001 between 6/28 and 7/4, 8/23 and 8/25, and 8/30 and 9/1. In 2002 the beach in Natick was closed between 6/20 and 6/21, 6/26 to 6/30, and 8/14 to 8/16 due to elevated *Enterococci* counts. The beach was also closed between 8/13 and 8/14 due to suspected swimmer's itch (MDPH 2002b). The *Primary Contact Recreational Use* is assessed as impaired because of the frequency and duration of beach postings due to elevated bacteria counts. Lake Cochituate (Middle Basin) is on the 2002 Integrated List of Waters in Category 5 because of priority organics and organic enrichment/low DO (MA DEP 2003a). There was a technical memorandum that examined nutrient controls at Lake Cochituate in 1980 and a Lake Cochituate Restoration Project (MA DEP 2005).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Lake Cochituate (Carling Basin), Natick	MA82126	14	IMPAIRED (Non-native aquatic plants)	IMPAIRED (PCBs)	Not Assessed	Not Assessed	Not Assessed
DWM conducted monitoring in Lake Cochituate in 2003 for nutrient criteria development. Three non-native aquatic macrophytes (*M. spicatum, M. heterophyllum, P. crispus*) were identified in both the Middle and South basins of Lake Cochituate by MA DCR (Straub 2004). It is presumed that these non-native macrophytes are also in this portion of Lake Cochituate so the *Aquatic Life Use* is assessed as impaired. DWM conducted fish toxics monitoring in the South basin of Lake Cochituate in 1995. MDPH issued a site-specific fish consumption advisory for all of Lake Cochituate due to elevated levels of PCBs in fish tissue. Because of the site-specific advisory the *Fish Consumption Use* is assessed as impaired. Lake Cochituate (Carling Basin) is on the 2002 Integrated List of Waters in Category 5 because of priority organics (MA DEP 2003a).							
Lake Cochituate (South Basin), Natick	MA82127	240	IMPAIRED (Non-native aquatic plants)	IMPAIRED (PCBs)	Not Assessed	Not Assessed	Not Assessed
The Army Natick R&D Lab Superfund Site is located on the banks of the South Basin of Lake Cochituate. In 1996 DWM conducted a synoptic survey of Lake Cochituate (Appendix C, Table C1). At the time of that survey a species of *Myriophyllum* was identified, but could not be confirmed as *M. heterophyllum*. Three non-native aquatic species (M*. spicatum, M. heterophyllum, P. crispus)* were identified in the South Basin of Lake Cochituate by MA DCR (Straub 2004). Friesz and Church (2001) noted that storm sewers adjacent to the "South Pond" of Lake Cochituate drain directly into the lake. Approximately bi-weekly (February 1998 to July 1999) and continuous (18 September to 19 September 1998) water temperatures recorded in the South Basin as part of the Friesz and Church study ranged from 2.5°C in February 1999 to 27.7 °C in August 1998 (n=80). Conductivities recorded as part of the Friesz and Church study ranged from 224 to 424 µS/cm (n=30). The *Aquatic Life Use* is assessed as impaired because of the presence of the non-native aquatic macrophyte species. DWM conducted fish toxics monitoring in the South Basin of Lake Cochituate in 1995 (Maietta 2002, Appendix B, Table B1). MDPH issued a site-specific fish consumption advisory for all of Lake Cochituate due to elevated PCB concentrations in fish tissue. Potential sources are unknown at this time (PCBs are not a site contaminant of concern at the Superfund site). Because of the site-specific advisory the *Fish Consumption Use* is assessed as impaired. The Natick Board of Health samples the semi-public beach at the handicapped day camp for *E. coli* bacteria (Wade 2004) and there were no reported closures. Too limited data are available so the recreational uses and aesthetics uses are currently not assessed. Lake Cochituate (South Basin) is on the 2002 Integrated List of Waters in Category 5 priority organics and organic enrichment/low DO (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Dudley Pond, Wayland	MA82029	83	IMPAIRED (Non-native aquatic plants and dissolved oxygen)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Two non-native aquatic species (*M. spicatum and P. crispus*) were identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Efforts by the Dudley Pond Association to control the spread of milfoil include: whole lake Sonar treatments in 1999 and 2003, hand-pulling and suction harvesting study in 1995 and 2002, and a study on the effects of milfoil eating weevils in 2002. In 2003 ENSR conducted a drawdown feasibility study of Dudley Pond (Town of Wayland 2004). In-lake water quality sampling was conducted in Dudley Pond between 2000 and 2002 (White 2004). Low DO/saturation occurred at depths greater than 3.3 m during the summer months. In-lake total phosphorus concentrations were fairly low with minimal evidence of phosphorus release from anoxic sediments. Since the pond is infested with two non-native aquatic macrophyte species and because of the oxygen depletion that affected approximately 20% of the bottom area of the pond the *Aquatic Life Use* is assessed as impaired. There is no formal bathing beach at Dudley Pond, although swimmers have been observed by the Board of Health. There is a public boat launch on Dudley Pond. The pond was tested monthly by MWRA in 2001 and 2002 *E. coli* samples collected by MWRA during the summer months of 2001 and 2002 did not reveal any bacterial problems (Calichman 2004). While the bacteria results did not indicate a problem, because the samples were not analyzed for fecal coliform bacteria, the *Recreational Uses* are not assessed. Dudley Pond is on the 2002 Integrated List of Waters in Category 5 because of turbidity and exotic species (MA DEP 2003a). IEP prepared a D/F Study of Dudley Pond in 1983 (MA DEP 2005). GeoSyntac produced a *Stormwater Infrastructure Assessment Technical Report* in 2004 for the Town of Wayland (Town of Wayland 2004). The report identified storm water runoff from the areas associated with the Middle School and the Wayland Highway Department properties on Main Street as sources of sediment and nutrients to Dudley Pond. In 2004 the Town of Wayland, in association with the Dudley Pond Association, was awarded a s. 319 grant to conduct a comprehensive water quality improvement project (Appendix F) aimed at reducing sediment and nutrient loading to the pond and controlling the Eurasian milfoil infestation. Additionally, the project scope includes stenciling 106 storm drains in the Dudley Pond watershed and monitoring pre- and post- project water quality at five locations for total phosphorus and TSS and aquatic vegetation mapping.							
Elm Street Pond, Chelmsford/ Carlisle	MA82032	66	NOT ASSESSED *	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Elm Street Pond (Appendix C, Table C1). Manipulation of the water level (draining of the pond) associated with cranberry bog dam operation and maintenance has occurred in the past (Wilson 2004). Therefore, the *Aquatic Life Use* is identified with an Alert Status. There is no formal bathing beach on Elm Street Pond (Day 2004). Elm Street Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Farm Pond, Framingham	MA82035	140	IMPAIRED (Non-native aquatic plants and excess algal growth)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
There is cartop boat access site, which is presently being reconstructed, on Farm Pond that is maintained by the Town of Framingham (PAB 2003). Non-native aquatic macrophyte species (*M. spicatum, P. crispus* and *C. caroliniana*) have been reported in the pond (Decesare 2004). During the 1996 synoptic survey a species of *Myriophyllum* was identified but could not be confirmed as *M. heterophyllum.* The pond has been treated with several herbicides and algaecide between 1996 and 2001. In 2001 MDFW surveyed the lake for MA DEP for the purpose of TMDL development. Low DO/saturation occurred at depths greater than 3.5 m during the August 2001 survey. Data from the other two surveys in the summer of 2001 were either censored or were not collected at the deep hole (Appendix C, Table C2). In-lake total phosphorus concentrations were not high, but there was evidence of phosphorus release from anoxic sediments. None of the Secchi disk depth measurements violated the bathing beach guidance of four feet (Appendix C, Table C3). Since the pond is infested with non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. The limited current data are not inconsistent with previous studies, which indicated that Farm Pond is an enriched waterbody so it is best professional judgment that the *Aquatic Life Use* is also impaired as a result of excess algal growth. Suspected sources include municipal urban high density areas (84), discharge from separate storm sewer systems (MS4)(34) and internal nutrient recycling (65). Sampling was also conducted by DWM in 2003 as part of a nutrient criteria development project but these data are not yet available. Farm Pond is on the 2002 Integrated List of Waters in Category 5 because of noxious aquatic plants, turbidity, and exotic species (MA DEP 2003a). MDFW conducted fish population sampling in Farm Pond in May 2001 (Richards 2003a and Hartley 2003).							
Farrar Pond, Lincoln	MA82036	83	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Farrar Pond (Appendix C, Table C1). There is no formal bathing beach on Farrar Pond (Lincoln BOH 2004). Farrar Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a).							
Fiske Street Pond, Carlisle/Chelmsford	MA82037	38	NOT ASSESSED*	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Fiske Street Pond (Appendix C, Table C1). Manipulation of the water level (draining of the pond) associated with cranberry bog dam operation and maintenance has occurred in the past (Wilson 2004). Therefore, the *Aquatic Life Use* is identified with an Alert Status. Fiske Street Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a).							
Fisk Pond, Natick	MA82038	61	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic macrophyte species (*M. heterophyllum*) was identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Since the pond is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. There is no formal bathing beach on Fisk Pond (Wade 2004). Fisk Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Fort Meadow Reservoir, Marlborough/ Hudson	MA82042	248	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	SUPPORT	SUPPORT	NOT ASSESSED
Cartop boat access is available on Fort Meadow Reservoir (PAB 2003). In 1996 DWM conducted a synoptic survey of Fort Meadow Reservoir (Appendix C, Table C1). The Reservoir is infested with *Myriophyllum spicatum*. The lake was treated in 2001 with herbicides to control the non-native plant infestation. Since the reservoir is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. The Hudson Board of Health conducted weekly bacteria sampling on Fort Meadow Reservoir between mid-June and Labor Day in 2001 and 2002. The beach was closed to swimming between 6-19 and 6-21-2002 due to elevated *E. coli* bacteria counts (MDPH 2002b). Since the beach was open for the majority of the 2001 and 2002 bathing seasons the *Recreational* uses are assessed as support. Fort Meadow Reservoir is on the 2002 Integrated List of Waters in Category 5 because of nutrients (MA DEP 2003a). A 1987-88 D/F study was prepared for Fort Meadow Reservoir by IEP Inc and CDM (MA DEP 2005). MDFW has proposed that Flagg Brook, a tributary to Fort Meadow Reservoir, be protected as cold-water fishery habitat (Richards 2003b). Additional monitoring of the fish population, DO, and temperature is needed to evaluate MDFW's proposal to list Flagg Brook as a cold water fishery in the next revision of the Surface Water Quality Standards.							
Fort Pond, Littleton	MA82043	102	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey in Fort Pond (Appendix C, Table C1). Fort Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Framingham Reservoir #1, Framingham (a.k.a. Stearns Reservoir)	MA82044	117	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Mercury)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED

Two non-native aquatic macrophyte species (*M. heterophyllum, M. spicatum*) were identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). ENSR conducted limited water quality monitoring at one station (SR15- above dam, Winter Street, Framingham) in Reservoir #1 as part of the Sudbury River Water Quality Study (ENSR 2004a). *In-situ* measurements of DO, temperature, pH and conductivity were taken in July and August 2002 and July and August 2003. Grab samples were also collected and analyzed for ammonia-nitrogen, total phosphorus and TSS. With the exception of one slightly elevated saturation measurement (109%) and somewhat elevated specific conductivies (ranged from 392 to 456 µS/cm), the limited water quality sampling did not indicate any other problems. Since the pond is infested with two non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. DWM conducted fish toxics monitoring for metals in Framingham Reservoir #1 in 1986 (Maietta 1989). MDPH issued a fish consumption advisory for the pond due to mercury so the *Fish Consumption Use* is assessed as impaired. The source of mercury is associated with the Nyanza Superfund Site. Framingham Reservoir #1 is on the 2002 Integrated List of Waters in Category 5 for metals, noxious aquatic plants and exotic species (MA DEP 2003a). ENSR also collected bacteria samples in the summers of 2002/2993. Although fecal coliform bacteria counts ranged from 20 to 300 cfu/100 mL (n=4) with only one of the samples exceeding 200 cfu/100mls, too limited data are available to assess the *Primary and Secondary Contact Recreational* uses.

While not included in the *Aquatic Life Use* assessment it should also be noted that the following information was also developed for Framingham Reservoir #1 as part of the Nyanza Superfund Site investigations.

A bioaccumulation study using burrowing mayfly nymphs (*Hexagenia* sp.) exposed to sediment collected from this reservoir (21-day exposure) was conducted in July and September 1994. Survival of the mayfly nymphs was greater than 90%. The mean concentration of total mercury (gut contents not depurated) in the mayflies was 5,182 and 4,147 ppb dry-weight for the July and September tests, respectively (Naimo *et al.* 2000). Surficial sediment samples were also collected from this reservoir in July and September 1994 as part of the bioaccumulation study. The mean total mercury concentrations in the sediment collected was 7.548 ppm and 11.221 ppm dry weight from samples collected in July and September 1994, respectively. The USFWS collected ten similar sized yellow perch and white perch from one site in Reservoir #1 in 1986 and 1987(Eaton and Carr 1991). Whole body composite samples were analyzed for heavy metals, PCBs and organochlorine pesticides. (It should be noted that in Eaton and Carr (1991) concentrations in whole fish are compared to the Food and Drug Administration's edible portion action levels.) Total PCBs, where detected, were well below the NAS/NAE guideline for the protection of fish eating wildlife of 500 ppb wet weight. Total DDT levels were also less than the 14.0 ppb wet weight guidelines. A sediment sample was also collected from this site in 1987 and analyzed for PCBs, PAH's, organochlorine pesticides, and heavy metals. PCBs were not detected. However, DWM analysis indicates that PAH, arsenic, and lead concentrations exceeded the lowest effect level (LE-L) guidelines from Persuad *et al.* (1993) and mercury, cadmium, and chromium concentrations exceeded both the L-EL and the severe effect level (SE-L) guidelines.

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Framingham Reservoir #2, Framingham/ Ashland (a.k.a. Bracket Reservoir)	MA82045	114	NOT ASSESSED	IMPAIRED (Mercury)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED

No non-native aquatic macrophyte species were observed in Framingham Reservoir #2 during the 1996 DWM synoptic survey (Appendix C, Table C1). ENSR conducted limited water quality monitoring at one station (SR26- Fountain Street, Framingham) in Reservoir #2 as part of the Sudbury River Water Quality Study (ENSR 2004a). *In-situ* measurements of DO, temperature, pH and conductivity were taken in July and August 2003. Grab samples were also collected and analyzed for ammonia-nitrogen, total phosphorus and TSS. The limited water quality sampling did not indicate any problems. Due to the very limited water quality information the *Aquatic Life Use* for Framingham Reservoir #2 is not assessed. Historically this reservoir was a public water supply for the Boston metropolitan area, but since it was contaminated from the Nyanza Superfund site, it is no longer used. DWM conducted fish toxics monitoring for metals in Framingham Reservoir #2 in 1986. MDPH issued a fish consumption advisory for the pond due to mercury. Edible fillets of 11 brown bullhead and 10 largemouth bass collected in September 1993 were composited and analyzed for total mercury. The mean concentration of total mercury in the edible fillet composite sample (adjusted for size) was 0.61 ppm wet weight in brown bullhead and 2.36 ppm wet weight in largemouth bass (Haines *et al*. 2003). Because of the site-specific fish consumption advisory the *Fish Consumption Use* is assessed as impaired. The source of mercury is associated with the Nyanza Superfund Site. Framingham Reservoir #2 is on the 2002 Integrated List of Waters in Category 5 (MA DEP 2003a).

While not included in the *Aquatic Life Use* assessment it should also be noted that the following information was also developed for Reservoir #2 as part of the Nyanza Superfund Site investigations.

USGS collected and analyzed sediment cores collected from both the deep hole in Reservoir #2 in August 1994 and a littoral zone site in May 1995. Total mercury concentrations in Reservoir #2 cores increased with depth from 6 ppm dry-weight at the top to 73 ppm in the midcore of the littoral zone sample and from approximately 6 ppm dry-weight at the top to approximately 55 ppm in the midcore (Colman *et al*. 1999). These concentrations exceeded the severe effect level (S-EL) for mercury of 2 ppm dry-weight by factors of 3 and 36.5, respectively, published in Persaud et al. (1994). A bioaccumulation study using burrowing mayfly nymphs (*Hexagenia* sp.) exposed to sediment collected from this reservoir (21-day exposure) was conducted in July and September 1994. Survival of the mayfly nymphs was greater than 90%. The mean concentration of total mercury (gut contents not depurated) in the mayflies was 6,360 and 10,819 ppb dry-weight for the July and September tests, respectively (Naimo *et al.* 2000). Surficial sediment samples were also collected from this reservoir in July and September 1994 as part of the bioaccumulation study. The mean total mercury concentrations in the sediment collected was 14.78 ppm and 22.059 ppm dry weight from samples collected in July and September 1994, respectively. A caged mussel (*Elliptio complanata*) study was also conducted in the reservoir in June 1994. Three 35 organism replicate samplers (total of 105 mussels) per station were deployed for a twelve-week period (Station 4). Survival of the mussels was 95% and the total mercury concentration in the mussel sample was 690 ppb dry weight (Beckvar *et al*. 2000). With the exception of TOC (slightly over the L-EL), none of the analytes measured (total Hg, Cr, Pb, As, Cd) exceeded the L-ELs published in Persuad *et al.* 1993 (Beckvar *et al*. 2000). Results of this investigation concluded that tissue mercury concentrations decreased with distance away from the Nyanza Superfund site while mussel growth increased (Beckvar *et al*. 2000). Sediment, fish, dragonfly, and crayfish were collected from Framingham Reservoir #2 (Haines *et al*. 2003). Whole fish composite samples of 11 brown bullhead were collected in September 1993, 10 largemouth bass and ten yellow perch were collected in September 1993 and May and July 1994. The mean concentration of total mercury in the whole fish composite samples (adjusted for size) were 340 ppb wet weight in brown bullhead, 670 ppb wet weight in largemouth bass, and 410 ppb wet weight in yellow perch. The mean concentration of total mercury in dragonfly larvae (n=39) was 514 ppb dry weight, in crayfish (n=7) was 268 ppb dry weight, and in prey fish (n=40) was 623 ppb dry weight (Haines *et al*. 2003). In 1994 and 1995 USGS conducted sediment sampling for mercury (USGS 2003).

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Framingham Reservoir #3, Framingham (a.k.a. Foss Reservoir)	MA82046	221	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Framingham Reservoir #3 is listed in the 1996 SWQS as a Class A Public Water Supply. This source has been only an emergency water supply since 1976. A non-native aquatic macrophyte species (*M. spicatum*) was identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Since the reservoir is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. In 1985 the Department of Environmental Quality Engineering, Division of Water Pollution Control (now DWM) conducted fish toxics screening of fish from Framingham Reservoir #3 (Jonasch 1985). The data indicated elevated concentrations of mercury in chain pickerel. No site-specific advisory was issued for Reservoir #3 and it is not included in the Sudbury River advisory. The samples were three individual fish fillets. MDPH will not issue advisories based on individual fish. Additional sampling should be conducted in Reservoir #3 to obtain additional data and allow MDPH to determine if a site-specific advisory is warranted. Framingham Reservoir #3 is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							
Gates Pond, Berlin	MA82047	73	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Gates Pond is a Class A public water supply for the Town of Hudson. In 1996 DWM conducted a synoptic survey of Gates Pond (Appendix C, Table C1). Gates Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							
Gleasons Pond, Framingham	MA82048	11	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Gleasons Pond (Appendix C, Table C1). Gleasons Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a).							
Great Meadows Pond #3, Concord	MA82053	53	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic macrophyte species (*Trapa natans*) was identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). The USFWS manages the ponds to provide feeding and resting habitat for migrating shorebirds (Prior 2004). The USFWS collected ten similar sized yellow perch and white perch from one site in Great Meadows Pond #3 in 1986 (Eaton and Carr 1991). Whole-body composite samples were analyzed for heavy metals, PCBs and organochlorine pesticides. Since the pond is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. These plants also dominate the biovolume so the *Recreational* and *Aesthetics* uses are also assessed as impaired. Boards are placed at the inlet of Great Meadows Pond #3 from the Concord River to prevent fish from entering the pond from the river. There is also a grate between this pond and North Great Meadows Pond (MA82084) to prevent fish from passing between the ponds. These ponds have been dredged and drawn down to control invasives and to help breeding bird species. The pond can be flooded by the Concord River during high flows (Ryder 2004). Great Meadows Pond #3 is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Grist Mill Pond, Marlborough/ Sudbury	MA82055	17	IMPAIRED (Non-native aquatic plants, dissolved oxygen saturation, and total phosphorus)	NOT ASSESSED	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)
Grist Mill Pond was sampled as part of the ENSR Hop Brook Study (ENSR 2000). The majority (75%) of the pond surface was covered with algal and duckweed mats during the 1996 DWM synoptic survey (Appendix C, Table C1). Two non-native aquatic macrophyte species, *Potamogeten crispus* (curly-leaf pondweed) and *Trapa natans (*water chestnut), were document in the pond in July 1999 (ENSR 2000). Ashton (1998) looked at remediation options for *Elodea* dominated ponds in the Hop Brook System. *Hydrodictyon* sp. has been harvested in Grist Mill Pond since 1993. In 1996 approximately 10,000 cubic feet were removed (Ashton 1998). Elevated concentrations of total phosphorus, supersaturation of dissolved oxygen, and very dense cover of filamentous algae and macrophytes (e.g., duckweed) were also documented. Because of these conditions the *Aquatic Life, Primary and Secondary Contact Recreational* and *Aesthetics* uses are assessed as impaired. The major source of phosphorus to the Hop Brook system is the Marlborough East Wastewater Treatment Plant discharge. Grist Mill Pond is on the 2002 Integrated List of Waters in Category 5 because of nutrients, pathogens, and noxious aquatic plants (MA DEP 2003a). A reproduction of the original mill on Grist Mill Pond still operates as part of the historic Wayside Inn. Water can flow through the sluiceway to the mill or through the emergency overflow pipe. Water is returned to Hop Brook from the emergency overflow pipe and the mill approximately 50 yards from the dam.							
Hager Pond, Marlborough	MA82056	30	IMPAIRED (Non-native aquatic plants, dissolved oxygen saturation, and total phosphorus)	NOT ASSESSED	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth 227
Floating algal and duckweed mats were observed during the DWM 1996 synoptic survey (Appendix C, Table C1). Hager Pond was sampled as part of the ENSR Hop Brook Study (ENSR 2000). The non-native aquatic macrophyte species, *Potamogeten crispus* (curly-leaf pondweed), was document in the pond in July 1999 (ENSR 2000). Elevated concentrations of total phosphorus, supersaturation of dissolved oxygen, and elevated planktonic algae populations were also documented. Because of these conditions the *Aquatic Life, Primary and Secondary Contact Recreational* and *Aesthetics* uses are assessed as impaired. The major source of phosphorus to the Hop Brook system is the Marlborough East Wastewater Treatment Plant discharge. Hager Pond is on the 2002 Integrated List of Waters in Category 5 because of nutrients, pathogens, noxious aquatic plants, and turbidity (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Heard Pond, Wayland	MA82058	76	IMPAIRED (Non-native aquatic plants, excess algal growth)	IMPAIRED (Mercury)	IMPAIRED (Secchi disk transparency, excess algal growth)	IMPAIRED Secchi disk transparency, excess algal growth)	IMPAIRED Secchi disk transparency, excess algal growth)
Two non-native aquatic macrophyte species (*T. natans* and *C. caroliniana)* were identified in Heard Pond by DWM during the 1996 synoptic survey and by MDFW in August 2001 as part of the 2001 baseline lakes survey for TMDL development (Appendix C, Tables C1 and Mattson and Haque 2004). In-lake total phosphorus concentrations were moderately high and there was evidence of phosphorus release from sediments. All of the Secchi disk depth measurements were 1.2 m or less and chlorophyll *a* concentrations were also elevated on the three survey dates (Appendix C, Table C3). The USFWS collected ten similar sized yellow perch, white perch, and black crappie from Heard Pond in 1987 (Eaton and Carr 1991). Wholebody composite samples were analyzed for heavy metals, PCBs and organochlorine pesticides. These whole body composite samples did not exceed the NAS/NAE guideline of 500 ppb total PCB for the protection of fish-eating wildlife. The *Aquatic Life Use* is assessed as impaired because the pond is infested with non-native aquatic macrophyte species as well as excess algal growth. DWM conducted fish toxics monitoring in Heard Pond in 1987. MDPH issued a fish consumption advisory for the pond due to mercury so the *Fish Consumption Use* is assessed as impaired. Because of the excessive algal growth and the violations of the bathing beach guideline for Secchi disk transparency as a result of excessive algal growth the *Recreational* and *Aesthetics* uses are assessed as impaired. Heard Pond is on the 2002 Integrated List of Waters in Category 5 for metals, noxious aquatic plants, and exotic species (MA DEP 2003a). It should be noted that the Wayland Surface Water Quality Committee has undertaken a major water chestnut removal project. In the summer of 2004 up to three weed-harvesting machines were working at a time over a two-week period. At least 70 forty-yard containers containing the non-native macrophytes were disposed of in the town landfill (Largy 2004).							
Heart Pond, Chelmsford (a.k.a. Baptist Pond)	MA82059	94	NOT ASSESSED	NOT ASSESSED	IMPAIRED (*E. coli*)	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Heart Pond (Appendix C, Table C1). The Chelmsford Board of Health conducted weekly *E. coli* bacteria sampling in Heart (Baptist) Pond at the semi-public beach owned by the South Chelmsford Improvement Association between Memorial Day and Labor Day. The beach was never formerly posted in 2001 or 2002. In 2003 the beach was closed on the 18 August and never reopened (15 days). Because of the recent extended closure (2003) the *Primary Contact Recreational Use* is assessed as impaired. The source of the bacterial contamination is geese. The area around the pond is sewered (Day 2004). Heart Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							
Hocomonco Pond, Westborough	MA82060	27	NOT ASSESSED	IMPAIRED (PAH's)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Hocomonco Pond (Appendix C, Table C1). DWM conducted fish toxics monitoring in the pond 1985 and 2001 (Maietta 2002 and Appendix B, Table B1). MDPH issued a site-specific fish consumption advisory for the pond due to elevated levels of PAH's in fish tissue. Hocomonco Pond is a Superfund Site. Due to the site specific fish consumption advisory the *Fish Consumption Use* is assessed as impaired for Hocomonco Pond. Hocomonco Pond is on the 2002 Integrated List of Waters in Category 5 because of priority organics and noxious aquatic plants (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Hopkinton Reservoir, Ashland/ Hopkinton	MA82061	161	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	SUPPORT	SUPPORT	SUPPORT
There is a concrete boat ramp, maintained by MA DCR, that allows fishing and boating access to Hopkinton Reservoir in Ashland (PAB 2003). There is also a cartop access point to Hopkinton Reservoir in Hopkinton that allows recreational access (PAB 2003). In 1996 DWM conducted a synoptic survey of Hopkinton Reservoir (Appendix C, Table C1). Although no non-native aquatic macrophyte species were observed previous records indicate the presence of the non-native *Myriophyllum heterophyllum* in the reservoir, so the *Aquatic Life Use* is assessed as impaired. Hopkinton Reservoir was closed to swimming for one day in 2001 (20 June) and for five days in 2002 (5-30 to 6-2 and 8-1 to 8-2) (MDPH 2002b). Since the beach was open for the majority of the 2001 and 2002 bathing seasons the *Recreational* and *Aesthetic* uses are assessed as support. Hopkinton Reservoir is on the 2002 Integrated List of Waters in Category 5 because of organic enrichment/low DO and exotic species (MA DEP 2003a).							
Ice House Pond, Acton	MA82066	11	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED*	NOT ASSESSED	NOT ASSESSED
While there is no formal bathing beach on Ice House Pond, the Action Board of Health has been taking quarterly fecal coliform samples since 1988 (Reagor 2005). The source of the elevated counts is considered to be associated with upgradient septic systems (Halley 2004). Without fecal coliform bacteria or E. coli results the *Primary Contact Recreational Use* is not assessed but is identified with an Alert Status. Ice House Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a). Ice House Pond was dredged in 1995 as a result of siltation and infestation of the pond by *Trapa natans* (entire surface was covered). Dredging removed 18,000 yd^3 of organic material from the pond. There has been no recurrence of the non-native infestation (Tidman 2005).							
Learned Pond, Framingham	MA82069	34	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED*	NOT ASSESSED	NOT ASSESSED
In 1996 DWM a synoptic survey of Learned Pond (Appendix C, Table C1). Learned Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a). There is a public bathing beach on Learned Pond that is managed by the Framingham Parks and Recreation Department. The Board of Health collects weekly samples for *E. coli* testing. Sources of bacteria include geese and storm water. There is an outfall that discharges to the beach (Cooper 2004). Information on the number of closures was not readily available so the *Primary Contact Use* is not assessed but is identified with an Alert Status.							
Little Chauncy Pond, Northborough	MA82070	43	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
There is a gravel cartop access site that is maintained by MDFW that allows recreational access to Little Chauncy Pond (PAB 2003). Two non-native aquatic macrophyte species (*M. heterophyllum, P. crispus*) were identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Since the pond is infested with two non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. There is no public swimming beach on Little Chauncy Pond (Kent 2004). Little Chauncy Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Long Pond, Littleton	MA82072	102	NOT ASSESSED	NOT ASSESSED	SUPPORT	SUPPORT	NOT ASSESSED
There is a concrete boat ramp that is maintained by the Town of Littleton that allows fishing access to Long Pond (PAB 2003). In 1996 DWM conducted a synoptic survey of Long Pond (Appendix C, Table C1). The Nashoba Health Department conducted weekly bacteria sampling in Long Pond between the end of May and Labor Day in 2001 and 2002. The beach was closed to swimming between 8-20 and 8-22-2001 and 8-28 to 8-30 -2002 due to elevated *E. coli* counts (MDPH 2002b). Since the beach was open for the majority of the 2001 and 2002 bathing seasons the *Recreational* uses are assessed as support. Long Pond was selected as MA DCR Lake and Pond Initiative demonstration site in 2002 (Monnelly 2004). The project seeks to demonstrate how distributed Low Impact Development controls can effectively reduce storm water volume and nutrients to lakes having large residential areas and extensive storm water collection systems. A s. 319 grant was awarded to Littleton in 2000 to improve water quality through the implementation of a watershed management plan (Appendix F). Long Pond is on the 2002 Integrated List of Waters in Category 5 because of nutrients, organic enrichment/low DO and noxious aquatic plants (MA DEP 2003a).							
Meadow Pond, Carlisle	MA82129	12	IMPAIRED (Non-native aquatic plants 312)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic species (*Trapa natans)* was documented during a baseline survey of Meadow Pond by the (now) MA DCR in August 1995. Since the pond is infested with two non-native aquatic species the *Aquatic Life Use* is assessed as impaired. Meadow Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							
Milham Reservoir, Marlborough	MA82077	67	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Milham Reservoir is a Class A public water supply for the Town of Marlborough. In 1996 DWM conducted a synoptic survey of Milham Reservoir (Appendix C, Table C1). Millham Reservoir is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							
Nagog Pond, Littleton/ Acton	MA82082	278	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Nagog Pond is a Class A public water supply for the Town of Concord. DWM conducted a synoptic survey of Nagog Pond in 1996 (Appendix C, Table C1). Nagog Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							
North Great Meadows Pond, Concord	MA82084	73	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic macrophyte species (*Trapa natans*) was identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Since the pond is infested with a non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. The USFWS manages the ponds to provide feeding and resting habitat for migrating shorebirds (Prior 2004) .Boards are placed at the inlet of Great Meadows Pond #3 from the Concord River to prevent fish from entering the pond from the river. There is also a grate between this pond and North Great Meadows Pond (MA82084) to prevent fish from passing between the ponds. These ponds have been dredged and drawn down to control for invasives and to help breeding bird species. The pond can be flooded by the Concord River during high flows (Ryder 2004). The USFWS collected ten similar sized yellow perch and white perch from one site in North Great Meadows Pond in 1986 (Eaton and Carr 1991). Wholebody composite samples were analyzed for heavy metals, PCBs, and organochlorine pesticides.							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Nutting Lake (East Basin), Billerica	MA82088	30	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Mercury)	IMPAIRED (*E. coli*)	NOT ASSESSED	NOT ASSESSED
A non-native aquatic macrophyte species (*T. natans*) was identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Due to the presence of the non-native species the *Aquatic Life Use* is assessed as impaired. MDPH issued a site specific fish consumption advisory for the Nutting Lake due to mercury (sampling conducted by DWM in the west basin of the lake in 2000) so the *Fish Consumption Use* is assessed as impaired. In 2002 the beach on the east basin of Nutting Lake was closed to swimming due to elevated *E. coli* counts between 7/3 and 7/8, 7/10 and 7/11, 7/17 and 7/18, 7/24 and 7/25, and 8/2 and 8/6 (13 days) (MDPH 2002b). The beach was never closed to swimming in 2003. Because of the frequent closures in 2002 the *Primary Contact Recreational Use* is assessed as impaired. Further investigation is needed to identify pollution sources, including identifying failing septic systems (Billerica BOH 2004). Nutting Lake (East Basin) is on the 2002 Integrated List of Waters in Category 5 because of metals and exotic species (MA DEP 2003a). Purcell and Taylor, PC prepared a final report on Restoration Efforts in Nutting Lake (MA DEP 2005).							
Nutting Lake (West Basin), Billerica	MA82124	51	NOT ASSESSED*	IMPAIRED (Mercury)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of the west basin of Nutting Lake. The non-native aquatic macrophyte species observed in the east basin was not observed in the west basin (Appendix C, Table C1). The *Aquatic Life Use* is identified with an Alert Status because of the potential for the downstream spread of non-natives from the east basin of Nutting Lake. DWM conducted fish toxics monitoring in the west basin of Nutting Lake in 2000 (Appendix B). MDPH issued a site specific fish consumption advisory for the pond due to elevated levels of mercury in fish tissue. Therefore, the *Fish Consumption Use* is assessed as impaired. Nutting Lake (West Basin) is on the 2002 Integrated List of Waters in Category 5 because of metals (MA DEP 2003a).							
Puffers Pond, Maynard/Sudbury	MA82092	28	NOT ASSESSED	IMPAIRED- (Mercury)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
The US Army issued a fish consumption advisory for Puffer's Pond due to mercury contamination so the *Fish Consumption Use* is assessed as impaired. Puffers Pond is part of the Fort Devens Sudbury Training Annex Superfund Site. Puffers Pond is on the 2002 Integrated List of Waters in Category 5 because of metals (MA DEP 2003a).							
Rocky Pond, Boylston	MA82095	62	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic macrophyte species (*M. heterophyllum*) was identified in Rocky Pond by DWM during the 1996 synoptic survey (Appendix C, Table C1). Due to the presence of the non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. Rocky Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Russell Millpond, Chelmsford	MA82096	33	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic species (*T. natans*) was identified by DWM during the 1996 synoptic survey of Russell Millpond (Appendix C, Table C1). Due to the presence of the non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. Additional concerns include water level manipulations associated with upstream cranberry bog operating practices, the small diameter of the culverts, and dams. Lake drawdown has been documented by the River Meadow Brook Association (Wilson 2004) and DWM (O'Brien-Clayton, 2004). There is a dam at the outlet of Russell Millpond that was used for hydropower in colonial times (1656). The dam is classified by the MA DCR, Office of Dam Safety, as a significant hazard. The dam can impound a maximum 150 acre-feet of water but the average capacity is 51 acre-feet. The dam was in good condition when it was last inspected in 1998 (Ryan 2004). There is no formal bathing beach on Russell Millpond (Day 2004). Russell Millpond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a).							
Saxonville Pond, Framingham	MA82097	59	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Mercury)	NOT ASSESSED*	NOT ASSESSED*	NOT ASSESSED
Two non-native aquatic species (*Cabomba caroliniana* and *Marsilea quadrifolia*) were identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). ENSR conducted water quality monitoring at two stations in Saxonville Pond in 2002-2003 (ENSR 2004a). One station, SR12- Fenwich Street, Framingham, located near the inlet of the pond, was sampled on five occasions and one station, SR11- above Colonna Dam, Central Street, Framingham, located near the outlet of the pond, was sampled on four occasions. *In-situ* measurements of DO, temperature, pH and conductivity were taken in July and August 2002 and July, August and/or September 2003. Grab samples were also collected and analyzed for ammonia-nitrogen, total phosphorus and TSS. With the exception of one low dissolved oxygen/saturation measurement at SR12 and somewhat elevated specific conductivies (ranged from 402 to 584 µS/cm), the limited water quality sampling did not indicate any other problems. Due to the presence of the two non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. MDPH issued a fish consumption advisory for the Sudbury River for all towns between Ashland and Concord (MDPH 2004). Saxonville Pond is an impoundment of the Sudbury River in Framingham so, due to the site- specific Sudbury River advisory, the pond has been assessed as impaired for the *Fish Consumption Use.* The source of mercury is associated with the Nyanza Superfund Site. Saxonville Pond is on the 2002 Integrated List of Waters in Category 5 because of metals, noxious aquatic plants, and exotic species (MA DEP 2003a). ENSR also collected bacteria samples at both the inlet and outlet stations described above in the summers of 2002/2993. Fecal coliform bacteria counts at the inlet station ranged from 500 to 35,100 cfu/100 mL (n=4) with half of the samples exceeding 2000 cfu/100mls. The fecal coliform bacteria counts did not exceed 100 cfu/100 mL (n=3) at the outlet sampling station. Although too limited data are available to assess the *Primary and Secondary Contact Recreational* uses both are identified with an Alert Status because of the elevated fecal coliform bacteria counts at the inlet sampling station. While not included in the *Aquatic Life Use* assessment it should also be noted that the following information was also developed for Saxonville Pond as part of the Nyanza Superfund Site investigations. A caged mussel (*Elliptio complanata*) study was also conducted in the pond in June 1994. Three 35 organism replicate samplers (total of 105 mussels) per station were deployed for a twelve-week period (Station 5). Survival of the mussels was 87% and the total mercury concentration in the mussel sample was 520 ppb dry weight (Beckvar *et al.* 2000). Four analytes (total Hg, Cr, As, and TOC) exceeded L-EL but not S-EL published in Persuad *et al.* 1993 while Cd and Pb exceeded their S-ELs by a factor of 1 and 1.6, respectively (Beckvar *et al*. 2000). Results of this investigation concluded that tissue mercury concentrations decreased with distance away from the Nyanza Superfund site while mussel growth increased (Beckvar *et al*. 2000).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Smith Pond, Northborough	MA82099	15	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Smith Pond (Appendix C, Table C1). There is no formal public bathing beach on Smith Pond (Kent 2004). Smith Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a).							
Solomon Pond, Northborough	MA82100	21	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of Solomon Pond (Appendix C, Table C1). There is no formal bathing beach on Solomon Pond (Kent 2004). Solomon Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							
Stearns Mill Pond, Sudbury	MA82104	19	IMPAIRED (Non-native aquatic plants, dissolved oxygen saturation, and total phosphorus)	NOT ASSESSED	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)	IMPAIRED (Excess algal growth)
Approximately 50% of the lower pond and 100% of the upper end of this pond were covered with duckweed and algae during 1996 synoptic survey (Appendix C, Table C1). Stearns Mill Pond was sampled as part of the ENSR Hop Brook Study (ENSR 2000). A non-native aquatic macrophyte species*(Trapa natans*) was documented in Stearns Millpond by ENSR in July 1999 (ENSR 2000). Elevated concentrations of total phosphorus, supersaturation of dissolved oxygen, and very dense cover of filamentous algae and macrophytes were also documented. Because of these conditions the *Aquatic Life, Primary and Secondary Contact Recreational* and *Aesthetics* uses are assessed as impaired. The major source of phosphorus to the Hop Brook system is the Marlborough East Wastewater Treatment Plant discharge. Stearns Mill Pond is on the 2002 Integrated List of Waters in Category 5 (MA DEP 2003a).							
Sudbury Reservoir, Marlborough/ Southborough	MA82106	1178	NOT ASSESSED	IMPAIRED (Mercury)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Sudbury Reservoir is listed in the 1996 SWQS as a Class A public water supply but since 1976 has been only an emergency supply. In 1996 DWM conducted a synoptic survey of Sudbury Reservoir (Appendix C, Table C1). DWM conducted fish toxics monitoring in the reservoir in 1987 and 2001 (Maietta 2002, Appendix B, Table B1). MDPH issued a site-specific fish consumption advisory for the pond due to elevated levels of mercury in fish tissue, so the *Fish Consumption Use* is assessed as impaired. Sudbury Reservoir is on the 2002 Integrated List of Waters in Category 5 because of metals (MA DEP 2003a).							
Tripp Pond, Hudson	MA82107	3	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Tripp Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a). No additional information is available to assess the designated uses of Tripp Pond. MDFW has proposed that Hog Brook, a tributary to Tripp Pond, be protected as cold water fishery habitat (Richards 2003b). MDFW conducted fish population sampling in Hog Brook at one station downstream from Coolidge Avenue in Hudson on 5 June 2001. Sixteen brook trout and one pumpkinseed were collected (Richards 2003a). MDFW has also proposed that an unnamed tributary to Hog Brook be protected as cold water fishery habitat.							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Walden Pond, Concord	MA82109	63	SUPPORT*	IMPAIRED (Mercury)	SUPPORT	SUPPORT	SUPPORT
MA DCR maintains a gravel boat ramp and swimming beach within the Walden Pond State Reservation for recreational access to Walden Pond. On 11 July 1996 DWM recorded an in-lake DO and temperature profile in the deep hole of Walden Pond (Appendix G, Table G1). Between 1997 and 1999 USGS made *in-situ* measurements of DO, pH, temperature and analyzed groundwater samples for multiple water quality variables (Colman and Friesz 2001). Their analysis indicated significant oxygen depletion (DO less than 5 mg/L) at depths greater than 15 m, which encompasses approximately 35% of the lake area. While the area affected is greater than 10%, the report also indicated that the water quality in the pond was generally of high quality and conditions for trout were favorable. The *Aquatic Life Use* is assessed as support but is identified with an Alert Status because of the size of the lake area affected by oxygen depletion. DWM conducted fish toxics monitoring in Walden Pond in 1989 (Maietta 2002). MDPH issued a site specific fish consumption advisory for Walden Pond due to elevated concentrations of mercury in fish tissue. Due to the MDPH site specific advisory the *Fish Consumption Use* for Walden Pond is assessed as impaired. Walden Pond Red Cross Beach near Walden Street was closed to swimming due to an elevated *E. coli* count on 24 July and reopened on 25 July 2002 (MDPH 2002b). Since the beach was open for the majority of the 2002 bathing season the *Recreational* uses are assessed as support. Due to Walden Pond's high aesthetic quality the *Aesthetics Use* is assessed as support. Walden Pond is on the 2002 Integrated List of Waters in Category 5 because of metals and organic enrichment/low DO (MA DEP 2003a). Walden Pond is listed in the state register of historic places. Colman and Friesz (2001) estimated nitrogen and phosphorus loadings to the pond from natural and anthropogenic sources and recommended management options to prevent further water quality degradation.							
Warners Pond, Concord	MA82110	59	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Mercury)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
A non-native aquatic species (*Trapa natans*) was identified by DWM during 1996 synoptic survey (Appendix C). Due to the presence of the non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. DWM conducted fish toxics monitoring in Warners Pond in 1997 (Maietta 2002, Appendix B, Table B1). MPDH issued a site-specific fish consumption advisory for the pond due to elevated concentrations of mercury in fish tissue so the *Fish Consumption Use* is assessed as impaired. Suspected source of mercury is atmospheric deposition. Warners Pond is on the 2002 Integrated List of Waters in Category 5 because of metals, noxious aquatic plants, and exotic species (MA DEP 2003a).							
Waushacum Pond, Framingham	MA82112	87	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
There is a public boat launch on Waushacum Pond. A non-native aquatic species (*M. heterophyllum*) was identified by DWM during the 1996 synoptic survey (Appendix C). In October/November 2001 a D/F study was conducted by ESS for the Town of Ashland (ESS 2001). Due to the presence of the non-native macrophyte species the *Aquatic Life Use* is assessed as impaired. There is a public bathing beach on Waushacum Pond that is tested weekly during the swimming season by the Framingham Board of Health. Sources of bacteria to the pond include geese and storm water. There is a storm water outfall that discharges to the beach (Cooper 2004). Beach closure information was not readily available so the *Primary Contact Recreation Use* is currently not assessed. Waushacum Pond is on the 2002 Integrated List of Waters in Category 4c because of exotic species (MA DEP 2003a). In 1985 a septic leachate detection survey was performed for East Waushacum Pond by IEP Inc (MA DEP 2005).							
Westborough Reservoir, Westborough (a.k.a. Sandy Pond)	MA82114	41	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Westborough Reservoir is a Class A public water supply for the Town of Westborough. In 1996 DWM conducted a synoptic survey of Westborough Pond (Appendix C, Table C1). In 1989 DWM conducted fish toxics monitoring in Westborough Reservoir (Sandy Pond) (Maietta 2002). Fish tissue was scanned for PCBs and analyzed for metals. No site-specific advisory was issued by MPDH so the *Fish Consumption Use* is not assessed. There is no formal bathing beach on Westborough Reservoir (McNulty 2004). Westborough Reservoir is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
West Pond, Bolton	MA82115	19	NOT ASSESSED	NOT ASSESSED	SUPPORT	SUPPORT	NOT ASSESSED
The beach at Camp Virginia on West Pond was closed to swimming due to elevated *E. coli* counts between 9 August and 13 August 2001 (4 days) (MDPH 2002b). Since the beach was open for the majority of the 2001 bathing season the *Recreational* uses are assessed as support. West Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a).							
White Pond, Concord	MA82118	36	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED*	NOT ASSESSED*	NOT ASSESSED
In 1996 DWM conducted a synoptic survey of White Pond (Appendix C). This pond was sampled as a reference station as part of the W.R. Grace, Acton Superfund Site investigations (Menzie Cura & Associates, Inc. 2003). Sediment samples (0 to 2" depth) were collected in August 2002 and analyzed for metals, PCBs, pesticides, and TOC. With the exception of Pb, one of the three As measurements, and two of the three TOC measurements none of the metals analyzed exceeded their S-ELs reported in Persaud et al. (1993). The S-ELs were not exceeded for Pb, As, or TOC by more than a factor of 2.3. Sediment toxicity tests using *Chironomus tentans* were conducted in August/September (20-day survival) and in December 2002 (10-day survival). Four replicates of 12 organisms each for a total of 48 organisms were exposed for three samples (WP6, WP7, and WP8). The mean survival at 20-days for these samples was 69, 85, and 77%, respectively. The mean survival of the organisms exposed for 10-days (3 replicate samples with 80 organisms/replicate) was $\geq$99% (Menzie Cura & Associates, Inc. 2003). Too limited data (i.e., lack of *in-situ* data) are available so the *Aquatic Life Use* is not assessed for this waterbody. White Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a). Since the Town of Concord identified the White Pond area as needing off-site neighborhood wastewater treatment system as many of the septic systems in the area are old and failing (Stone Environmental and Lombardo Associates 2000a and b) the recreational uses are identified with an Alert Status.							
White Pond, Hudson/ Stow	MA82119	49	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
White Pond is listed in the 1996 SWQS as a Class A public water supply. A Town maintained gravel boat ramp allows recreational access to White Pond (PAB 2003). In 1996 DWM conducted a synoptic survey of White Pond (Appendix C, Table C1). White Pond is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Whitehall Reservoir, Hopkinton	MA82120	560	IMPAIRED (Non-native aquatic plants, dissolved oxygen saturation, dissolved oxygen)	IMPAIRED (Mercury)	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Non-native aquatic plants)	IMPAIRED (Non-native aquatic plants)

A MA DCR maintained asphalt boat ramp in the northern-most lobe allows recreational access to Whitehall Reservoir (PAB 2003). In 2001 MA DEP surveyed the lake for the purpose of TMDL development. Low DO/saturation occurred at depths greater than 3 m during the summer of 2001 (Appendix C, Table C2). In-lake total phosphorus concentrations were fairly low with some evidence of phosphorus release from anoxic sediments. None of the Secchi disk depth measurements violated the bathing beach guidance of four feet (Appendix C, Table C3). Two non-native aquatic macrophyte species, *Cabomba caroliniana* and *Myriophyllum heterophyllum*, were identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). In 2003 DWM collected samples from Whitehall Reservoir for nutrient criteria development, but these data are not yet available. Because of low DO/saturation encompassing approximately 15% of the lake area and the infestation with non-native aquatic macrophyte species the *Aquatic Life Use* is assessed as impaired. DWM conducted fish toxics monitoring in Whitehall Reservoir in 1996. MDPH issued a site-specific fish consumption advisory for Whitehall Reservoir due to elevated fish tissue mercury concentrations. Edible fillets of 10 brown bullhead and 10 largemouth bass collected in September 1993 were composited and analyzed for total mercury. The mean concentration of total mercury in the edible fillet composite sample (adjusted for size) was 0.74 ppm wet weight in brown bullhead and 1.03 ppm wet weight in largemouth bass (Haines *et al*. 2003). Because of the site-specific fish consumption advisory, the *Fish Consumption Use* is assessed as impaired. The suspected source of mercury is atmospheric deposition. The Hopkinton Stream Team reports that there is severe erosion of the shoreline of Whitehall Reservoir due to boat traffic (Vos 2004). Less than 20% of the households surrounding Whitehall Reservoir are tied into the town sewer system. Whitehall Reservoir is on the 2002 Integrated List of Waters in Category 5 because of metals, nutrients, organic enrichment/low DO, noxious aquatic plants, and exotic species (MA DEP 2003a). The *Recreational* and *Aesthetic* uses are assessed as impaired because of the density (approximately 50% of the lake area) of the non-native macrophytes.

While not included in the *Aquatic Life Use* assessment it should also be noted that the following information was also developed for Whitehall Reservoir as part of the Nyanza Superfund Site investigations.
USGS collected and analyzed sediment cores collected from both the deep hole and a littoral zone site in Whitehall Reservoir in August 1994. The total mercury concentration in the sediment decreased continuously with depth from a maximum of 0.4 ppm dry-weight in the deep hole sample and 0.3 ppm dry-weight in the littoral zone sample. This same pattern has been noted in many lakes for which the source of mercury is atmospheric deposition (Colman *et al*. 1999). A bioaccumulation study using burrowing mayfly nymphs (*Hexagenia* sp.) exposed to sediment collected from this reservoir (21-day exposure) was conducted in July and September 1994. Survival of the mayfly nymphs was greater than 90%. The mean concentration of total mercury (gut contents not depurated) in the mayflies was 123 and 171 ppb dry-weight for the July and September tests, respectively (Naimo *et al.* 2000). Surficial sediment samples were also collected from the reservoir in July and September 1994 as part of the bioaccumulation study. The mean total mercury concentrations in the sediment collected was 0.149 ppm and 0.272 ppm dry weight from samples collected in July and September 1994, respectively. A caged mussel (*Elliptio complanata*) study was also conducted in the reservoir in June 1994. Three 35 organism replicate samplers (total of 105 mussels) per station were deployed for a twelve-week period (Station 1). Survival of the mussels was 83% and the total mercury concentration in the mussel sample was 890 PPB dry weight (Beckvar *et al*. 2000). With the exception of Pb and TOC (both exceeded L-EL but not S-EL) none of the analytes measured (total Hg, Cr, As, Cd) exceeded the L-ELs published in Persuad *et al.* 1993 (Beckvar *et al*. 2000). Sediment, fish, dragonfly, and crayfish were also collected from Whitehall Reservoir (Haines *et al*. 2003). Whole fish composite samples of 10 brown bullhead were collected in September 1993, ten largemouth bass and ten yellow perch were collected in September 1993 and May and July 1994. The mean concentration of total mercury in the whole fish composite samples (adjusted for size) were 420 ppb wet weight in brown bullhead, 510 ppb wet weight in largemouth bass, and 330 ppb wet weight in yellow perch. The mean concentration of total mercury in dragonfly larvae (n=15) was 303 ppb dry weight, in crayfish (n=10) was 257 ppb dry weight, and in prey fish (n=50) was 493 ppb dry weight (Haines *et al*. 2003).

Table 7 (Continued). SuAsCo Watershed Lake Use Assessments.

Lake, Location	WBID	Size (Acres)	Aquatic Life (Impairment Cause)	Fish Consumption (Impairment Cause)	Primary Contact (Impairment Cause)	Secondary Contact (Impairment Cause)	Aesthetics (Impairment Cause)
Williams Lake, Marlborough	MA82121	69	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Williams Lake is a Class A public water supply for the Town of Marlborough. In 1996 DWM conducted a synoptic survey on Williams Lake (Appendix C, Table C1). Williams Lake is on the 2002 Integrated List of Waters in Category 2 (MA DEP 2003a).							
Willis Pond, Sudbury	MA82122	67	SUPPORT	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	SUPPORT
In 1996 DWM conducted a synoptic survey of Willis Pond (Appendix C, Table C1). The water color in Willis Pond is affected by high iron and organic contents and a large marsh is encroaching on the west end of the lake. In 2001 MDFW surveyed the lake for MA DEP for the purpose of TMDL development. Low DO/saturation occurred at depths greater than 1.5 m during the August 2001 survey; *in-situ* data from the other two surveys in the summer of 2001 were either censored or were not collected at the deep hole (Appendix C, Table C2). In-lake total phosphorus concentrations were moderately high. All of the Secchi disk depth measurements were less than 1.2 m (Appendix C, Table C3). Since Willis Pond is a very shallow waterbody surrounded by wetlands these conditions are considered naturally occurring. Although the data are limited it is best professional judgment that the *Aquatic Life Use* is supported in Willis Pond. Willis Pond is on the 2002 Integrated List of Waters in Category 3 (MA DEP 2003a). There are no public bathing beaches on Willis Pond, but there is a Town maintained access area for canoeing or boating. The Sudbury Park and Recreation Department is looking into conducting water quality tests and possibly using the lake for recreation. Samples taken as part of the former Fort Devens Sudbury Training Annex indicate no in lake contamination. Septic failures are not problematic in the Willis Pond subwatershed (Leupold 2004). No objectionable deposits, odors, oils or other conditions were noted during the four surveys conducted in Willis Pond in the summer of 2001 and therefore the *Aesthetics Use* is assessed as support.							
Winning Pond, Billerica	MA82123	22	IMPAIRED (Non-native aquatic plants)	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED	NOT ASSESSED
Three non-native aquatic macrophyte species (*Eichornia crassipes*, *M. spicatum, T. natans*) were identified by DWM during the 1996 synoptic survey (Appendix C, Table C1). Due to the presence of the non-native macrophyte species the *Aquatic Life Use* is assessed as impaired. There is no public beach on Winning Pond (Billerica BOH 2004). Winning Pond is on the 2002 Integrated List of Waters in Category 4c due to exotic species (MA DEP 2003a). ENSR conducted water quality monitoring in an unnamed tributary to Winning Pond, known locally as "Winning Pond Brook" in summer 2001 and 2002 as part of the assessment phase for the development of the Concord River nutrient TMDL (ENSR 2003).							

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