Appendix 8
Boston Harbor: Mystic River Watershed and Coastal Drainage Area
Assessment and Listing Decision Summary

Final Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle

CN: 505.1

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Table of Contents

2018/20 Cycle Impairment Changes

Waterbody	AU_ID	2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Aberjona River	MA71-01	5	5	Arsenic		Removed
Aberjona River	MA71-01	5	5	Arsenic in Sediment		Added
Aberjona River	MA71-01	5	5	Chloride		Added
Aberjona River	MA71-01	5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Aberjona River	MA71-01	5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Aberjona River	MA71-01	5	5	Fish Bioassessments		Added
Aberjona River	MA71-01	5	5	Phosphorus, Total	R1_MA_2020_5a	Changed
Alewife Brook	MA71-20	--	5	Chloride		Added
Alewife Brook	MA71-20	--	5	Copper		Removed
Alewife Brook	MA71-20	--	5	Copper in Sediment		Added
Alewife Brook	MA71-20	--	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Alewife Brook	MA71-20	--	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Alewife Brook	MA71-20	--	5	Lead		Removed
Alewife Brook	MA71-20	--	5	Lead in Sediment		Added
Alewife Brook	MA71-20	--	5	Phosphorus, Total	R1_MA_2020_5a	Changed
Alewife Brook	MA71-20	--	5	Trash		Changed
Alewife Brook	MA71-20	--	5	(Water Chestnut*)		Added
Belle Isle Inlet	MA71-14	5	5	Fecal Coliform	R1_MA_2019_01	Changed
Blacks Nook	MA71005	5	5	(Non-Native Aquatic Plants*)		Removed
Blacks Nook	MA71005	5	5	(Water Chestnut*)		Added
Chelsea River	MA71-06	5	5	Dissolved Oxygen		Removed
Chelsea River	MA71-06	5	5	Fecal Coliform	R1_MA_2019_01	Changed
Chelsea River	MA71-06	5	5	Trash		Changed
Horn Pond	MA71019	5	5	(Curly-leaf Pondweed*)		Added
Horn Pond	MA71019	5	5	(Fish Passage Barrier*)		Added
Horn Pond	MA71019	5	5	(Non-Native Aquatic Plants*)		Removed
Little Pond	MA71024	5	5	(Water Chestnut*)		Added
Little River	MA71-21	--	5	Chloride		Added
Little River	MA71-21	--	5	Copper		Removed
Little River	MA71-21	--	5	Copper in Sediment		Added
Little River	MA71-21	--	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Little River	MA71-21	--	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Little River	MA71-21	--	5	Lead		Removed
Little River	MA71-21	--	5	Lead in Sediment		Added
Little River	MA71-21	--	5	Phosphorus, Total	R1_MA_2020_5a	Changed
Little River	MA71-21	--	5	Sediment Bioassay		Removed
Little River	MA71-21	--	5	Trash		Changed
Little River	MA71-21	--	5	(Water Chestnut*)		Added
Little River	MA71-22	--	5	Copper		Removed
Little River	MA71-22	--	5	Copper in Sediment		Added
Little River	MA71-22	--	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Little River	MA71-22	--	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Little River	MA71-22	--	5	Lead		Removed
Little River	MA71-22	--	5	Lead in Sediment		Added
Little River	MA71-22	--	5	Phosphorus, Total	R1_MA_2020_5a	Changed
Little River	MA71-22	--	5	Sediment Bioassay		Removed
Little River	MA71-22	--	5	Trash		Changed

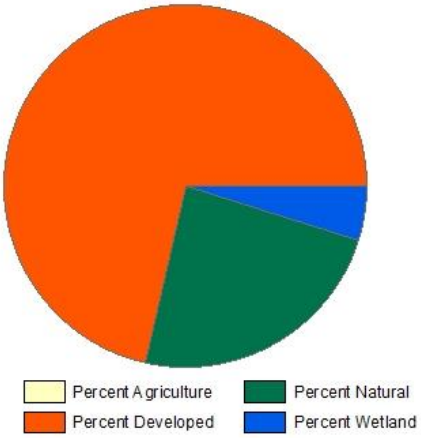
Waterbody	AU_ID	2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Lower Mystic Lake	MA71027	5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Malden River	MA71-05	5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Malden River	MA71-05	5	5	Dissolved Oxygen Supersaturation	R1_MA_2020_5a	Changed
Malden River	MA71-05	5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Malden River	MA71-05	5	5	Flocculant Masses	R1_MA_2020_5a	Changed
Malden River	MA71-05	5	5	Phosphorus, Total	R1_MA_2020_5a	Changed
Malden River	MA71-05	5	5	Temperature		Added
Malden River	MA71-05	5	5	Transparency / Clarity	R1_MA_2020_5a	Changed
Malden River	MA71-05	5	5	Trash		Changed
Malden River	MA71-05	5	5	(Water Chestnut*)		Added
Mill Brook	MA71-07	5	5	Benthic Macroinvertebrates		Added
Mill Brook	MA71-07	5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Mill Creek	MA71-08	5	5	Fecal Coliform	R1_MA_2019_01	Changed
Mystic River	MA71-02	5	5	Chlorophyll-a	R1_MA_2020_5a	Changed
Mystic River	MA71-02	5	5	Dissolved Oxygen	R1_MA_2020_5a	Added
Mystic River	MA71-02	5	5	Dissolved Oxygen Supersaturation	R1_MA_2020_5a	Changed
Mystic River	MA71-02	5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Mystic River	MA71-02	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Added
Mystic River	MA71-02	5	5	(Fish Passage Barrier*)		Removed
Mystic River	MA71-02	5	5	pH, High		Added
Mystic River	MA71-02	5	5	Phosphorus, Total	R1_MA_2020_5a	Changed
Mystic River	MA71-02	5	5	Transparency / Clarity	R1_MA_2020_5a	Changed
Mystic River	MA71-02	5	5	(Water Chestnut*)		Added
Mystic River	MA71-03	5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Mystic River	MA71-03	5	5	Fecal Coliform	R1_MA_2019_01	Changed
Mystic River	MA71-03	5	5	Flocculant Masses	R1_MA_2020_5a	Changed
Mystic River	MA71-03	5	5	Nutrient/Eutrophication Biological Indicators	R1_MA_2020_5a	Added
Pond Brook	MA71-16	3	5	Benthic Macroinvertebrates		Added
Pond Brook	MA71-16	3	5	(Fish Passage Barrier*)		Added
Spy Pond	MA71040	5	5	(Curly-leaf Pondweed*)		Added
Spy Pond	MA71040	5	5	(Water Chestnut*)		Added
Unnamed Tributary	MA71-13	5	4a	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
Unnamed Tributary	MA71-19	--	5	Benthic Macroinvertebrates		Added
Upper Mystic Lake	MA71043	5	5	(Curly-leaf Pondweed*)		Added
Upper Mystic Lake	MA71043	5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
Upper Mystic Lake	MA71043	5	5	Dissolved Oxygen Supersaturation	R1_MA_2020_5a	Changed
Upper Mystic Lake	MA71043	5	5	(Non-Native Aquatic Plants*)		Removed
Winn Brook	MA71-09	5	4a	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed

Aberjona River (MA71-01)

Location:	Source just south of Birch Meadow Drive, Reading to inlet Upper Mystic Lake at Mystic Valley Parkway, Winchester (portion culverted underground). (through former 2010 segments: Judkins Pond MA71021 and Mill Pond MA71031).
AU Type:	RIVER
AU Size:	9.2 MILES
Classification/Qualifier:	B: WWF

Aberjona River - MA71-01

Watershed Area: 25.23 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	25.21	11.41	5.07	2.8
Agriculture	0.82%	0.99%	0.69%	0.23%
Developed	70.87%	66.48%	52.74%	50.61%
Natural	23.45%	29.73%	34.28%	41.99%
Wetland	4.85%	2.8%	12.29%	7.18%
Impervious Cover	35.18%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Arsenic		Removed
5	5	Arsenic in Sediment		Added
5	5	Chloride		Added
5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
5	5	Fish Bioassessments		Added
5	5	Phosphorus, Total	R1_MA_2020_5a	Changed

Fish, other Aquatic Life and Wildlife Use: Not Supporting

According to DMF biologists, the new fish ladder at Center Falls Dam in Winchester on the Aberjona River was completed in 2017. While evaluation of the effectiveness of the ladder is underway, this structure now has a fish passage score of 2 (minor obstruction) for river herring & American eel. MassDEP biologists collected fish community samples at 3 locations (#4513 ~80m DS of Olympia Ave; #4514 US of Washington St, #4515 at USGS gage) in August 2009. These samples had 25.5% similarity to the Target Fish Community model for the Aberjona River. MassDEP biologists also collected benthic samples upstream of Washington St, Woburn (B0755) and ~75m downstream of USGS gage, Winchester (B0131) in August 2009. The RBPIII analyses indicated moderate

impairment for both samples (<30% comparability to the W. Branch Palmer River reference site in Narragansett Bay). MassDEP staff conducted water quality monitoring at three sites along the river as follows: ~700m downstream of Halls Brook Holding Area Pond (W1979), at the downstream Washington St crossing, Winchester (W1964), and at the USGS gage (W1965) in summer 2009. Good DO from 3 5-day probe deployments at W1964 & W1965 (min 5.5 mg/L). However, the mean daily min DO was 3.75-4.61mg/L for the 3 probe deployments at the upstream site W1979. Thermistors deployed 61 days beginning 7/09 at W1979 & W1965 (max temperatures 27.6/27.2°C). Attended probe & grab sample data (temp., pH, DO, ammonia) good (no violations of criteria). TP <0.04 mg/L at the 2 downstream sites but elevated at W1979 (avg 0.079 mg/L; n=5). Five of 6 specific conductance measurements at site W1964 exceeded the estimated chloride chronic criterion (but only one exceeded the criterion plus 10% to account for uncertainty in the model). Although there were exceedances at the upstream W1979, this site was judged too close to the Industri-plex & Wells G&H superfund sites (known jointly as Industri-plex Operational Unit-2), potential sources of dissolved ions. As part of remediation of the Industri-plex Operational Unit-2, data were collected monthly as part of the Baseflow Surface Water Monitoring Program (BSWMP) from roughly March 2009 through March 2011, then quarterly through February 2014 (& under a reduced sampling regime into 2016). The program had a USEPA-approved QAPP & included sampling locations on the Aberjona River at Montvale Ave, Woburn (SW-06-TT) and Swanton St, Woburn (SW-07-TT), & USGS/Mystic Ave, Woburn (SW-08-TT)- that DEP staff considered to be located far enough away from the Superfund Sites so as to have minimal influence of migrating dissolved ions. Using specific conductance as a surrogate for chloride, >50% of samples (between n of 4 to 12 samples/year) exceeded 994 µs/cm (the estimated chloride chronic criterion plus 10% to account for uncertainty in the model) in more than one 3-year period at site SW-06-TT. For SW-07-TT, 44% (12 of 27 samples in the 2009-2011 period) exceeded 994 µs/cm. At SW-08-TT, 5 of 27 samples collected 2009-2011 exceeded 994µs/cm. As part of the Industri-plex OU-2 BSWMP, un-ionized ammonia concentrations were measured at sites SW-03-TT & SW-05-TT thru SW-08-TT from 2009-2014. Concentrations exceeded calculated sample-specific chronic criteria twice within a 3-year window for site SW-03-TT, roughly 3-8 times per rolling 3-year window for site SW-05-TT, & twice within one 3-year window for SW-06-TT.

The Aquatic Life Use of the Aberjona River is assessed as Not Supporting. The historical impairments will remain with Arsenic being clarified to the more specific Arsenic in Sediment. Impairments for Chloride (due to multiple exceedances of the estimated chloride chronic toxicity criterion) and Fishes Bioassessments (due to a poor comparison with the Target Fish Community model) are being added.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Arsenic	Clarification of listing cause	The Arsenic cause code was originally used as the impairment prior to the addition of the more appropriate cause code of Arsenic in Sediment to the ATTAINS database. Therefore, Arsenic is being delisted and the Arsenic in Sediment cause will be added. The arsenic data used to support the original listing during the 2004 reporting cycle were from sediment not fish tissue or water column so this change is just a clarification.
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Supporting Information for Delisted Impairments

Arsenic

The Aberjona River was originally impaired for Arsenic contamination of the sediments, using the code "Metals", after MassDEP received public comments from the Mystic River Watershed Association regarding the draft 2004 Integrated List of Waters (MassDEP 2005). Therefore, Arsenic is being delisted and the Arsenic in Sediment cause is being added for clarification.

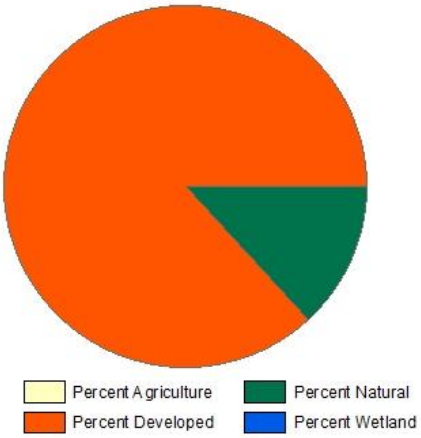
> Comment: The MyRWA requests that the Aberjona River and Upper Mystic Lake (Woburn/Winchester) be listed as requiring a TMDL for arsenic. We would like to direct your attention toward a recent human and ecological health risk assessment prepared by the EPA for sections of the Aberjona River Watershed south of Rt. 128 down through the Mystic Lakes (Baseline Human Health and Ecological Risk Assessment Report: Wells G&H Superfund Site, Aberjona River Study Operable Unit 3, US EPA June 2003). In that report, EPA identified 6 sites that pose unacceptable current or future risk to human health due to arsenic contaminated sediments. In addition, EPA identified unacceptable ecological risk at 22 sampling locations. In the majority of the cases this risk arose from arsenic contamination, although in several locations elevated levels of chromium, lead, and copper also posed unacceptable risk. The majority of the locations with unacceptable ecological risk are located in the Wells G&H wetland and in a former cranberry bog. Two sites within the Upper Mystic Lake were also identified as having arsenic levels in sediments that posed unacceptable risk to benthic organisms. We request that DEP take EPA's findings on contaminated sediments into consideration.
>
> Response: This comment was previously submitted by the MyRWA for the 2002 Integrated List. At that time the available information on the contamination of the Aberjona River was difficult to interpret within the context of the Massachusetts Surface Water Quality Standards (refer to *Massachusetts Year 2002 Integrated List of Waters – Part 3 – Public Comment Responsiveness Document*). Since that time more data and information have been published relative to the upstream Superfund sites and their impact on the Aberjona River and Mystic lakes. In particular, the EPA risk assessment report cited above, as well as a revised version that was released in September, 2004, were reviewed in response to this comment. Quoting from the executive summary of the latter document, "the risk to invertebrates from high arsenic concentrations in sediments was located mainly in reaches 1 and 2, with limited areas of reach 6 (Mystic Lake) having arsenic concentrations minimally above level associated with risk. However, no risk to other receptors, including fish, were identified from exposure to arsenic in the Mystic Lakes." From this, the MADEP has concluded that the upper reaches of the Aberjona River do exhibit impairment from arsenic and "metals" will be added to the list of stressors for the Aberjona River segment MA71-01. The argument for designating Upper Mystic Lake as impaired by metals, on the other hand, is less compelling. Sediment arsenic levels in the lake were only "minimally above" those associated with risk and the MADEP typically does not 303(d)-list a segment solely on the basis of sediment metal concentrations because no standards have been adopted for aqueous sediments. As a result, a decision was reached to not place Upper Mystic Lake on the 303(d) List at this time.

Alewife Brook (MA71-20)

Location:	From emergence north of Cambridgepark Drive, Cambridge to mouth at confluence with Mystic River, Arlington/Somerville (formerly part of 2016 segment: Alewife Brook MA71-04).
AU Type:	RIVER
AU Size:	1.6 MILES
Classification/Qualifier:	B: WWF, CSO

Alewife Brook - MA71-20

Watershed Area: 8.87 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	8.86	7.99	0.65	0.65
Agriculture	0.29%	0.32%	0.75%	0.75%
Developed	85.99%	85.58%	68.93%	68.93%
Natural	12.94%	13.24%	24.47%	24.47%
Wetland	0.78%	0.86%	5.84%	5.84%
Impervious Cover	45.36%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
--	5	Chloride		Added
--	5	Copper		Removed
--	5	Copper in Sediment		Added
--	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
--	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
--	5	Lead		Removed
--	5	Lead in Sediment		Added
--	5	Phosphorus, Total	R1_MA_2020_5a	Changed
--	5	Trash		Changed
--	5	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting
The non-native aquatic macrophyte, *Trapa natans*, has been reported in Alewife Brook. MassDEP staff conducted water quality monitoring in Alewife Brook upstream of Broadway bridge, Arlington/Somerville (W1969) in the summer 2009. DO was low (mean daily minimum for two 5-day DO probe deployments were ≤3.05mg/L) and the maximum diel DO shift was high in September (6.0mg/L) with a maximum saturation of

103%. The maximum temperature during the thermistor deployment was good (26.8°C). *In situ* and grab sample data for pH & ammonia were indicative of good water quality, while DO was consistent with deployed probe data. The seasonal average (n=5) total phosphorus concentration was 0.076 (maximum 0.15mg/L). There were no observations of excessive filamentous algae. Five of six specific conductance (SC) measurements were >904µs/cm (estimated chloride chronic criterion) and four were above 994 µs/cm (the margin of error that accounts for uncertainty in the model). MWRA conducted water quality monitoring from 2009-2018 as part of their long-term monitoring of Boston Harbor and its tributaries. From up to downstream their sites along Alewife Brook included Alewife MBTA station offramp, downstream MWR003/CAM401A CSOs (074), 50 yards upstream CAM401B CSO (277), upstream Mass Ave bridge (172), just downstream SOM001A CSO (276), and mouth, south of Mystic Valley Parkway bridge (070). Excluding sites 277 and 276 (which were only sampled in 2017/2018), their data can be summarized as follows: DO was frequently low (>10% of surface measurements <4.0mg/L in four years at site 074 and in all years at stations 172 and 070, saturations did not exceed 125%, the maximum temperature was 27.59°C, pH ranged from 6.13 to 8.45SU (only 4 measurements >8.3SU). Some SC measurements were >904µs/cm in every year at every station, but in recent years (roughly 2013-2018) >75% of measurements were >994µs/cm.

The Aquatic Life Use of Alewife Brook MA71-20 is assessed as Not Supporting. Recent data support retaining the DO and total phosphorus impairments as there was evidence of frequent low DO and enrichment (high DO diel shifts). The Sediment Bioassay impairment is also being retained (no new data). Lead and copper are being delisted and replaced with the more appropriate Lead in Sediment and Copper in Sediment impairments based on the original data in both a 1997 Master's thesis and a USGS study support. Additionally, there is compelling evidence to warrant a Chloride impairment based on MWRA 2013-2018 estimated chloride data since most SC data along Alewife Brook were >994µs/cm whereas comparison to data collected during a 1988 survey (paired SC/chloride data at four stations on two dates documented much lower chloride/SC data -maximum SC 641µs/cm, maximum chloride 120mg/L). Lastly a new impairment for the non-native aquatic macrophyte Water Chestnut (*Trapa natans*) infestation is also being added.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Copper	Clarification of listing cause	Alewife Brook (including Little River) was listed as impaired for metals in the 2002 Integrated Report. In 2010, this metals impairment code was remapped to copper and lead. In the 2018/2020 reporting cycle, the MA71-04 AU was split into two Little River AUs, as well as the new Alewife Brook AU (MA71-20), and the data from each new segment were reexamined separately. Lead was originally used as the impairment prior to the addition of the more appropriate cause code of Lead in Sediment in the ATTAINS database. Therefore, Copper is being delisted and the Copper in Sediment cause will be added. The copper data were from sediment not fish tissue or water column.
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)
Lead	Clarification of listing cause	Alewife Brook (including Little River) was listed as impaired for metals in the 2002 Integrated Report. In 2010, this metals impairment code was remapped to copper and lead. In the 2018/2020 reporting cycle, the MA71-04 AU was split into two Little River AUs, as well as the new Alewife Brook AU (MA71-20), and the data from

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
		each new segment were reexamined separately. Lead was originally used as the impairment prior to the addition of the more appropriate cause code of Lead in Sediment in the ATTAINS database. Therefore, Lead is being delisted and the Lead in Sediment cause will be added. The Lead data were from sediment not fish tissue or water column.

Supporting Information for Delisted Impairments

Copper

For this 2018/2020 reporting cycle, the MA71-04 AU was split into 2 Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) and MA71-22, as well as the new Alewife Brook AU (MA71-20) and the data from each new segment were reexamined separately. For Alewife Brook (MA71-20), the data from 7-8 sites were averaged and it was determined that the average copper concentration did not exceed the Canadian Council of Ministers of the Environment (CCME) Probable Effect Level (PEL) (140 mg/kg avg vs 197 mg/kg PEL). USGS conducted a study of sediment quality in the Mystic basin from 2001-2003 (Breault, Durant and Robbat, Jr. 2005). Samples from 5 locations on Alewife Brook were analyzed for contaminants. None of the samples exceeded the PEL for copper (140 mg/kg max vs 197 mg/kg PEL).

A reevaluation of the Tufts University student's M.S. thesis data: Surface sediments at Alewife Brook sites ABS2180 through ABS1 (it is unclear in which assessment unit site ABS2400 is located, so it was not included here) were sampled (likely in 1997) as part of a Tufts University student's M.S. thesis (Ivushkina 1999). At that time, Little River was part of the Alewife Brook AU and the data were averaged amongst all the Little River and Alewife Brook sites. They were then incorporated into the 1999 Boston Harbor Water Quality Assessment Report (O'Brien, Weinstein and McVoy 2002) and subsequently cited in the 2002 303d WBS sheet which concluded there was an impairment of the Aquatic Life Use based on elevated copper and lead concentrations. Data for the new Alewife Brook AU are summarized below.

Map depicting study locations (Ivushkina 1999):

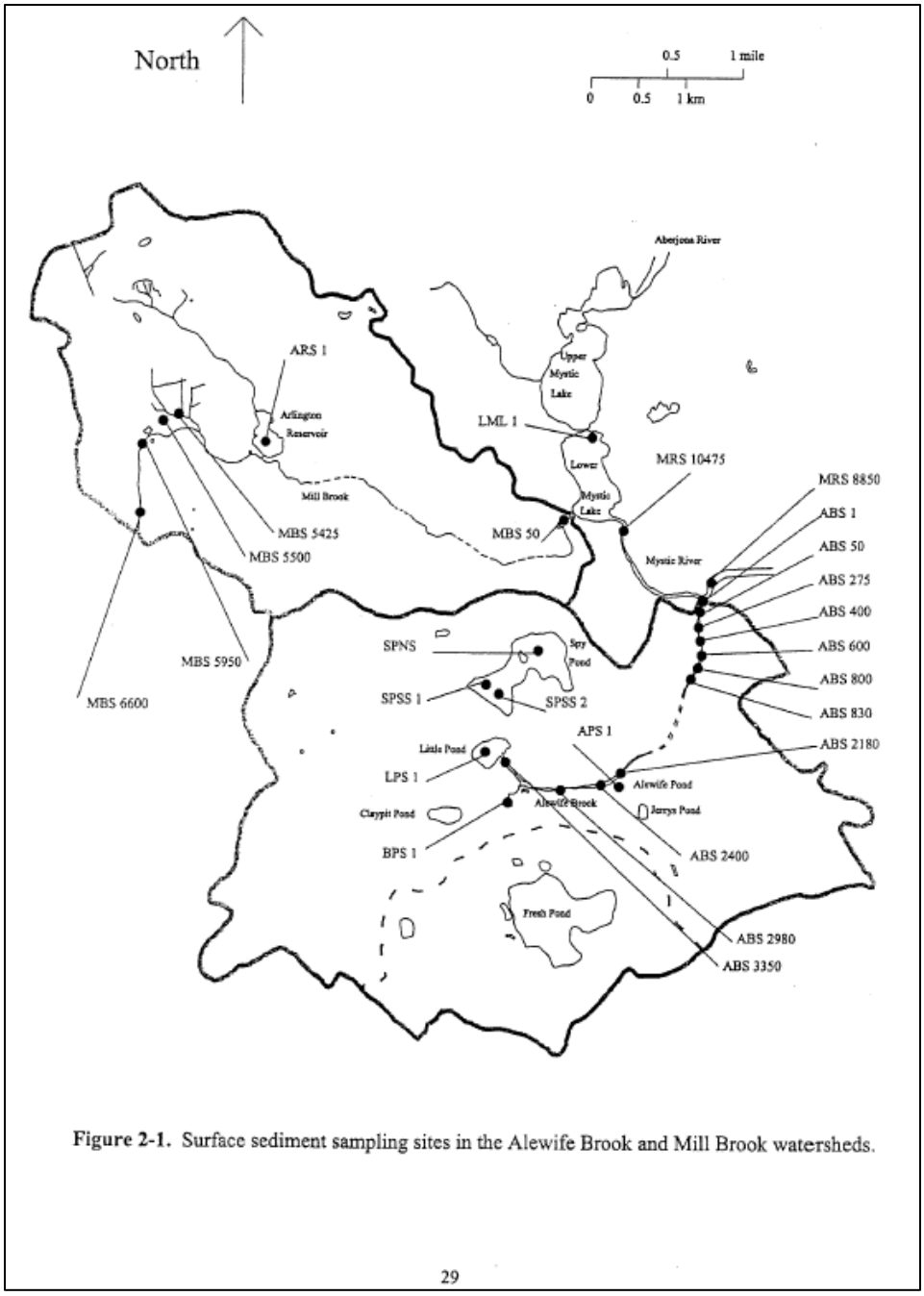


Figure 2-1. Surface sediment sampling sites in the Alewife Brook and Mill Brook watersheds.

(Ivushkina 1999) Selected Data Compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002)

	Count	Min Concentration	Max Concentration	Average Concentration
Copper Concentration (mg/kg[1])	7	57	290	140
> CCME ISQG Cu Criterion (35.7 mg/kg)?				yes
> CCME PEL Cu Criterion (197 mg/kg)?				no

[1] mg/kg = ppm
* ISQG represents the concentration below which adverse biological effects are expected to rarely occur; PEL represents the levels for which adverse biological effects are expected to frequently occur.

(Breault, Durant and Robbat, Jr. 2005) Selected Data (Sites 11-15) Compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002)

	Count	Min Concentration	Max Concentration	Average Concentration
Copper Concentration (mg/kg[1])	5	87	140	113.4
> CCME ISQG Cu Criterion (35.7 mg/kg)?				yes
> CCME PEL Cu Criterion (197 mg/kg)?				no

Based on this reevaluation the copper impairment for Alewife Brook (MA71-20) should be delisted since the average concentrations in both the Tufts thesis project as well as the USGS study did not exceed the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life.

Lead

For this 2018/2020 reporting cycle, the MA71-04 AU was split into 2 Little River AUs, as well as the new Alewife Brook AU (MA71-20) and the data from each new segment were reexamined separately. For Alewife Brook (MA71-20), the data from 7-8 sites were averaged and it was determined that the average lead concentration exceeded the Canadian Council of Ministers of the Environment (CCME) Probable Effect Level (PEL) (408 mg/kg avg vs 91.3 mg/kg PEL). USGS conducted a study of sediment quality in the Mystic basin from 2001-2003 (Breault, Durant and Robbat, Jr. 2005). Samples from 5 locations on Alewife Brook were analyzed for contaminants. All the samples exceeded the PEL for lead (210 mg/kg min vs 91.3 mg/kg PEL).

A reevaluation of the Tufts University student's M.S. thesis data: Surface sediments at Alewife Brook sites ABS2180 through ABS1 (it is unclear in which assessment unit site ABS2400 is located, so it was not included here) were sampled (likely in 1997) as part of a Tufts University student's M.S. thesis (Ivushkina 1999). At that time, Little River was part of the Alewife Brook AU and the data were averaged amongst all the Little River and Alewife Brook sites. They were then incorporated into the 1999 Boston Harbor Water Quality Assessment Report (O'Brien, Weinstein and McVoy 2002) and subsequently cited in the 2002 303d WBS sheet which concluded there was an impairment of the Aquatic Life Use based on elevated lead concentrations. For the 2018 assessment cycle, the Alewife Brook AU was split into two Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) and MA71-22, as well as Alewife Brook AU MA71-20. Data for the new Alewife Brook AU are summarized below.

Map depicting study locations (Ivushkina 1999):

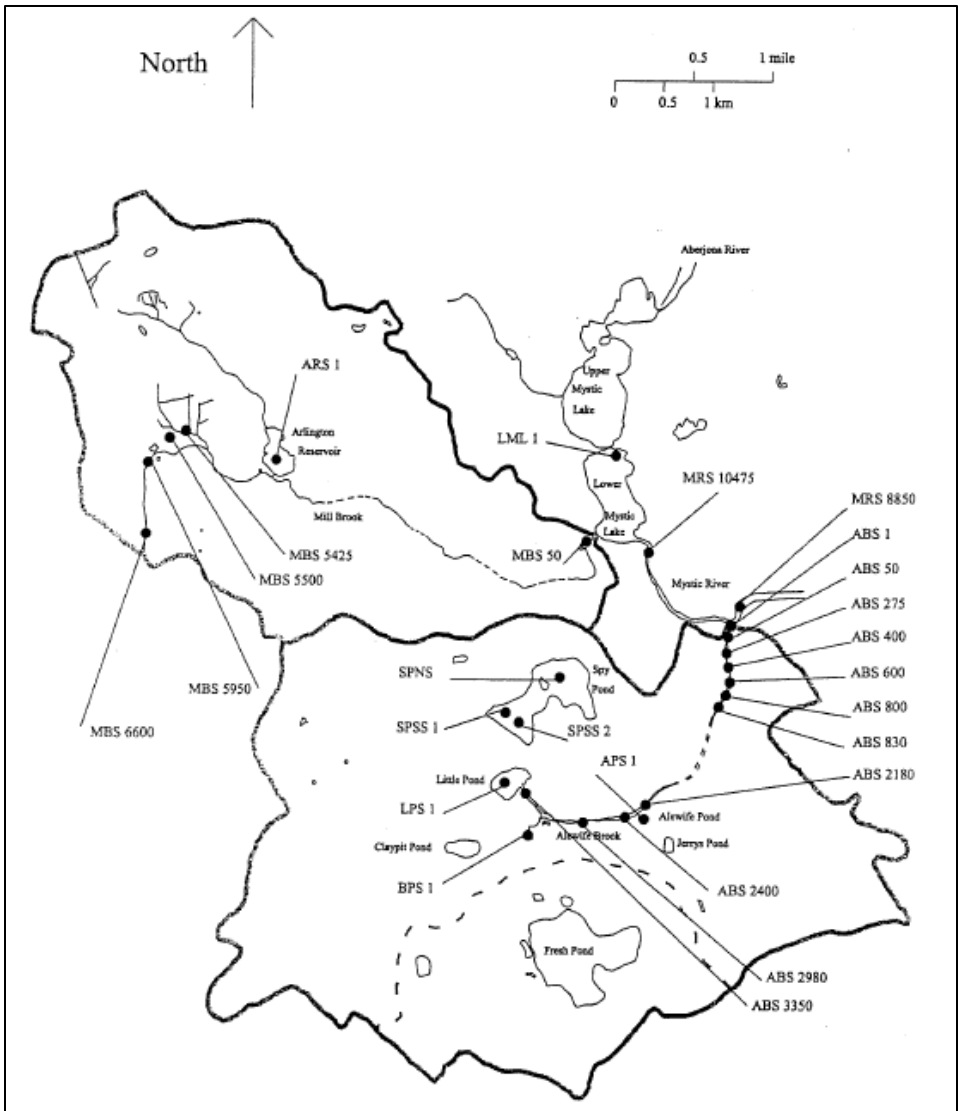


Figure 2-1. Surface sediment sampling sites in the Alewife Brook and Mill Brook watersheds.

29

(Ivushkina 1999) Selected Data Compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002)

	Count	**Min Concentration**	**Max Concentration**	**Average Concentration**
Lead Concentration (mg/kg[1])	7	170	1,000	408
> CCME ISQG Pb Criterion (35.0 mg/kg)?				yes
> CCME PEL Pb Criterion (91.3 mg/kg)?				yes

[1] mg/kg = ppm

* ISQG represents the concentration below which adverse biological effects are expected to rarely occur; PEL represents the levels for which adverse biological effects are expected to frequently occur.

(Breault, Durant and Robbat, Jr. 2005) Selected Data (Sites 11-15) Compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002)

	Count	**Min Concentration**	**Max Concentration**	**Average Concentration**
Lead Concentration (mg/kg[1])	5	210	340	288
> CCME ISQG Pb Criterion (35.0 mg/kg)?				yes
> CCME PEL Pb Criterion (91.3 mg/kg)?				yes

Therefore, the Lead impairment is being delisted and the Lead in Sediment cause is being added for clarification.

Belle Isle Inlet (MA71-14)

Location:	From tidegate at Bennington Street, Boston/Revere to confluence with Winthrop Bay, Boston/Winthrop.
AU Type:	ESTUARY
AU Size:	0.12 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Fecal Coliform	R1_MA_2019_01	Changed

Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available for this reporting cycle, the Aquatic Life Use of Belle Isle Inlet MA71-14 remains Not Assessed.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Fecal Coliform	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Bellevue Pond (MA71004)

Location:	Medford.
AU Type:	FRESHWATER LAKE
AU Size:	2 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available for this reporting cycle, the Aquatic Life Use of Bellevue Pond MA71004 remains Not Assessed.

Blacks Nook (MA71005)

Location:	Cambridge.
AU Type:	FRESHWATER LAKE
AU Size:	2 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Non-Native Aquatic Plants*)		Removed
5	5	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting
There is an infestation of the non-native aquatic macrophyte, water chestnut (*Trapa natans*), in Blacks Nook. With no other data available for this reporting cycle, the historical impairment for Nutrient/Eutrophication Biological Indicators will remain. Non-Native Aquatic Plants is being delisted and replaced with the specific Water Chestnut. The Aquatic Life Use of Blacks Nook MA71005 is assessed as Not Supporting.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	Non-Native Aquatic Plants is being delisted and replaced with the specific species Water Chestnut.

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

There is an infestation of the non-native aquatic macrophyte, *Trapa natans*, in Blacks Nook (Frymire 2007). The Native Aquatic Plants impairment is being delisted and replaced with the specific species Water Chestnut.

Chelsea River (MA71-06)

Location:	From confluence with Mill Creek, Chelsea/Revere to confluence with Boston Inner Harbor, Chelsea/East Boston.
AU Type:	ESTUARY
AU Size:	0.37 SQUARE MILES
Classification/Qualifier:	SB(CSO)

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen		Removed
5	5	Fecal Coliform	R1_MA_2019_01	Changed
5	5	Trash		Changed

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)

Three oil terminals located in the Chelsea River watershed- (from upstream to downstream) Irving Oil, Gulf Oil, and Sunoco Logistics- are required under their NPDES permits to conduct whole effluent toxicity tests utilizing Mysid shrimp (*Americamysis bahia*) and inland silverside (*Menidia beryllina*) test organisms. Survival of organisms exposed roughly 48 hours to Chelsea River water during tests conducted between 2009-2018 for all the facilities (n = 40 tests for *A. bahia* and n = 38 tests for *M. beryllina*) was excellent (93-100% survival). In WET tests conducted on the effluent of the facilities, the LC_{50}s were all ≥100% effluent for both species in the Gulf Oil and Sunoco Logistics tests, while the LC_{50}s ranged from 82.5% to >100% in the Irving Oil tests. At mid-channel off the Condor Street Urban Wild (Station 027), MWRA measured temperature, dissolved oxygen, and pH data roughly 2 dozen times per year from 2009-2018 as part of its long term environmental monitoring of the Boston Harbor and its tributaries. The maximum temperature measured at station 027 was 24.74 °C and only one pH surface measurement from June 2011 was slightly elevated (8.65 SU). There was more than one DO saturation surface measurement >125% in 5 of 10 years and such measurements made up >10% of measurements in 2013 and 2015 (annual maxima range from 119-171%). This could be an indicator of enriched conditions, which is likely, given the urban nature of the sub-watershed and the presence of active CSOs. Of 241 DO surface measurements, only one was <5 mg/L and of 236 bottom measurements, only 3 were <5 mg/L (with no instances of DO depletion between 2016-2018). The Aquatic Life Use of the Chelsea River MA71-06 AU remains Not Supporting due to un-ionized ammonia, petroleum hydrocarbons, and contaminants in aquatic wildlife as measured in sediment screening values (Cause Unknown). However, based on the extensive MWRA data set, Dissolved Oxygen is being delisted (see Removal Comment for full rationale). An Alert for DO supersaturation is being added.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Dissolved Oxygen	Applicable WQS attained; based on new data	Dissolved oxygen was first listed as an impairment of the Chelsea River in 1992 (under the cause "Organic enrichment/Low DO") based on data collected by MassDEP in 1987. Depth profiles were measured on July 6 and 7, 1987 at three locations, from upstream to downstream, IH06 (near Merritt Park, Chelsea/Revere), CR02 (Chelsea St, Chelsea/Boston), and CR01 (Meridian St, Chelsea/Boston). At all three locations, DO was well over 5 mg/L at the surface, but dropped below 5 mg/L

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
		around 4 m or a little more in depth. Measurements at 4 m and below ranged from 3.4 to 5.6 mg/L for 5 of 6 depth profiles. More recently, MWRA collected water quality data in the Chelsea River from 2009-2018 as part of its long term environmental monitoring of the Boston Harbor and its tributaries. At Station 027 (mid-channel at the Condor Street Urban Wild, between the Chelsea St and Meridian St historic sites), only 1 of 241 surface measurements was <5 mg/L and of 236 bottom measurements, only 3 were <5 mg/L (with no instances of DO depletion between 2016-2018). Based on this extensive ten-year data set, Dissolved Oxygen is being delisted as an impairment of the Chelsea River MA71-06.
Fecal Coliform	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Supporting Information for Delisted Impairments

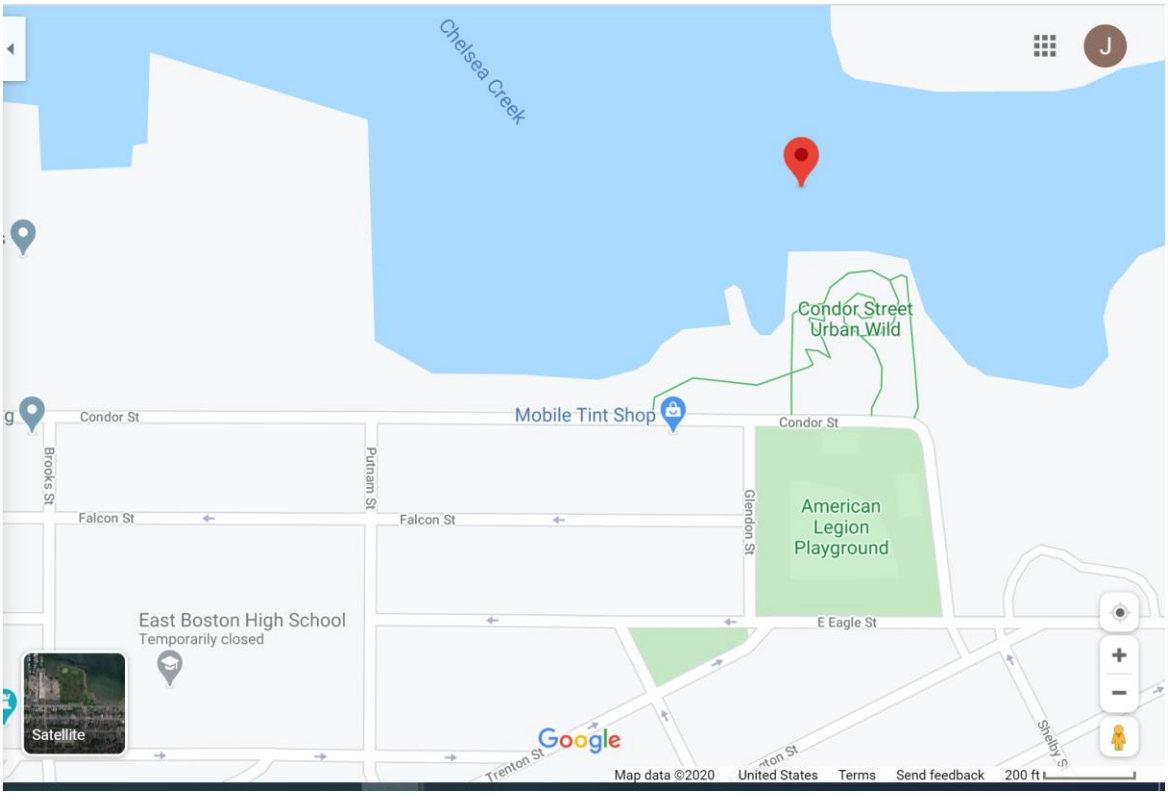
Dissolved Oxygen

Data Sources (MWRA 2019, MassDEP Undated 5):

MWRA 2009-2018 Environmental Monitoring Data, from Chelsea River MA71-06 at Station 027 (Inner Harbor, Chelsea River, midchannel at the Condor Street Urban Wild):

Station ID	Latitude	Longitude	Location Description	Map
027	**42.384**	-71.029833	Inner Harbor, Chelsea Creek, midchannel at the Condor Street Urban Wild	027

Data Sources (MWRA 2019, Google Maps Undated):



Dissolved Oxygen Check for <5 mg/L (2009-2018 annual data)								Dissolved Oxygen Check for <4 mg/L (2009-2018 annual data)					
		Surface (S)			Bottom (B)			Surface (S)			Bottom (B)		
Stat. ID	Year	DO >5 mg/L	DO <5 mg/L	(S) Count Total	DO >5 mg/L	DO <5 mg/L	(B) Count Total	DO >4 mg/L	DO <4 mg/L	(S) Count Total	DO >4 mg/L	DO <4 mg/L	(B) Count Total
027	2009	21		21	21		21	21		21	21		21
	2010	18		18	18		18	18		18	18		18
	2011	25		25	23		23	25		25	23		23
	2012	28		28	27		27	28		28	27		27
	2013	22	1	23	21	2	23	22	1	23	22	1	23
	2014	20		20	20		20	20		20	20		20
	2015	20		20	17	1	18	20		20	18		18
	2016	30		30	30		30	30		30	30		30
	2017	31		31	31		31	31		31	31		31

	2018	25		25	25		25	25		25	25		25
Grand Total		**240**	**1**	**241**	**233**	**3**	**236**	**240**	**1**	**241**	**235**	**1**	**236**

MA71-06 Dissolved Oxygen mg/L (annual)							MA71-06 Dissolved Oxygen Saturation % (annual)				
Station ID	**Year**	**Surface (S) or Bottom (B)**	**Min**	**Max**	**Avg**	**Count**	**Surface (S) or Bottom (B)**	**Min**	**Max**	**Avg**	**Count**
027	**2009**	S	7.1	11.0	9.0	21	S	83	130	106	21
		B	6.1	9.9	7.3	21	B	75	96	84	21
	2010	S	5.7	9.7	8.3	18	S	76	120	100	19
		B	5.6	9.6	7.5	18	B	70	103	87	19
	2011	S	7.3	13.2	8.8	25	S	85	171	103	25
		B	6.1	8.8	7.1	23	B	74	91	81	23
	2012	S	7.1	10.4	8.6	28	S	86	132	105	28
		B	5.5	9.9	6.9	27	B	70	93	83	27
	2013	S	2.1	12.3	8.9	23	S	55	159	110	23
		B	1.6	11.2	7.3	23	B	43	126	88	23
	2014	S	7.0	10.9	8.8	20	S	87	142	105	20
		B	5.6	9.9	7.6	20	B	70	100	88	20
	2015	S	6.8	11.6	9.1	20	S	88	140	111	20
		B	4.5	10.3	7.5	18	B	59	97	87	18
	2016	S	6.2	10.4	8.5	30	S	83	122	103	30
		B	5.4	10.0	7.8	30	B	72	107	93	30
	2017	S	6.3	11.2	8.7	31	S	77	129	99	31
		B	6.0	10.3	7.9	31	B	74	100	87	31
	2018	S	7.3	10.7	9.1	25	S	87	119	107	25
		B	5.4	10.5	8.2	25	B	67	108	93	25

* Only 1 DO surface/bottom measurement in 2013 was <4 mg/L (MWRA 2019, MassDEP Undated 5). MWRA collected water quality data in the Chelsea River from 2009-2018 as part of its long term environmental monitoring of the Boston Harbor and its tributaries. At Station 027 (mid-channel at the Condor Street Urban Wild, between the Chelsea St and Meridian St historic sites), only 1 of 241 surface measurements of DO was <5 mg/L and of 236 bottom measurements, only 3 were <5 mg/L (with no instances of DO depletion between 2016-2018). Based on this extensive ten-year data set, Dissolved Oxygen is being delisted as an impairment of the Chelsea River MA71-06.

Clay Pit Pond (MA71011)

Location:	Belmont.
AU Type:	FRESHWATER LAKE
AU Size:	12 ACRES
Classification/Qualifier:	B

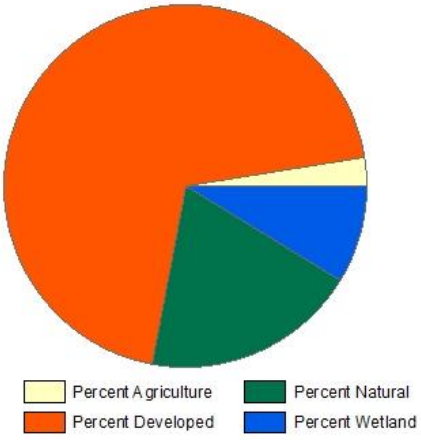
Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
There is a potential infestation of the non-native aquatic macrophyte, *Potamogeton crispus*, in Clay Pit Pond, but confirmation by DEP staff is required. Therefore, the Aquatic Life Use of Clay Pit Pond MA71011 is assessed as Insufficient Information and an Alert is being issued for a non-native species.

Cummings Brook (MA71-10)

Location:	Headwaters east of Wright Street, Woburn to confluence with Fowle Brook, Woburn.
AU Type:	RIVER
AU Size:	2.1 MILES
Classification/Qualifier:	B

Cummings Brook - MA71-10

Watershed Area: 3.98 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	3.98	3.98	0.99	0.99
Agriculture	2.48%	2.48%	2.89%	2.89%
Developed	69.63%	69.63%	59.99%	59.99%
Natural	19.18%	19.18%	22.13%	22.13%
Wetland	8.7%	8.7%	14.99%	14.99%
Impervious Cover	33.45%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting

DFG collected a fish community sample (Sample ID 3320, off of Mt Ida Rd US, US of Willow St, Woburn) in the downstream portion of Cummings Brook (in August 2010) which included a fluvial dependent species (white sucker) and a moderately tolerant macrohabitat generalist (largemouth bass). Roughly 800 feet downstream, MassDEP staff collected attended probe and grab sample water quality data (temperature, pH, dissolved oxygen, specific conductance, ammonia, total phosphorus) in summer 2009. These data were generally indicative of good water quality (no violations of WQ criteria). Of note, the TP seasonal average was 0.027 mg/L (n=5) and there were no observations of excessive filamentous algae. However, 1 of 5 specific conductance measurements (981 µs/cm) exceeded the estimated chloride chronic toxicity criterion (but without a 10% margin of error). Of note, the majority of the watershed lies within Zone II Wellhead Protection areas for the Burlington and Woburn Water Departments. Based on a fish community sample containing a fluvial dependent species and good water quality data, the Aquatic Life Use of Cummings Brook MA71-10 is assessed as Fully Supporting.

Ell Pond (MA71014)

Location:	Melrose.
AU Type:	FRESHWATER LAKE
AU Size:	23 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Ell Pond was posted for extended periods due to Harmful Algal Blooms in 2009 (18 days), 2010 (40 days), 2012 (64 days), and 2013 (104 days). With no other data available for this reporting cycle, the Aquatic Life Use of Ell Pond MA71014 remains Not Supporting due to Chlorophyll-a and "Phosphorus (Total)." A new impairment is being added for Harmful Algal Blooms.

Fellsmere Pond (MA71016)

Location:	Malden.
AU Type:	FRESHWATER LAKE
AU Size:	5 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Fellsmere Pond MA71016 was posted for 91 days in 2011 due to a Harmful Algal Bloom. Therefore, the Aquatic Life Use is assessed as Not Supporting.

Hills Pond (MA71018)

Location:	Arlington.
AU Type:	FRESHWATER LAKE
AU Size:	2 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
There is an infestation of the non-native aquatic macrophyte, Eurasian Water Milfoil (*Myriophyllum spicatum*), in Hills Pond MA71018. Therefore, the Aquatic Life Use is assessed as Not Supporting.

Horn Pond (MA71019)

Location:	Woburn.
AU Type:	FRESHWATER LAKE
AU Size:	108 ACRES
Classification/Qualifier:	B: WWF

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Added
5	5	(Fish Passage Barrier*)		Added
5	5	(Non-Native Aquatic Plants*)		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
There is an infestation of the non-native aquatic macrophyte, *Potamogeton crispus*, in Horn Pond. The pond was posted for Harmful Algal Blooms in 2009 (15 days), 2010 (14 days), 2011 (42 days), and 2012 (21 days). While DMF staff manually adjusted the stone substrate at the Scalley Dam's bypass channel, allowing herring to pass into Horn Pond, it is still a struggle for fish to work their way up the steep, craggy bypass channel, and passage may not be possible under high outflow from the dam. DMF staff indicate that the dam allows restricted passage (passage score = 6) to river herring and American eel, an improvement from its prior status of permitting no possible passage. Water quality data were collected as a profile of the deep hole at site W1087 in August 2005. Temperature (max = 25.3 °C), pH (8.0 SU), specific conductance (684 µs/cm), and total phosphorus (0.013 mg/L) at the surface were generally indicative of good water quality, as was a depth integrated chlorophyll *a* measurement (8.6 µg/L). Dissolved oxygen dropped below 5 mg/L between 5.0 meters (16.4 ft) and 5.5 meters (18.0 ft) in depth. Bathymetry data indicate that the area at 13-20 feet in depth encompasses roughly 51% of the surface area of the pond. Near the bottom, specific conductance (1,860 µs/cm) and total phosphorus (1.2 mg/L) markedly increased. Data collected during this reporting cycle indicate that the Aquatic Life Use of Horn Pond MA71019 should remain Not Supporting due to historical impairments (harmful algal blooms, dissolved oxygen, and total phosphorus). Non-Native Aquatic Plants is being delisted and replaced with Curly-leaf Pondweed (*Potamogeton crispus*). New for this reporting cycle, an impairment for a Fish Passage Barrier is being added because of the difficulties for diadromous fish attempting to pass into Horn Pond. An Alert is being issued due to elevated specific conductance measured in the hypolimnion, which could be indicative of chronic chloride toxicity.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	Non-Native Aquatic Plants is being delisted and replaced with the specific species Curly-leaf Pondweed (Potamogeton crispus).

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

There is an infestation of the non-native aquatic macrophyte, *Potamogeton crispus*, in Horn Pond (MassDEP Undated 1). The generic Non-Native Aquatic Plants impairment is being delisted and replaced with the specific species Curly-leaf Pondweed (Potamogeton crispus).

Little Pond (MA71024)

Location:	Belmont.
AU Type:	FRESHWATER LAKE
AU Size:	18 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Water Chestnut*)		Added

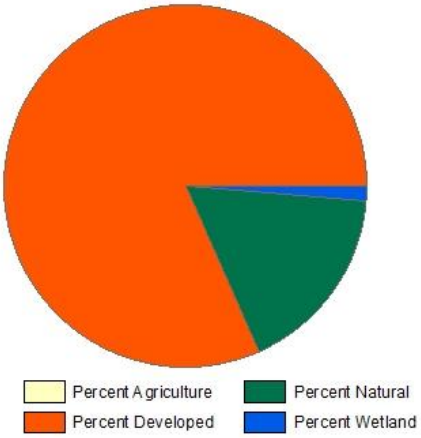
Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
There is an infestation of the non-native aquatic macrophyte, water chestnut (*Trapa natans*), in Little Pond. The pond was posted due to a Harmful Algal Bloom lasting 24 days in 2011. The Aquatic Life Use of Little Pond MA71024 is assessed as Not Supporting due to an infestation by a non-native species (Water Chestnut). An Alert is being identified for the HAB that occurred in 2011.

Little River (MA71-21)

Location:	Headwaters, outlet Little Pond, Belmont to MWRA CSO outfall (MWR003) approximately 150 feet upstream of mouth at the confluence with Alewife Brook, Cambridge (formerly part of 2016 segment: Alewife Brook MA71-04).
AU Type:	RIVER
AU Size:	0.8 MILES
Classification/Qualifier:	B

Little River - MA71-21

Watershed Area: square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.23	4.23	0.39	0.39
Agriculture	0.29%	0.29%	1.19%	1.19%
Developed	81.47%	81.47%	59.32%	59.32%
Natural	16.93%	16.93%	30.34%	30.34%
Wetland	1.31%	1.31%	9.15%	9.15%
Impervious Cover	38.31%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
--	5	Chloride		Added
--	5	Copper		Removed
--	5	Copper in Sediment		Added
--	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
--	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
--	5	Lead		Removed
--	5	Lead in Sediment		Added
--	5	Phosphorus, Total	R1_MA_2020_5a	Changed
--	5	Sediment Bioassay		Removed
--	5	Trash		Changed
--	5	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
There is a report of the non-native aquatic macrophyte, *Trapa natans*, in Little River. Data from a Tufts University student's M.S. thesis assessing contaminants in surface sediment samples were previously summarized in the 1999 Boston Harbor WQAR. At that time, Little River was included in the Alewife Brook AU

(MA71-04) & data from the sites on both water bodies were averaged. As a result, Alewife Brook (including Little River) was listed as impaired for metals in the 2002 Integrated Report (remapped to copper and lead in 2010). For this reporting cycle, the MA71-04 AU was split into 2 Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) & MA71-22, as well as Alewife Brook AU MA71-20, & the data from each new segment were reexamined separately. For Little River MA71-21, the very limited data from 2 sites, ABS3350 & ABS2980, were averaged and the averages exceeded the Canadian Council of Ministers of the Environment (CCME) Probable Effect Level (PEL) for both lead (250 vs 91.3 mg/kg PEL) & arsenic in sediment (34 vs 17.0 mg/kg PEL). The limited averaged copper data did not exceed the PEL (91 vs 197 mg/kg PEL)). The data resulting in the impairments for dissolved oxygen, total phosphorus, & chronic toxicity in sediment bioassays for the original Alewife Brook segment were also reevaluated in light of the segment split. Data from the 1988 Little River / Alewife Brook Survey indicated DO concentrations were <5.0 mg/L (min = 3.5 mg/L) in Little River & TP concentrations were substantially greater than 0.1 mg/L (0.20-0.32 mg/L). The impairment cause "Sediment Bioassays -- Chronic Toxicity Freshwater" was imparted on the original Alewife Brook segment due to data compiled in a 2001-03 USGS sediment study which did not include any study sites on Little River. More recently, MWRA collected water quality data in the Little River upstream of active CSOs (415 ft upstream of Rt. 2 east offramp to Alewife MBTA station) mainly from 2009 to 2014. Most temperature (n= 2-14/year) & pH (n= 12-31/year) data were indicative of good quality, with only 1 data point higher than the 28.3 °C and 8.3 SU criteria. Of the DO measurements (n= 12-31/year), more than 10% of measurements were <5.0 mg/L in 4 years, and >1 measurement was <4.0 mg/L in 2009 and 2014 (7 of 25 in 2014 ranged from 0.36-3.86 mg/L). For DO saturation, 3 measurements in 2011 were >125% (130-190%). Specific conductance (n= 12-31 individual measurements/year) 4-day averages exceeded 994 µs/cm (the estimated chloride chronic criterion +10% margin of error) from 3-7 times per year in 4 of 6 years (May-Oct). Such a high percentage of the data were elevated in 2013 and 2014 (the last two years with substantial amounts of data), that the annual averages even exceeded the criterion, at 1,077 & 1,083 µs/cm, respectively. The Aquatic Life Use of the new Little River AU MA71-21 will retain the dissolved oxygen & total phosphorus impairments from the original Alewife Brook AU MA71-04. Based on the limited sediment sample data available for the new Little River segment, the impairments for copper & lead will also be retained. However, the "Copper" & "Lead" cause codes are being delisted and replaced with the specific causes "Copper in Sediment" & "Lead in Sediment." An Alert is being issued for elevated arsenic found in the limited sediment sample data & a recommendation is being made for further sampling of the sediments. A "Chloride" impairment is being added (due to MWRA estimated data with multiple specific conductance 4-day averages >994 µs/cm in multiple years), as well as an impairment for "Water Chestnut" (*Trapa natans*). "Sediment Bioassays -- Chronic Toxicity Freshwater" is being delisted since the USGS data triggering that impairment (for Alewife Brook) were not collected in Little River.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Copper	Clarification of listing cause	The Copper cause code was originally used as the impairment prior to the addition of the more appropriate cause code of Copper in Sediment to the ATTAINS database. Therefore, Copper is being delisted and the Copper in Sediment cause will be added. The Copper data were from sediment not fish tissue or water column.
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)
Lead	Clarification of listing cause	The Lead cause code was originally used as the impairment prior to the addition of the more appropriate cause code of Lead in Sediment to the ATTAINS database. Therefore, Lead is being delisted and the Lead in

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
		Sediment cause will be added. The Lead data were from sediment not fish tissue or water column.
Sediment Bioassay	Applicable WQS attained; original basis for listing was incorrect	The "Sediment Bioassays – Chronic Toxicity Freshwater" cause code was originally listed as an impairment when Littler River was part of the old Alewife Brook assessment unit MA71-04. For the 2018 assessment cycle, the MA71-04 AU was split into two Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) and MA71-22, as well as Alewife Brook AU MA71-20. The USGS sediment study upon which this impairment was based did not include any study sites on Little River. Therefore, "Sediment Bioassays – Chronic Toxicity Freshwater" should not be applied to this Little River AU MA71-21.

Supporting Information for Delisted Impairments

Copper

For this 2018/2020 IR reporting cycle, the MA71-04 AU was split into 2 Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) & MA71-22, as well as Alewife Brook AU MA71-20, & the data (sampled likely in 1997 as part of a Tufts University student's M.S. thesis (Ivushkina 1999)) from each new segment were reexamined separately. For Little River MA71-21, the very limited sediment concentration data from 2 sites, ABS3350 & ABS2980, were averaged and while the limited averaged copper data did not exceed the Canadian Council of Ministers of the Environment (CCME) Probable Effect Level (PEL) (91 vs 197 mg/kg PEL)), the "Copper" impairment is being delisted and the "Copper in Sediment" impairment is being added for clarification.

(Ivushkina 1999) Selected Data Compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002)

	ABS3350	ABS2980	Average
Copper Concentration (mg/kg[1])	63	120	91.5
> CCME ISQG Cu Criterion (35.7 mg/kg)?	yes	yes	yes
> CCME PEL Cu Criterion (197 mg/kg)?	no	no	no

[1] mg/kg = ppm

* ISQG represents the concentration below which adverse biological effects are expected to rarely occur; PEL represents the levels for which adverse biological effects are expected to frequently occur.

Lead

For this 2018/2020 IR reporting cycle, the MA71-04 AU was split into 2 Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) & MA71-22, as well as Alewife Brook AU MA71-20, & the data (sampled likely in 1997 as part of a Tufts University student's M.S. thesis (Ivushkina 1999)) from each new segment were reexamined separately. For Little River MA71-21, the very limited sediment concentration data from 2 sites, ABS3350 & ABS2980, were averaged and the averages exceeded the Canadian Council

of Ministers of the Environment (CCME) Probable Effect Level (PEL) for lead (250 vs 91.3 mg/kg PEL)), so the "Lead" impairment is being delisted and the "Lead in Sediment" impairment is being added for clarification.

(Ivushkina 1999) Selected Data Compared to the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2002)

	ABS3350	**ABS2980**	**Average**
Lead Concentration (mg/kg[1])	240	260	250
> CCME ISQG Pb Criterion (35.0 mg/kg)?	yes	yes	yes
> CCME PEL Pb Criterion (91.3 mg/kg)?	yes	yes	yes

[1] mg/kg = ppm

* ISQG represents the concentration below which adverse biological effects are expected to rarely occur; PEL represents the levels for which adverse biological effects are expected to frequently occur.

Sediment Bioassay

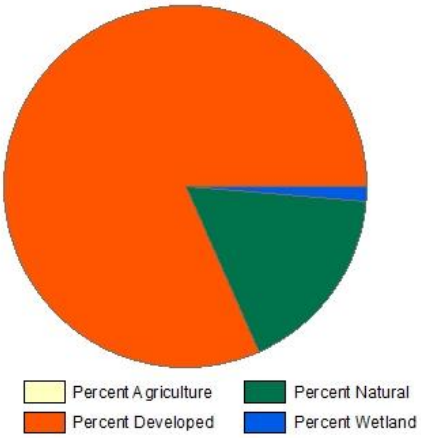
When Alewife Brook AU MA71-04 was split into three segments (MA71-21, MA71-22, MA71-20), the impairment cause code "Sediment Bioassays -- Chronic Toxicity Freshwater" was tacked onto the two Little River segments as well as the new Alewife Brook segment. The data supporting this impairment is from (Breault, Durant and Robbat, Jr. 2005) and there were no sampling locations on Little River. Therefore, the Sediment Bioassays cause code should not apply to either Little River AU.

Little River (MA71-22)

Location:	From MWRA CSO outfall (MWR003, approximately 150 feet upstream of mouth), Cambridge to mouth at confluence with Alewife Brook, Cambridge (formerly part of 2016 segment: Alewife Brook MA71-04).
AU Type:	RIVER
AU Size:	0.03 MILES
Classification/Qualifier:	B: CSO (river not listed in SWQS yet)

Little River - MA71-22

Watershed Area: square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.23	4.23	0.39	0.39
Agriculture	0.29%	0.29%	1.18%	1.18%
Developed	81.47%	81.47%	59.51%	59.51%
Natural	16.93%	16.93%	30.22%	30.22%
Wetland	1.31%	1.31%	9.09%	9.09%
Impervious Cover	38.29%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
--	5	Copper		Removed
--	5	Copper in Sediment		Added
--	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
--	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
--	5	Lead		Removed
--	5	Lead in Sediment		Added
--	5	Phosphorus, Total	R1_MA_2020_5a	Changed
--	5	Sediment Bioassay		Removed
--	5	Trash		Changed

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
There are reports of the non-native aquatic macrophyte, *Trapa natans*, in Little Pond which feeds Little River, as well as in Little River itself. However, the Little River report is not clear as to whether there were sightings in both DEP Assessment Units. Therefore, further confirmation by DEP staff will be required for this downstream AU (MA71-22). Ammonia (no violations of criteria) and total phosphorus (seasonal avg = 0.063 mg/L; no observations of excessive filamentous algae) samples were collected by MassDEP staff at station W1976 (approximately 65 feet upstream of the bridge crossing of the Route 2 off ramp (West Roadway) to the Alewife

T Station) in summer 2009. They were indicative of good water quality. For the 2018 assessment cycle, the former Alewife Brook Assessment Unit MA71-04 was split into two Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) and MA71-22, as well as Alewife Brook AU MA71-20. Surface sediment samples were collected in Little River MA71-21 and the new Alewife Brook segment MA71-20 as part of a 1999 Tufts University student's M.S. thesis. These data were reexamined in the sections for those segments. From the map included with the thesis, it is unclear whether any of the study sites were located in Little River MA71-22. When the former Alewife Brook AU MA71-04 was split into three segments, the impairment cause code "Sediment Bioassays -- Chronic Toxicity Freshwater" was tacked onto the two Little River segments as well as the new Alewife Brook segment. The data supporting this impairment are from a USGS study and there were no sampling locations on Little River. Therefore, the Sediment Bioassays cause code should not apply to either Little River AU

The Aquatic Life Use of Little River MA71-22 is assessed as Not Supporting due to prior impairments. These include dissolved oxygen and total phosphorus (a new round of TP data should be collected to potentially justify a delisting). Additionally, because it is unclear whether the sediment sample data from the 1999 M.S. thesis were located in this AU, the impairments for copper and lead will be retained. However, the "Copper" and "Lead" impairment cause codes are being delisted and replaced with the more appropriate causes "Copper in Sediment" and "Lead in Sediment." The impairment cause "Sediment Bioassays -- Chronic Toxicity Freshwater" is being delisted since the USGS data triggering that impairment (for Alewife Brook) were not collected in Little River. An Alert is being added for a potential infestation of Water Chestnut (*Trapa natans*).

2018/20 Delisted Impairment	**Delisting Reason**	**Delisting Comment**
Copper	Clarification of listing cause	The Copper cause code was originally used as the impairment prior to the addition of the more appropriate cause code of Copper in Sediment to the ATTAINS database. Therefore, Copper is being delisted and the Copper in Sediment cause will be added. The Copper data were from sediment not fish tissue or water column.
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)
Lead	Clarification of listing cause	The Lead cause code was originally used as the impairment prior to the addition of the more appropriate cause code of Lead in Sediment to the ATTAINS database. Therefore, Lead is being delisted and the Lead in Sediment cause will be added. The Lead data were from sediment not fish tissue or water column.
Sediment Bioassay	Applicable WQS attained; original basis for listing was incorrect	The "Sediment Bioassays – Chronic Toxicity Freshwater" cause code was originally listed as an impairment when Littler River was part of the old Alewife Brook assessment unit MA71-04. For the 2018 assessment cycle, the MA71-04 AU was split into two Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) and MA71-22, as well as Alewife Brook AU MA71-20. The USGS sediment study upon which this impairment was based did not include any study sites on Little River. Therefore, "Sediment Bioassays – Chronic Toxicity Freshwater" should not be applied to this Little River AU (MA71-22).

Supporting Information for Delisted Impairments

Copper

For this 2018/2020 IR reporting cycle, the MA71-04 AU was split into 2 Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) & MA71-22, as well as Alewife Brook AU MA71-20, & the data (sampled likely in 1997 as part of a Tufts University student's M.S. thesis (Ivushkina 1999)) from each new segment were reexamined separately. For this Little River AU (MA71-22), while it is unclear whether sediment sampling data from the thesis project were collected in this AU, at this time the "Copper" impairment is being delisted and a "Copper in Sediment" impairment is being added for clarification erring on the side of caution.

Lead

For this 2018/2020 IR reporting cycle, the MA71-04 AU was split into 2 Little River AUs, MA71-21 (which ends at MWRA CSO outfall 003) & MA71-22, as well as Alewife Brook AU MA71-20, & the data (sampled likely in 1997 as part of a Tufts University student's M.S. thesis (Ivushkina 1999)) from each new segment were reexamined separately. For this Little River AU (MA71-22), while it is unclear whether sediment sampling data from the thesis project were collected in this AU, at this time the "Lead" impairment is being delisted and a "Lead in Sediment" impairment is being added for clarification erring on the side of caution.

Sediment Bioassay

When Alewife Brook AU MA71-04 was split into three segments (MA71-21, MA71-22, MA71-20), the impairment cause code "Sediment Bioassays -- Chronic Toxicity Freshwater" was tacked onto the two Little River segments as well as the new Alewife Brook segment. The data supporting this impairment is from (Breault, Durant and Robbat, Jr. 2005) and there were no sampling locations on Little River. Therefore, the Sediment Bioassays cause code should not apply to either Little River AU.

Lower Mystic Lake (MA71027)

Location:	Arlington/Medford.
AU Type:	FRESHWATER LAKE
AU Size:	93 ACRES
Classification/Qualifier:	B: WWF

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed

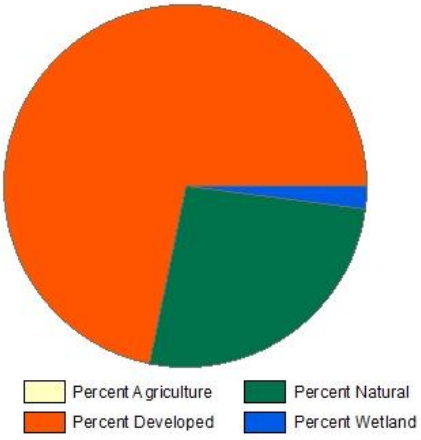
Fish, other Aquatic Life and Wildlife Use: Not Supporting
A new fish ladder on the Mystic Lakes Dam was completed in 2011. According to DMF staff, "the Mystic River herring run has become one of the largest in the state in the last five years". The DMF staffer indicated that the dam has very good upstream passage that could warrant a passage score of 0 or 1, but is being give a score of 2 due to "downstream passage conditions that are resulting in more predation on post-spawned adult herring and juvenile herring than necessary." In addition to river herring, the Mystic Lakes dam fish ladder also provides passage from Lower Mystic Lake into Upper Mystic Lake for American eel. With no other data available for this reporting cycle, the Aquatic Life Use of Lower Mystic Lake MA71027 will remain assessed as Not Supporting due to historical impairments (DO, Hydrogen Sulfide, Salinity, Sediment Bioassay)

Malden River (MA71-05)

Location:	From culverted portion south of Charles Street, Malden to confluence with Mystic River, Everett/Medford.
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B: WWF

Malden River - MA71-05

Watershed Area: 11 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	10.99	4.91	0.93	0.45
Agriculture	0.02%	0%	0%	0%
Developed	71.8%	89.91%	49.98%	64.55%
Natural	26.13%	9.37%	46.34%	33.97%
Wetland	2.06%	0.72%	3.68%	1.48%
Impervious Cover	40.27%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
5	5	Dissolved Oxygen Supersaturation	R1_MA_2020_5a	Changed
5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
5	5	Flocculant Masses	R1_MA_2020_5a	Changed
5	5	Phosphorus, Total	R1_MA_2020_5a	Changed
5	5	Temperature		Added
5	5	Transparency / Clarity	R1_MA_2020_5a	Changed
5	5	Trash		Changed
5	5	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)

There are reports of the non-native aquatic macrophytes, *Trapa natans* and *Myriophyllum spicatum*, in the Malden River. The latter should be confirmed by MassDEP staff. The river was posted due to Harmful Algal Blooms for 19 days in 2011. DFG conducted boat shocking upstream of Medford St, Malden (Sample ID 1043) and upstream of the Rt 16 bridge, Everett/ Medford (Sample ID 1095) in August 2004. The majority of both fish community samples was composed of multiple moderately tolerant macrohabitat generalist species (alewife most numerous upstream, while downstream it was pumpkinseed followed by alewife). MassDEP collected water quality data at site W1967 (Medford St, Malden, in the vicinity of the upstream fish sample) during

summer 2009. Dissolved oxygen probes were deployed for a 4-day period in June and a 3-day period in July. The mean daily minima for both deployments were <5.0 mg/L (4.1 & 4.5 mg/L) and the maximum diel shift was 7.52 mg/L for the July deployment (with a maximum DO saturation of 148.7%), indicating enriched conditions. A thermistor was deployed for 47 days beginning on July 10, recording a 7-DADM >27.7 °C on 9 occasions and a maximum 24-hour rolling average of 28.6 °C (this is a violation of the acute temperature criterion). *In situ* attended probe and grab sample data for pH, specific conductance, ammonia, and total phosphorus were generally indicative of good water quality. Of note, the TP seasonal avg/max concentrations were 0.064/0.08 mg/L (n=5) and there were no observations of excessive filamentous algae. A short way downstream, MWRA conducted water quality monitoring upstream of the Rt 16 bridge (Station 176) from 2009-2018 as part of its long term monitoring of the Boston Harbor and its tributaries. Temperature exceeded 28.3 °C on only one date in 2013 (1-2 doz. measurements per summer). Well over 10% of DO measurements (1+ to 3+ doz. / year) were <4 mg/L at the bottom in 8 of 10 years (annual minimum measurements <1.0 mg/L in 9 years), while low concentrations were infrequent at the surface. DO saturation measurements (1+ to 3+ doz. / year) were >125% at the surface at least once, and multiple times in 6 of 10 years (annual maxima 126-178%), indicating enriched conditions. More than 10% of surface pH measurements (1+ to 3+ doz. / year) were >8.3 SU (annual surface max = 8.14-9.17 SU), again indicating enriched conditions. Although specific conductance data ranged into the many thousands, the Malden River is tidally influenced due to its location near the locks on the Amelia Earhart Dam (on the Mystic River), so the model for estimated chloride is not valid. The Aquatic Life Use of the Malden River MA71-05 continues to be assessed as Not Supporting. Recent MassDEP (2009) and MWRA data (2009-2018) indicate that problems remain with low DO concentrations, DO supersaturation, and high pH, factors indicative of enriched conditions (and there was one year with an algal bloom). Although limited total phosphorus data (seasonal avg of 0.064 mg/L) shows an improvement over prior years, the impairment is being carried forward due to these other indicators. Other impairments (Sediment Bioassays, TSS) are also being carried forward. Because long term deployed temperature data from 2009 violated the warm water acute criterion (max 24-hr rolling avg = 28.6 °C), a Temperature impairment is being added, as is an impairment for the non-native Water Chestnut (*Trapa natans*) impairment. An Alert for a potential infestation of the non-native Eurasian Water Milfoil (*Myriophyllum spicatum*) is noted.

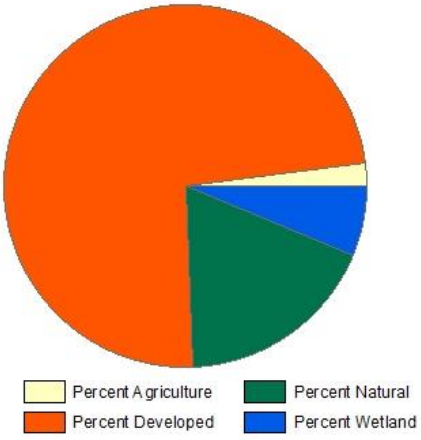
2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Mill Brook (MA71-07)

Location:	Headwaters south of Massachusetts Avenue, Lexington to inlet of Lower Mystic Lake, Arlington (portions culverted underground).
AU Type:	RIVER
AU Size:	3.9 MILES
Classification/Qualifier:	B

Mill Brook - MA71-07

Watershed Area: 5.47 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	5.47	4.58	1.25	1.05
Agriculture	2.07%	1.64%	5.53%	4.31%
Developed	73.6%	76.4%	49.98%	53.99%
Natural	18.11%	16.84%	24.16%	24.4%
Wetland	6.22%	5.13%	20.33%	17.3%
Impervious Cover	32.14%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Benthic Macroinvertebrates		Added
5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)

A benthic community sample (Site B0130, upstream of Mill St, Arlington), was collected by MassDEP in August 2009. The RBPIII status was determined to be 43% comparable or moderately impaired in comparison to the reference location (West Branch Palmer River, Narragansett Bay). In the downstream portion of Mill Brook (upstream and downstream of Mt. Pleasant Cemetery), DFG conducted a fish community survey (Sample ID 1098) in July 2004 while MassDEP conducted a survey (Sample ID 4516) in August 2009. Both samples included a substantial percentage of a fluvial species (white sucker). DEP staff collected water quality data at site W1966 (in Mt. Pleasant Cemetery, upstream of weir approximately 80 feet upstream of Mystic Valley Parkway, Arlington) in summer 2009. The data from one 3-day probe deployment and two 5-day deployments (lowest DO mean daily min = 6.0 mg/L, max DO diel shift = 2.7 mg/L, max DO saturation = 97%; max temp. = 21.7 °C) were indicative of good conditions. *In situ* and grab sample data (temperature, pH, dissolved oxygen, ammonia; TP avg = 0.051 mg/L) were also indicative of good water quality. Four of six specific conductance measurements recorded at W1966 in 2009 were ≥904 µs/cm (the criterion for evaluating chronic chloride toxicity using estimated data) and two of these were >994 µs/cm (the estimated criterion plus 10% margin to account for error in the model). The Aquatic Life Use of Mill Brook MA71-07 is being assessed as Not Supporting due to the

historical impairment “Physical substrate habitat alterations”. An impairment is being added for “Benthic Macroinvertebrates” based on the results of the RPBIII analysis of the 2009 Mill Street (Arlington) benthic sample indicating moderately conditions. The specific conductance data from site W1966 are considered appropriate to use as estimates of chloride concentrations and an Alert is being issued for chronic chloride toxicity.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Mill Creek (MA71-08)

Location:	From Route 1, Chelsea/Revere to confluence with Chelsea River, Chelsea/Revere.
AU Type:	ESTUARY
AU Size:	0.02 SQUARE MILES
Classification/Qualifier:	SB: SFR

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Fecal Coliform	R1_MA_2019_01	Changed

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
With no new data available for this reporting cycle, there is still Insufficient Information to assess the Aquatic Life Use of Mill Creek MA71-08 and the Alert Status for poor dissolved oxygen will remain.

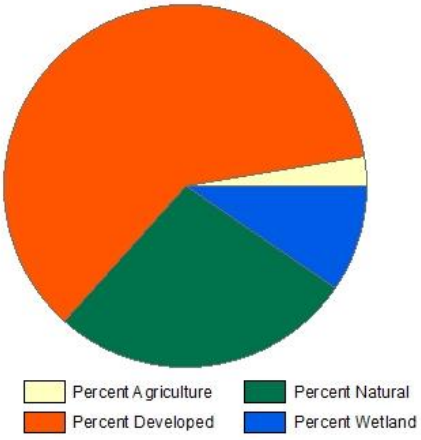
2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Fecal Coliform	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Munroe Brook (MA71-15)

Location:	Headwaters, north of Solomon Pierce Road, Lexington to the mouth at inlet Arlington Reservoir, Lexington (includes culverted portion).
AU Type:	RIVER
AU Size:	1.8 MILES
Classification/Qualifier:	B

Munroe Brook - MA71-15

Watershed Area: 0 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.49	1.49	0.38	0.38
Agriculture	2.66%	2.66%	7.21%	7.21%
Developed	60.74%	60.74%	38.02%	38.02%
Natural	27.08%	27.08%	28.38%	28.38%
Wetland	9.52%	9.52%	26.38%	26.38%
Impervious Cover	22.77%			

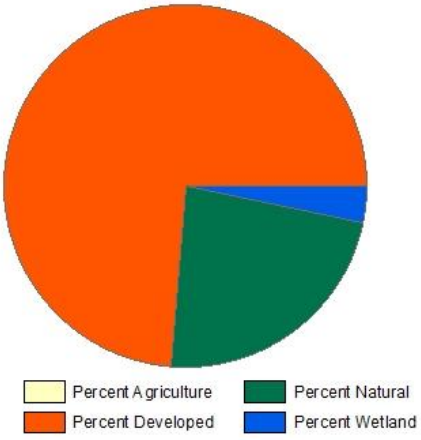
Fish, other Aquatic Life and Wildlife Use: Fully Supporting
DFG biologists collected a very small fish sample (n=2) at the Bryant Rd crossing, Lexington (SampleID 1036) in July 2004. The sample included a redfin pickerel, a moderately tolerant macrohabitat generalist. During summer 2009, MassDEP staff collected water quality data downstream at the footbridge south of Bartlett Ave, Lexington (station W1977). The data from two 5-day DO probe deployments were indicative of good conditions (DO mean daily min >6.0 mg/L, DO max diel shift <2.1 mg/L, max DO saturation <85%; max temp. = 19.8 °C). Attended probe and grab sample data for all parameters- temperature, pH (no violations of criteria), dissolved oxygen, specific conductance (max = 681 µs/cm), ammonia (no violations of criteria), and total phosphorus (avg = 0.045 mg/L, n=5)- were also indicative of good water quality. Based on the water quality data and limited fish data, the Aquatic Life Use of Munroe Brook MA71-15 is assessed as Fully Supporting.

Mystic River (MA71-02)

Location:	Outlet Lower Mystic Lake, Arlington/Medford to Amelia Earhart Dam, Somerville/Everett.
AU Type:	RIVER
AU Size:	5 MILES
Classification/Qualifier:	B: WWF, CSO

Mystic River - MA71-02

Watershed Area: 62.94 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	62.9	12.06	10.4	1.34
Agriculture	0.6%	0.01%	1.05%	0%
Developed	73.29%	91.8%	50.17%	59.04%
Natural	22.89%	7.65%	38.79%	39.64%
Wetland	3.23%	0.53%	9.99%	1.31%
Impervious Cover	38.22%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Chlorophyll-a	R1_MA_2020_5a	Changed
5	5	Dissolved Oxygen	R1_MA_2020_5a	Added
5	5	Dissolved Oxygen Supersaturation	R1_MA_2020_5a	Changed
5	5	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Added
5	5	(Fish Passage Barrier*)		Removed
5	5	pH, High		Added
5	5	Phosphorus, Total	R1_MA_2020_5a	Changed
5	5	Transparency / Clarity	R1_MA_2020_5a	Changed
5	5	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)

According to DMF biologists, the Mystic River herring run has become one of the largest in the state in the last five years (Amelia Earhart Dam has passage score 2 (minor obstruction)). The locks require dedicated locking by staff to move fish past the dam. MassDEP staff conducted water quality monitoring in the river during the summer of 2009 upstream at Route 38 (Winthrop Street), Medford (W1974), off the Riverside Yacht Club boat dock in Medford (W1973), and off the Winter Hill Yacht Club boat dock in Somerville (W1975). Infestations of

two non-native aquatic macrophytes, *Myriophyllum spicatum* and *Trapa natans* were found and a report of *Potamogeton crispus* needs confirmation. Multiprobes deployed for three 5-day periods documented low DO conditions with mean daily minimums below 4mg/L (2.9mg/L at W1973) and elevated diel DO shifts (3.3 to 5.7mg/L at W1975) indicative of enrichment. Saturation was above 125% once at W1975 (135%). Thermistor temperature data (74 day deploys starting June 26 at W1973 and W1975) met warm water standards upstream (W1973) (maximum 28.2, 7DADM 27.7, 24 hour rolling average 27.7°C) and were occasionally elevated downstream (W1975) but not over impairment criteria (maximum 29.0, 7DADM 28.5 (over 27.7 seven times), 24 hour rolling average 27.9°C). Seasonal average total phosphorus concentrations were <0.05mg/L at all three sites and there were no observations of any dense or very dense filamentous algae present. MWRA also conducted water quality monitoring (2009-2018): along this AU as part of their long-term monitoring program of Boston Harbor and its tributaries from ups to downstream as follows: upstream Alewife Br. confluence (083), Alewife Br. confluence (057), Boston Ave, Medford (066), 100m upstream Rt 93 (056), downstream Rt 16 (177), Rt 28 bridge near SOM007A/MWR205A CSOs (067), Malden R. confluence (059), and upstream Amelia Earhart Dam (167). DO, pH, temperature and specific conductance measured all sites. Bottom DO measurements were <4mg/L in more than half of the sampling years at all but two sites (>10% measurements) and several surface measurements were also <4mg/L. Saturations were >125% multiple times in multiple years along with elevated pH (>8.8SU). Maximum temperature 28.8°C (<10% of measurements >28.3°C). Four-day averages of SC (083-upstream Alewife Brook) were often >994µs/cm (chronic criterion for estimated chloride plus a 10% margin of error) twice/year 2013-2015, almost all of 2016 (drought), twice in 2017 and five times in 2018. More frequent exceedances were documented moving downstream. Due to tidal influence at Amelia Earhart Dam/locks the influence road salt (chloride toxicity) needs further investigation. Nutrient related data (083, 066, & 167) found multiple years with >10% of chlorophyll-*a* concentrations >16µg/L and where ≥50% of samples were >16µg/L (8 of 10 years) above the dam (167). Seasonal total phosphorus averages were generally ≤0.069mg/L but were 0.081-0.110mg/L from 2016-2018 (site 167). The MWRA Somerville Marginal CSO can discharge to the river via outfall 205A mid to high tides. Between January 2010 and 2018, all but one test WET tests using *C. dubia* and *P. promelas* test organisms (n=13) were not acutely toxic (LC_{50} >100% effluent, the October 2016 *C. dubia* test 72% effluent).

The Aquatic Life Use for this Mystic River AU (MA71-02) is assessed as Not Supporting. All prior impairments except for fish passage barrier are being carried forward. Because of improved passage at Amelia Earhart Dam (passage score now 2), the Fish Passage Barrier is being delisted (see Removal Comment). New impairments for low DO (>10% bottom measurements <4 mg/L, multi years most sites throughout this AU), high pH (>8.8SU at 6 MWRA stations) and non-native aquatic macrophytes *M. spicatum* (Eurasian water milfoil) and *Trapa natans* (water chestnut) are being added with alerts for *P. crispus* and chloride toxicity.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)
Fish Passage Barrier	Applicable WQS attained; based on new data	This Mystic River AU (MA71-02) was originally impaired for Fish Passage Barrier in the 2012 reporting cycle. This impairment was made since the fishway at the Amelia Earhart Dam was described by DMF biologists as non-functional. Based on more recent information provided by DMF biologists (16 April 2019 email) noted "the Mystic River herring run has become one of the largest in the state in the last five years". The passage score for the Amelia Earhart Dam was updated to 2 and DMF staff implied the score could even be better (lower), except "the locks require dedicated locking by staff to move fish

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
		past the dam." With such a successful herring run and a current passage score of 2 (minor obstruction), the Fish Passage Barrier impairment is being delisted.

Supporting Information for Delisted Impairments

Fish Passage Barrier

Fish Passage Scoring Update (Chase April 16, 2019):

From: Chase, Brad (FWE)
Sent: Tuesday, April 16, 2019 11:41 AM
To: Peet, Jenny (DEP)
Subject: RE: questions regarding fish passage and Mystic dams

Hi Jenny,

I'm glad that you and Laurie are using our fish passage data for your assessments. Let me respond by number:

1.) You have identified an issue where our Priority List could connect better to DEP's use of the data. When projects are *Completed*, we pull them out of the ranking and put them at the bottom of the file with no present values or ranking. This leaves your process wondering what the "Passage" and "Population Status" is. I need to correct this with our next update. For now, the site-specific story is easy since the corrections at both sites were highly successful and the Mystic River herring run has become one of the largest in the state in the last 5 years. Population status is easily a "10" at both sites. Right now in the present version, "Passage" is not assigned. Let me for your use assign a "2" value for both sites. The Mystic Lakes Dam has very good upstream passage that could warrant a 0 or 1. I'll give it a "2" because there are downstream passage conditions that are resulting in more predation on post-spawned adult herring and juvenile herring than necessary. We are working directly with DCR now to resolve this. The Amelia Earhart Dam gets a "2" because the locks require dedicated locking by staff to move fish past the dam. A "0" would be assigned with no locks present or no need for real-time human action to pass fish.

Mystic River (MA71-03)

Location:	Amelia Earhart Dam, Somerville/Everett to confluence with Boston Inner Harbor, Chelsea/Charlestown (Includes Island End River).
AU Type:	ESTUARY
AU Size:	0.49 SQUARE MILES
Classification/Qualifier:	SB(CSO): SFR

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
5	5	Fecal Coliform	R1_MA_2019_01	Changed
5	5	Flocculant Masses	R1_MA_2020_5a	Changed
5	5	Nutrient/Eutrophication Biological Indicators	R1_MA_2020_5a	Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

The MWRA discharges CSO effluent (permit MA0103284) from its Somerville Marginal pre-treatment facility via outfall 205 (during mid to low tide) to the Mystic River MA71-03 downstream of the Amelia Earhart dam. The facility is required to report the discharge event maximum, and to perform biannual acute toxicity testing with an LC_{50} limit of 100% effluent. Between July 2009 and October 2019, 22 valid WET tests were performed on the effluent using *Menidia beryllina* and 24 tests using *Mysidopsis bahia* test organisms. The LC_{50} and ANOEC values were >100% effluent and 100% effluent, respectively, for all the *M. beryllina* tests. The *M. bahia* tests also had an LC_{50} of >100% effluent, with one exception in the October 2016 test (LC_{50} = 46.9% effluent). There was greater variability in the ANOEC values of the *M. bahia* tests, which ranged from 25-100% effluent (7 of the 24 tests were 24 or 50% effluent). ExxonMobil Oil Corporation is authorized (permit MA0000833 issued December 2011) to discharge storm water, groundwater, hydrostatic test water, boiler condensate, fire testing water, truck wash water, effluent pond water, and continuous treatment system filter backwash water via Outfall 01C to a culvert on the Island End River (part of this AU). Between January 2009 and March 2019, 16 valid WET tests were conducted on the effluent using *A. bahia* (2x/year) and the LC_{50} was >100% effluent for all the tests. The MWRA collected water quality data from 2009-2018 at four stations in this AU (generally 1 to 2+ dozen times / year), from upstream to downstream, Station 052 (Mystic River, below Amelia Earhart Dam, at Somerville Marginal MWR205), 069 (Mystic River, near Schraffts Building, BOS017 CSO), 137 (Mystic River, 1/3-mile upstream of Tobin Bridge), and 183 (Island End River, near marina). Station 137 was the only one where nutrient data were collected. Surface chlorophyll *a* concentrations exceeded 10 µg/L 2-5 times (>10% of samples) during most summers at station 137 (seasonal maxima 11.0-49.4 µg/L). Seasonally averaged TN measurements (n= ~10/year) did not exceed 0.45 mg/L in surface measurements at station 137. Physical data were collected at all four stations. Stations 052 and 183 both had a couple of years where >10% of bottom DO measurements were <5 mg/L and at least 1 instance where bottom DO was <4.0 mg/L. Among bottom/surface data from all the stations, the minimum DO was 2.5 mg/L (surface at 069, 2013). At the 3 mainstem stations, DO saturation was >125% multiple times per year in multiple years in the surface measurements (annual maxima 92-197%). This is an indicator of enrichment. Temperature data from all four sites were well under 29.4 °C (the criterion for estuaries). With few exceptions, pH did not violate criteria, staying between 6.5 and 8.5 SU. The Aquatic Life Use of Mystic River MA71-03 is assessed as Not Supporting. Indicators of enrichment (>10% of surface chlorophyll *a* samples >10 µg/L and DO saturation >125% multiple times per year) warrant adding an impairment for "Nutrient/Eutrophication Biological Indicators." Problems with low DO at the bottom persist, so that impairment is being retained. Without additional data, the prior impairments for Un-ionized Ammonia, Cause Unknown, and Petroleum Hydrocarbons are also being retained.

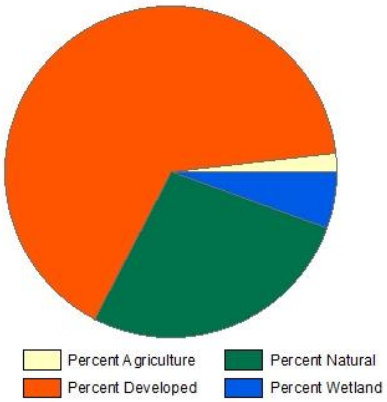
2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Fecal Coliform	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Pond Brook (MA71-16)

Location:	Headwaters, outlet Horn Pond, Woburn to mouth at inlet Wedge Pond, Winchester.
AU Type:	RIVER
AU Size:	1 MILES
Classification/Qualifier:	B

Pond Brook - MA71-16

Watershed Area: 10.28 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	10.27	8.48	2.36	2.06
Agriculture	1.77%	2.11%	1.48%	1.58%
Developed	65.66%	64.99%	52.2%	51.67%
Natural	27.14%	28.26%	34.31%	34.9%
Wetland	5.43%	4.65%	12.01%	11.85%
Impervious Cover	31.02%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	5	Benthic Macroinvertebrates		Added
3	5	(Fish Passage Barrier*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

While DMF staff manually adjusted the stone substrate at the Scalley Dam's bypass channel, allowing herring to pass from Pond Brook (also known as Horn Pond Brook) into Horn Pond, it is still a struggle for fish to work their way up the steep, craggy bypass channel, and passage may not be possible under high outflow from the dam. DMF staff indicated that the dam allows restricted passage (passage score 6 out of 10; 10 = no possible passage) to river herring and American eel, an improvement from its prior status of permitting no possible passage. In the downstream portion of the brook, MassDEP staff conducted a fish survey (Sample ID 4517, upstream from Lake Ave & Wedge Pond, along Horn Pond Brook Rd, Winchester) of Pond Brook in August 2009, and DFG staff sampled a short way downstream in July 2004 (Sample ID 1097, Palmer St upstream, next to Main St, Winchester). Both samples included a fluvial species and multiple moderately tolerant macrohabitat generalist species. In August 2009, DEP staff conducted a benthic survey at site B0754 (in the vicinity of the two fish samples in the downstream portion of the brook). The RBPIII status was determined to be "Moderately Impaired" (29% comparable) when compared with the West Branch Palmer River reference location (B0777, Narragansett Bay). The Aquatic Life Use of Pond Brook MA71-16 (locally known as Horn Pond Brook) is assessed as Not Supporting due to a moderately impaired benthic macroinvertebrate community (RBPIII status 29% comparable to the reference), and also due to less than optimal diadromous fish passage past Scalley Dam.

Sales Creek (MA71-12)

Location:	Headwaters near Route 145, Revere to Bennington Street tidegate/confluence with Belle Isle Inlet, Boston/Revere.
AU Type:	ESTUARY
AU Size:	0.01 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO (Tributary)

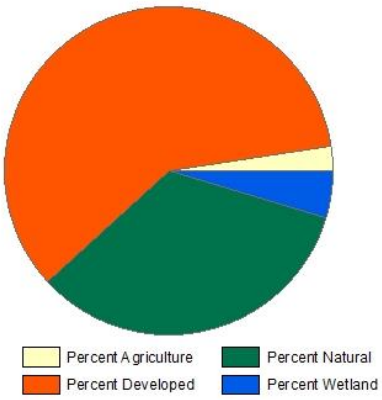
Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available for this reporting cycle, the Aquatic Life Use of Sales Creek MA71-12 remains Not Assessed.

Shaker Glen Brook (MA71-11)

Location:	Headwaters, west of Dix Road Extention, Woburn to confluence with Fowle Brook, Woburn (portion culverted underground).
AU Type:	RIVER
AU Size:	1.5 MILES
Classification/Qualifier:	B

Shaker Glen Brook - MA71-11

Watershed Area: 2.77 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.77	2.77	0.75	0.75
Agriculture	2.44%	2.44%	0.85%	0.85%
Developed	59.32%	59.32%	47.6%	47.6%
Natural	33.61%	33.61%	40.36%	40.36%
Wetland	4.63%	4.63%	11.19%	11.19%
Impervious Cover	25.02%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting (Alert)

Moving from upstream to downstream in Shaker Glen Brook, DFG collected four fish community samples [Sample IDs 3322 (Dix St Ext DS, Woburn), 3323 (Lexington Rd @ Elks Lodge US, @ powerlines crossing, Woburn), 3324 (Totman Rd xing US, off Lexington St, Woburn), and 3325 (upstream from confluence with Fowle Brook, Woburn)] in August 2010, while MassDEP collected one sample (4512, upstream from Totman Dr, Woburn) in the vicinity of 3324 in August 2009. Although the samples were relatively small, they all contained a fluvial species (white sucker) and most contained at least one moderately tolerant macrohabitat generalist as well. DEP biologists conducted a benthic invertebrate survey just upstream of Totman Drive (station B0756, in the vicinity of fish stations 3324 & 4512) in August 2009. The RBPIII status was determined to be 52% comparable or on the border between the "Slightly Impaired" and "Moderately Impaired" categories when compared to the reference location (B0777, West Branch Palmer River, Narragansett Bay). The percent comparability to reference site B0777 was substantially lower than the habitat comparison (78%), which would imply that the benthic invertebrate community was stressed due to water quality. However, the reference was not sampled until September, and taking into account the uncertain RBPIII status of the B0756 sample, the Shaker Glen Brook benthic community should be resampled in the same location, as opposed to making an impairment decision at this time. DEP collected *in situ* attended probe water quality data and grab samples (temperature, pH, dissolved oxygen, specific conductance, ammonia, total phosphorus) at site W1972 (in the vicinity of benthic site B0756 and fish site 3324). There were no violations of any applicable water quality criteria. Of note, the seasonal average/maximum TP concentrations were 0.030/0.039 mg/L (n=5) and there were no observations of excessive filamentous algae. Based on fish community (presence of a fluvial species) and water quality data (no violations of water quality criteria), the Aquatic Life Use of Shaker Glen Brook MA71-11 is assessed as Fully Supporting. However, an Alert is being issued (and a recommendation for further sampling is being made) due to an inconclusive benthic invertebrate sample.

Spot Pond (MA71039)

Location:	Stoneham/Medford.
AU Type:	FRESHWATER LAKE
AU Size:	290 ACRES
Classification/Qualifier:	A: PWS, ORW

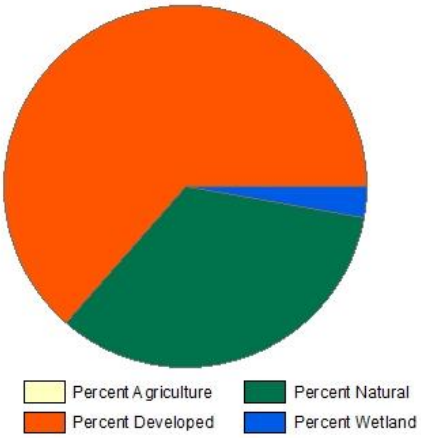
Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available for this reporting cycle, the Aquatic Life Use of Spot Pond MA71039 remains Not Assessed.

Spot Pond Brook (MA71-17)

Location:	Headwaters outlet Spot Pond, Stoneham to mouth at confluence with Malden River, south of Charles Street, Malden (approximately 55% culverted).
AU Type:	RIVER
AU Size:	3.5 MILES
Classification/Qualifier:	B

Spot Pond Brook - MA71-17

Watershed Area: square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.21	5.52	0.53	0.38
Agriculture	0.03%	0%	0%	0%
Developed	63.56%	61.63%	42.1%	42.23%
Natural	33.7%	36.83%	52.67%	55.98%
Wetland	2.71%	1.54%	5.23%	1.79%
Impervious Cover	33.09%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting (Alert)
MassDEP staff collected water quality data at site W1978 (unnamed tributary to Malden River locally known as Spot and Ell Pond Brook, west off end of Fairlawn Street, Malden) during summer 2009. The data from a 3-day probe deployment, a 4-day (no DO data from the July deploy), and a 5-day deployment were also indicative of good conditions (min DO = 6.1 mg/L, max DO diel shift = 2.3 mg/L, max saturation = 110%; max temp = 24.3 ˚C). The attended probe and grab sample data for most parameters (temperature, pH, dissolved oxygen, ammonia, total phosphorus) did not violate their respective criteria (of note, TP avg = 0.049 mg/L). However, three of six specific conductance measurements recorded at W1978 exceeded the estimated chloride chronic criterion (904 µs/cm SC). Because the data above the criterion were within a 10% margin of error needed to account for cumulative error in the model, chloride data should be collected as corroborating evidence of impairment. Based on limited water quality data, the Aquatic Life Use of Spot Pond Brook MA71-17 is being assessed as Fully Supporting. An Alert is being issued for potential elevated chloride concentrations.

Spy Pond (MA71040)

Location:	Arlington.
AU Type:	FRESHWATER LAKE
AU Size:	98 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Added
5	5	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)

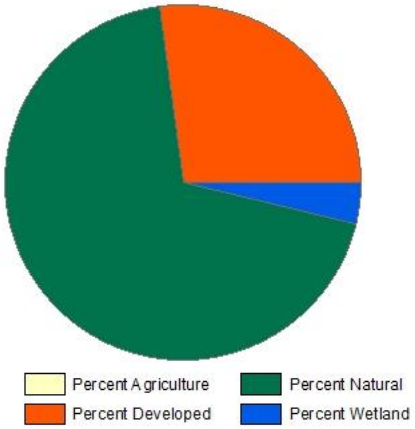
There are infestations of the non-native aquatic macrophytes, *Myriophyllum spicatum*, *Potamogeton crispus*, and *Trapa natans*, in Spy Pond, as well as a potential infestation of *Corbicula fluminea* (Asian clam). However, confirmation of the presence of *live* specimens of *Corbicula fluminea* is required. Spy Pond was posted due to Harmful Algal Blooms in 2009 (86 days), 2010 (119 days), 2011 (15 days), 2012 (30 days), and 2014 (14 days). The continuing occurrence of Harmful Algal Blooms in Spy Pond MA71040 warrants retaining this impairment and assessing the Aquatic Life Use as Not Supporting. Without recent data, the prior impairments for dissolved oxygen and total phosphorus will also be retained. Infested by multiple species of non-native aquatic macrophytes, the Eurasian water milfoil (*Myriophyllum spicatum*) impairment is being retained, while two new impairments for Curly-leaf pondweed (*Potamogeton crispus*) and Water Chestnut (*Trapa natans*) are being added. An Alert is identified due to a potential infestation of Asian clam (*Corbicula fluminea*)- the presence of *live* specimens should be confirmed.

Unnamed Tributary (MA71-13)

Location:	Unnamed tributary locally known as 'Meetinghouse Brook', from emergence south of Route 16/east of Winthrop Street, Medford to confluence with the Mystic River, Medford. (brook not apparent on 1985 Boston North USGS quad - 2005 orthophotos used to delineate stream).
AU Type:	RIVER
AU Size:	0.1 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA71-13

Watershed Area: 0 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.76	2.76	1.04	1.04
Agriculture	0%	0%	0%	0%
Developed	27.07%	27.07%	11.18%	11.18%
Natural	69.23%	69.23%	82.93%	82.93%
Wetland	3.7%	3.7%	5.89%	5.89%
Impervious Cover	14.93%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	4a	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)

MassDEP staff collected limited water quality data from this Unnamed Tributary AU (MA71-13) south of Mystic Valley Parkway bridge, approximately 80 feet from confluence with Mystic River (W1968) during summer 2009. A thermistor was deployed for 68 days beginning on July 9th and did not record any violations of warm water criteria (maximum temperature 25.3°C). Grab samples for nutrients were collected on five surveys dates. Both ammonia and the seasonal average total phosphorus concentrations were low (≤0.24, and 0.03mg/L, respectively) (no violations of criteria) indicative of good water quality. There were no observations of excessive filamentous algae either.

Too limited data are available to assess the Aquatic Life Use of this Unnamed Tributary AU (MA71-13 locally known as Meetinghouse Brook) so it is assessed as having Insufficient Information. Without deployed dissolved oxygen data, the prior Alert for low DO will remain. Given that the seasonal total phosphorus average concentration measured by DEP staff in 2009 (0.03 mg/L) was markedly decreased from the MyRWA 2002-2008 average concentrations (0.04-0.125 mg/L) previously noted in the 2004-2008 WQAR, the Alert for elevated TP is being removed.

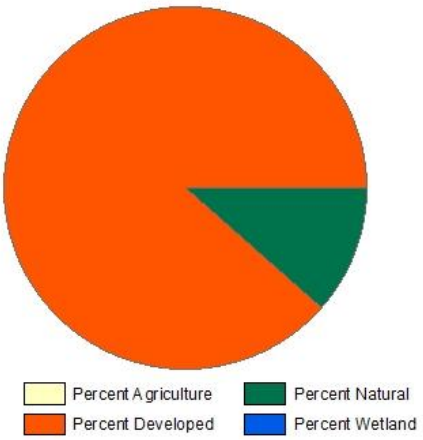
2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Unnamed Tributary (MA71-19)

Location:	Unnamed tributary to Little River (locally known as 'Wellington Brook'), headwaters south of Trapelo Road, Belmont to inlet Claypit Pond, Belmont (portions culverted underground) (1893 Boston USGS quad used to delineate stream).
AU Type:	RIVER
AU Size:	2.1 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA71-19

Watershed Area: square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.35	1.35	0	0
Agriculture	0%	0%	0%	0%
Developed	88.21%	88.21%	77.03%	77.03%
Natural	11.41%	11.41%	22.97%	22.97%
Wetland	0.38%	0.38%	0%	0%
Impervious Cover	45.92%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
--	5	Benthic Macroinvertebrates		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

MassDEP biologists collected a benthic macroinvertebrate sample approximately 25 meters upstream of the Cottage Sreet culvert, Belmont (B0757) in August 2009. The RBPIII status was determined to be 24% comparable or "Moderately Impaired" when compared to the West Branch Palmer River reference (B0777, Narragansett Bay). The low score was influenced by a lack of species diversity and a dearth of sensitive EPT taxa and scraper organisms. Nutrient data (ammonia, total suspended solids, total phosphorus) were collected at station W1970, in the vicinity of the benthic sample, during summer 2009. The TSS (max = 3.9 mg/L; n=5) and TP data (seasonal avg = 0.047 mg/L; n=5) were indicative of good water quality. Without pH and temperature data, the site specific ammonia criteria could not be calculated, but the seasonal maximum concentration of 0.65 mg/L was relatively low. Based on the moderately impaired benthic macroinvertebrate sample, the Aquatic Life Use of the Unnamed Tributary (Wellington Brook) MA71-19 is assessed as Not Supporting. A recommendation is being made to conduct a complete water quality survey of Wellington Brook.

Upper Mystic Lake (MA71043)

Location:	Winchester/Arlington/Medford.
AU Type:	FRESHWATER LAKE
AU Size:	176 ACRES
Classification/Qualifier:	B: WWF

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Added
5	5	Dissolved Oxygen	R1_MA_2020_5a	Changed
5	5	Dissolved Oxygen Supersaturation	R1_MA_2020_5a	Changed
5	5	(Non-Native Aquatic Plants*)		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)

There is an infestation of the non-native aquatic macrophyte, *Potamogeton crispus*, in Upper Mystic Lake. A new fish ladder on the Mystic Lakes Dam was completed in 2011. According to DMF staff, "the Mystic River herring run has become one of the largest in the state in the last five years". The DMF staffer indicated that the dam has very good upstream passage that could warrant a passage score of 0 or 1, but is being give a score of 2 due to "downstream passage conditions that are resulting in more predation on post-spawned adult herring and juvenile herring than necessary." In addition to river herring, the Mystic Lakes dam fish ladder also provides passage into Upper Mystic Lake for American eel. A MassDEP 2005 Nutrient Criteria study (8/10/2005) of Upper Mystic Lake documented dissolved oxygen concentrations below 5.0 mg/L at depths ≥5 meters. This is similar to documentation noted in the Mystic River Watershed 2004-2008 Water Quality Assessment Report. A depth integrated chlorophyll *a* sample measured 8.2 µg/L in 2005. Total phosphorus was indicative of good water quality at the surface but was somewhat elevated near the anoxic bottom (there is evidence that phosphorus can be released from anoxic sediments). Additionally, specific conductance was quite elevated (1,610 µs/cm) near the bottom. The 1975 Upper Mystic Lake Water Quality Study noted that although salt water intrusion was possible before the dam between the Upper and Lower Mystic lakes was constructed in 1864, there was "no evidence for a hypolimnion salt water layer" in the 1970s. In fact, specific conductance values calculated from monthly conductivity measurements (June 1974 - April 1975) in the hypolimnion ranged from 884-1,038 µs/cm. The Aquatic Life Use of Upper Mystic Lake MA71043 will remain assessed as Not Supporting due to low dissolved oxygen concentrations occurring over a large portion of the lake. The Non-Native Aquatic Plants impairment is being delisted and replaced with the specific Curly-leaf Pondweed (*Potamogeton crispus*). An Alert is being issued due to elevated specific conductance measured in the hypolimnion, which could be indicative of chronic chloride toxicity. A recommendation will be made for further monitoring.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	The Non-Native Aquatic Plants impairment is being delisted and replaced with the specific Curly-leaf Pondweed (Potamogeton crispus).

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

The MassDEP Herbicide Database indicates that there is an infestation of the non-native aquatic macrophyte, *Potamogeton crispus*, in Upper Mystic Lake (MassDEP 2017). The generic Non-Native Aquatic Plants impairment is being delisted and replaced with the specific Curly-leaf Pondweed (Potamogeton crispus).

Wedge Pond (MA71045)

Location:	Winchester.
AU Type:	FRESHWATER LAKE
AU Size:	23 ACRES
Classification/Qualifier:	B

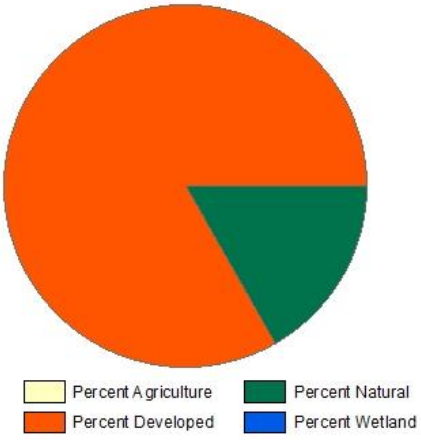
Fish, other Aquatic Life and Wildlife Use: Not Supporting
Between 2009 and 2014, Wedge Pond was posted due to Harmful Algal Blooms (HABs) in 2009 (24 days), 2011 (25 days), 2012 (29 days), and 2014 (13 days). Given the history of Harmful Algal Blooms, the Aquatic Life Use of Wedge Pond MA71045 is assessed as Not Supporting due to HABs. With no additional data available for this reporting cycle, the historical impairments for dissolved oxygen and total phosphorus are being retained.

Winn Brook (MA71-09)

Location:	Headwaters near Juniper Road and the Belmont Hill School, Belmont to confluence with Little Pond, Belmont (portions culverted underground).
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

Winn Brook - MA71-09

Watershed Area: square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.39	1.39	0.21	0.21
Agriculture	0.55%	0.55%	0%	0%
Developed	82.14%	82.14%	83.38%	83.38%
Natural	16.51%	16.51%	15.65%	15.65%
Wetland	0.79%	0.79%	0.98%	0.98%
Impervious Cover	32.05%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	4a	Escherichia Coli (E. Coli)	R1_MA_2019_01	Changed

Fish, other Aquatic Life and Wildlife Use: Not Supporting
With no data available in this reporting cycle, the Aquatic Life Use for Winn Brook MA71-09 is retaining its prior assessment of Not Supporting due to physical substrate habitat alterations.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Escherichia Coli (E. Coli)	TMDL approved or established by EPA (4a)	Impairment covered under TMDL: Pathogen TMDL for the Boston Harbor, Weymouth-Weir, and Mystic Watersheds (Report CN 157.1, approved 11/21/2018, ATTAINS Action ID: R1_MA_2019_01)

Winter Pond (MA71047)

Location:	Winchester.
AU Type:	FRESHWATER LAKE
AU Size:	19 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Winter Pond was originally listed as impaired due to the presence of the non-native aquatic macrophyte, *Myriophyllum heterophyllum*, in the 2012 Integrated Report. The 2004-2008 Water Quality Assessment Report referenced DCR's aquatic invasive species database (which informs the DEP Freshwater Aquatic Invasive Species Database) as the source of the *Myriophyllum heterophyllum* record. However, recent validation of aquatic invasive species reports indicates that DCR does not have any record of occurrence of this species in Winter Pond. Review of MassDEP's Herbicide Database revealed the pond was treated for this species in 2011, 2012, and 2013. Due to conflicting occurrence reports, MassDEP staff should confirm the presence of *Myriophyllum heterophyllum* in Winter Pond. With no additional new data available for this reporting cycle, the historical impairments of Winter Pond MA71047 remain (Non-Native Aquatic Plants, Nutrient/Eutrophication Biological Indicators) and its Aquatic Life Use is assessed as Not Supporting.

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