Appendix 12
Charles River Watershed
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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2018/20 Cycle Impairment Changes

Waterbody	AU_ID	2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Beaver Brook	MA72-28	5	5	Chloride		Added
Beaver Brook	MA72-28	5	5	(Non-Native Aquatic Plants*)		Removed
Beaver Brook	MA72-28	5	5	(Water Chestnut*)		Added
Beaver Pond	MA72006	4c	4c	(Fanwort*)		Added
Bogastow Brook	MA72-16	4a	4a	(Dewatering*)		Added
Cedar Swamp Pond	MA72016	4a	4a	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Added
Charles River	MA72-04	5	5	Ambient Bioassays - Chronic Aquatic Toxicity		Added
Charles River	MA72-04	5	5	Nutrient/Eutrophication Biological Indicators		Added
Charles River	MA72-04	5	5	Phosphorus, Total		Added
Charles River	MA72-04	5	5	Temperature		Added
Charles River	MA72-05	5	5	(Fanwort*)		Added
Charles River	MA72-05	5	5	(Non-Native Aquatic Plants*)		Removed
Charles River	MA72-05	5	5	(Water Chestnut*)		Added
Charles River	MA72-06	5	5	(Fanwort*)		Added
Charles River	MA72-06	5	5	(Water Chestnut*)		Added
Charles River	MA72-07	5	5	Benthic Macroinvertebrates		Added
Charles River	MA72-07	5	5	(Curly-leaf Pondweed*)		Added
Charles River	MA72-07	5	5	(Non-Native Aquatic Plants*)		Removed
Charles River	MA72-07	5	5	Temperature		Added
Charles River	MA72-07	5	5	(Water Chestnut*)		Added
Charles River	MA72-36	5	5	(Non-Native Aquatic Plants*)		Removed
Charles River	MA72-36	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Added
Charles River	MA72-36	5	5	(Water Chestnut*)		Added
Charles River	MA72-38	5	5	(Fish Passage Barrier*)		Added
Cheese Cake Brook	MA72-29	4a	5	Fish Bioassessments		Added
Dug Pond	MA72034	4c	4c	(Curly-leaf Pondweed*)		Added
Dug Pond	MA72034	4c	4c	(Non-Native Aquatic Plants*)		Removed
Franklin Reservoir Northeast	MA72095	4a	4a	(Water Chestnut*)		Added
Hardys Pond	MA72045	4a	4a	(Non-Native Aquatic Plants*)		Removed
Hardys Pond	MA72045	4a	4a	(Water Chestnut*)		Added
Houghton Pond	MA72050	4a	4a	(Non-Native Aquatic Plants*)		Removed
Jamaica Pond	MA72052	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Added
Lake Waban	MA72125	4c	4c	(Fanwort*)		Added
Lake Winthrop	MA72140	5	5	(Fanwort*)		Added
Louisa Lake	MA72068	3	4c	(Non-Native Aquatic Plants*)		Added
Mill River	MA72-15	5	5	(Curly-leaf Pondweed*)		Added
Mill River	MA72-15	5	5	(Non-Native Aquatic Plants*)		Added
Mirror Lake	MA72078	4a	4a	(Curly-leaf Pondweed*)		Added
Mirror Lake	MA72078	4a	4a	(Non-Native Aquatic Plants*)		Removed

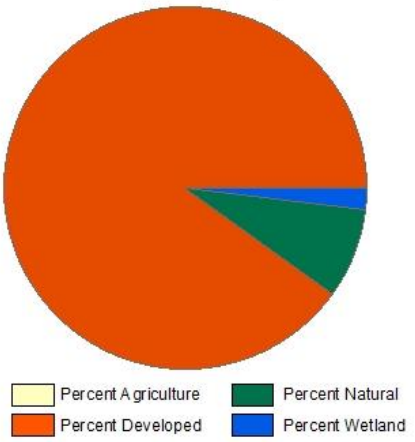
Waterbody	AU_ID	2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Morses Pond	MA72079	4c	4c	(Fanwort*)		Added
Nonesuch Pond	MA72085	4c	4c	(Curly-leaf Pondweed*)		Added
Nonesuch Pond	MA72085	4c	4c	(Non-Native Aquatic Plants*)		Removed
Rock Meadow Brook	MA72-21	5	5	Organic Enrichment (Sewage) Biological Indicators		Added
South Meadow Brook	MA72-24	4a	5	Fish Bioassessments		Added
South Meadow Brook	MA72-24	4a	5	Trash		Changed
Stony Brook	MA72-26	2	5	Temperature		Added
Stop River	MA72-10	5	4a	Temperature		Removed
Unnamed Tributary	MA72-31	5	5	Metals		Removed
Unnamed Tributary	MA72-31	5	5	Trash		Changed
Unnamed Tributary	MA72-31	5	5	Unspecified Metals in Sediment		Added
Unnamed Tributary	MA72-42	2	5	Benthic Macroinvertebrates		Added

Alder Brook (MA72-22)

Location:	Headwaters, perennial portion northwest of the Route 135 and South Street intersection, Needham to mouth at confluence with the Charles River, Needham.
AU Type:	RIVER
AU Size:	0.3 MILES
Classification/Qualifier:	B

Alder Brook - MA72-22

Watershed Area: 1.73 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.73	1.73	0.16	0.16
Agriculture	0%	0%	0%	0%
Developed	90.1%	90.1%	62.4%	62.4%
Natural	8%	8%	20.4%	20.4%
Wetland	1.9%	1.9%	17.2%	17.2%
Impervious Cover	33.2%			

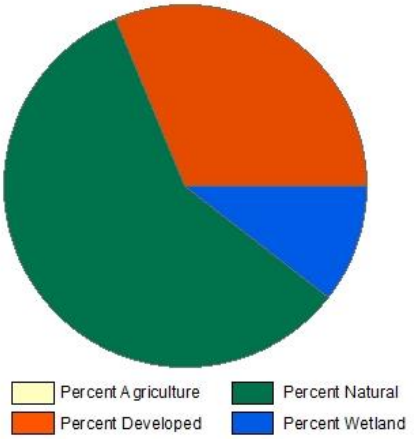
Fish, other Aquatic Life and Wildlife Use: Not Supporting
DFG biologist conducted backpack electrofishing in Alder Brook upstream of South Street in Needham (Sample #4026) on 7/30/2012. Of the eight species collected, roughly half were moderately tolerant macrohabitat generalists and there were no fluvial species. This likely reflects the influence of the nearby Needham Reservoir (which is connected to Alder Brook by a short unnamed tributary). Without recent benthic community and water quality data downstream of South Street, it is not possible to reevaluate the impairments for "Benthic Macroinvertebrates" and "Nutrient/Eutrophication Biological Indicators". The Aquatic Life Use of Alder Brook (MA72-22) will continue to be assessed as Not Supporting with the existing impairments being carried forward.

Beaver Brook (MA72-12)

Location:	Headwaters, outlet Beaver Pond, Bellingham to mouth at confluence with the Charles River, Bellingham.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

Beaver Brook - MA72-12

Watershed Area: 2.85 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.85	2.78	0.93	0.93
Agriculture	0.6%	0.6%	0.3%	0.3%
Developed	31.1%	30.5%	22.4%	22.4%
Natural	57.8%	58.3%	55.2%	55.2%
Wetland	10.5%	10.7%	22.1%	22.1%
Impervious Cover	12.7%			

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

MassDEP staff surveyed Beaver Brook (MA72-12) at station W1142 (approximately 725 ft upstream of confluence with Charles River and upstream of footpath off Taunton St., Bellingham) during the summer of 2007. Multiprobe data (dissolved oxygen and temperature) were collected during five 3-day deploys. Although the maximum DO diel shift during the May deploy was elevated (shift = 4.86 mg/L), all other data during that deploy and the other four deploys were indicative of good conditions (maximum temperature = 25.3 ˚C; lowest mean minimum DO concentration = 5.50 mg/L; maximum DO diel shift other than May = 2.13 mg/L; maximum DO saturation = 115.6%). In situ attended probe (DO, temperature, pH) and grab sample (total phosphorus, ammonia) data were also indicative of good conditions. In particular, the maximum TP concentration was 0.038 mg/L.

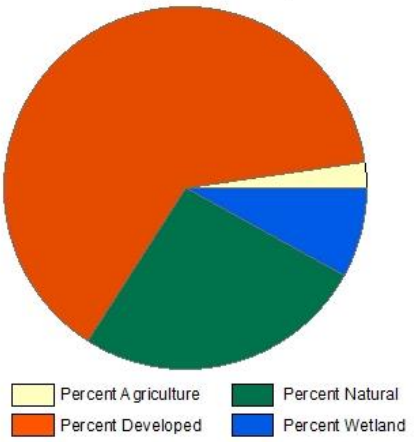
The Aquatic Life Use of this Beaver Brook AU (MA72-12) is assessed as Fully Supporting based on the 2007 water quality data. The prior Alert status (due to the potential impacts of water withdrawals and a sand & gravel operation in the sub-watershed) is being maintained.

Beaver Brook (MA72-28)

Location:	Headwaters, perennial portion north of Route 2, Lexington to mouth at confluence with the Charles River, Waltham (one culverted portion approximately 2900 feet (0.55mile)).
AU Type:	RIVER
AU Size:	5.5 MILES
Classification/Qualifier:	B

Beaver Brook - MA72-28

Watershed Area: 11.43 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	11.42	8.58	3.19	2.28
Agriculture	2.3%	2%	2.9%	1.5%
Developed	63.7%	64.5%	44.3%	48.3%
Natural	26.1%	27.1%	29.6%	31.4%
Wetland	8%	6.4%	23.2%	18.8%
Impervious Cover	28.9%			

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting

In July 2011, DFG attempted to sample the fish community (sample 3778) at three locations just upstream of and in the upper roughly 40% of the Beaver Brook MA72-28 AU. None of these locations (beside the Bowman School just upstream of the AU in Lexington, at Concord Avenue in Lexington, and the end of Marlborough Road in Waltham) had flowing water and 2011 was not considered a drought year according to DCR's Recent Drought History document. In summer 2007, MassDEP staff conducted a water quality survey at station W1143 (inlet to Mill Pond, Waltham/Belmont). A multiprobe was deployed for five 3-day periods. The max dissolved oxygen saturation values were all <100% and the diel DO shifts were all <3.0 mg/L. The mean daily min DO concentrations were >6.0 mg/L in the early part of the summer, but decreased to 4.8 mg/L and 2.2 mg/L at the end of August and end of September, respectively. Most of the state was under a Drought Advisory by October 1st, however, so toward the end of the summer, the flow was likely composed of a higher percentage of groundwater (which is low in oxygen). The max temperature during these deploys was 24.9 °C. Attended probe and grab sample data (temperature, pH, DO, ammonia, total phosphorus) were generally indicative of good

water quality (i.e. no violations of CALM guidance criteria). However, one DO measurement was <4.0 mg/L (2.3 mg/L on October 1) around the time that low measurements were recorded by the deployed multiprobe. Of concern, the avg/max TP concentrations were 0.069/0.13 mg/L (n=5), which are higher than the guidance criterion of a seasonal avg of 0.05 mg/L for waters entering a lake/reservoir. Additionally, one out of five averaged pairs of specific conductance data exceeded the chronic criterion for estimated chloride with a value of 1,035 µs/cm. As has been previously described, DEP staff conducted a water quality survey of Beaver Brook during summer 2002 and reported that roughly 50% of Mill Pond (part of the A.U. in Waltham/Belmont) was covered in the non-native water chestnut, *Trapa natans*. DEP collected specific conductance (n=3) and chloride grab sample data at station W2518 [~160 ft downstream/south of Trapelo Rd, Waltham/Belmont] during summer 2015. Four of five chloride samples exceeded the chronic criterion (230 mg/L), with a maximum of 390 mg/L. The specific conductance data were consistent. In summer 2007, DEP collected water quality data at a second downstream location, W1144 (Beaver St, Waltham, downstream of Clematis Brook confluence). A multiprobe was deployed for five 3-day periods, with some indications of poor dissolved oxygen (all but the June deploy had mean daily min <5.0 mg/L, ranging from 1.3 mg/L in late September to 4.9 mg/L in May). Additionally, the max DO diel shifts were generally ≤1.1 mg/L, with the exception of the May deploy (4.5 mg/L), and the max saturations were ≤91%. The max temperature during the deploys was 24.2 °C. Attended probe and grab sample data (temperature, pH, ammonia, total phosphorus) were acceptable (TP seasonal average = 0.091 mg/L; criterion for flowing waters is 0.1 mg/L), with the exception of DO data which were comparable to the deployed probe data. Although individual specific conductance measurements exceeded the chronic criterion for estimated chloride, once 4-day avgs were calculated, there were no exceedances. Three water samples analyzed for metals had no exceedances of chronic/acute criteria.
The Aquatic Life Use of this Beaver Brook AU (MA72-28) is assessed as Not Supporting. DO and TP data indicate that these prior impairments should remain in place, and several other impairments should as well, since there are no data available to refute them. A new impairment for chloride is being added due to the exceedances of the chronic criterion at W2518. “Non-Native Aquatic Plants” is being delisted and replaced with “Water Chestnut”.

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 “Water Chestnut”.

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

During the summer 2002 DEP water quality survey of Beaver Brook (MA72-28), it was reported that roughly 50% of Mill Pond (part of the Beaver Brook A.U. in Waltham/Belmont) was covered in the non-native water chestnut, *Trapa natans* (Connors 2007). The generic “Non-Native Aquatic Plants” is being delisted and replaced with the specific codes.

Beaver Pond (MA72004)

Location:	Bellingham/Milford.
AU Type:	FRESHWATER LAKE
AU Size:	87 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed (Alert)
It was previously reported in the 2002-2006 Water Quality Assessment Report that the aquatic macrophyte, *Myriophyllum* sp., was identified in Beaver Pond during a MassDEP 1997 synoptic survey. In order to determine whether this is a non-native species, further identification needs to be made when flowering heads are present. The Aquatic Life Use for this Beaver Pond AU (MA72004) is Not Assessed. The Alert status for a potential infestation of a non-native species remains.

Beaver Pond (MA72006)

Location:	Franklin.
AU Type:	FRESHWATER LAKE
AU Size:	32 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Fanwort*)		Added

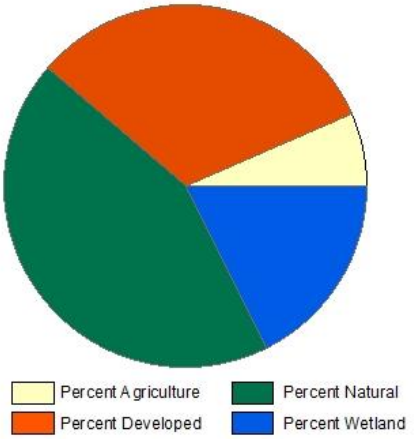
Fish, other Aquatic Life and Wildlife Use: Not Supporting
The DCR Lakes and Ponds Program reported infestations of the non-native aquatic macrophytes, *Myriophyllum heterophyllum* (variable water milfoil) and *Cabomba caroliniana* (fanwort), in 2002 in Beaver Pond (MA72006). The Aquatic Life Use for this Beaver Pond AU (MA72006) will continue to be assessed as Not Supporting due to the presence of fanwort (new cause code) and *M. heterophyllum* (Non-Native Aquatic Plants).

Bogastow Brook (MA72-16)

Location:	Headwaters, outlet Factory Pond, Holliston to mouth at inlet South End Pond, Millis.
AU Type:	RIVER
AU Size:	9.4 MILES
Classification/Qualifier:	B

Bogastow Brook - MA72-16

Watershed Area: 25.38 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	25.08	12.66	8.64	4.64
Agriculture	6.5%	7.7%	5.5%	6.1%
Developed	32.2%	25.9%	20.5%	13.5%
Natural	43.7%	43.1%	38.9%	35.6%
Wetland	17.6%	23.3%	35%	44.8%
Impervious Cover	10.1%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Dewatering*)		Added

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

MassDEP staff conducted water quality surveys of Bogastow Brook at the 1st (W2153 near the Glen Ellen Country Club) and 3rd (W0423 downstream of Bogastow Pond) Orchard Street crossings in Millis. In June 2010, a multiprobe was deployed for one 5-day period at W2153. These data were indicative of good water quality (daily mean minimum DO = ~5 mg/L, maximum diel shift = 1.1 mg/L, maximum saturation = 71%, maximum temperature = 25.6 ˚C). A thermistor was deployed for 38 days starting May 6 and the maximum temperature was 27.1 ˚C. In situ attended probe and grab sample data (DO, temperature, pH, ammonia, total phosphorus) for this site were all indicative of good conditions (TP average concentration was 0.052 mg/L, n=2 and there were no observations of dense or very dense filamentous algae). Downstream of Bogastow Pond, a multiprobe was deployed for three 2-day periods in 2007 at W0423. These data were also indicative of good conditions (lowest daily mean minimum DO = 5.7 mg/L, maximum diel shift = 1.2 mg/L, maximum saturation = 95%, maximum temperature = 24.5 ˚C. A thermistor was deployed for 94 days over the index period, beginning on June 28. The 7-DADM exceeded 27.7 °C on four occasions, and the maximum 24-hour rolling average was 27.0 °C. In situ attended probe and grab sample data (DO, temperature, pH, ammonia, total phosphorus) for this site were generally indicative of good conditions and there were no observations of dense or very dense filamentous algae. However, the TP average concentration was slightly elevated at 0.078 mg/L (n=4). A benthic

sample (B0614) was collected approximately 200 meters downstream of W0423, also in 2007. The RBP III status was determined to be "not impaired" (95% comparable) when compared to the Stony Brook reference (B0073). On September 12, 2016, CRWA staff observed a dewatered streambed at the Orchard Street crossing (Millis) downstream of Bogastow Pond Dam (this is in the vicinity of DEP site W0423, whose 2007 data are discussed above). A Drought Advisory/Watch/Warning was in effect for this part of the state from July 2016 through April 2017. However, the presence of the dam would have prevented downstream flow under low flow conditions. Additionally, this location is on the edge of a Zone II Wellhead Protection Area and the dewatering event might have been influenced by the groundwater withdrawals as well.

The Aquatic Life Use of Bogastow Brook will be assessed as Not Supporting because of dewatering downstream from Bogastow Pond Dam in August and September 2016 that was reported by CWRA staff. The impact of the dam as well as potentially groundwater withdrawals exacerbated the low flow conditions from the drought. While the benthic macroinvertebrate and water quality data collected in 2007 and 2010 were generally excellent, an Alert is being added due to an average seasonal total phosphorus concentration >0.05mg/L measured at station W0423. The prior Alert status based on the relative lack of fluvial fish species is being removed, per the 2018 CALM guidance, since fluvial species were present.

Brookline Reservoir (MA72010)

Location:	Brookline.
AU Type:	FRESHWATER LAKE
AU Size:	21 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available, the Aquatic Life Use of Brookline Reservoir (MA72010) is Not Assessed.

Bulloughs Pond (MA72011)

Location:	Newton.
AU Type:	FRESHWATER LAKE
AU Size:	7 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
There are no data available for Bulloughs Pond (MA72011), so the Aquatic Life Use is Not Assessed.

Cambridge Reservoir (MA72014)

Location:	Waltham/Lincoln/Lexington.
AU Type:	FRESHWATER LAKE
AU Size:	531 ACRES
Classification/Qualifier:	A: PWS, ORW

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Following the public comment period for the 2016 IR, Cambridge Water Department data and USGS data (collected at Trapelo Road and the intake for the gatehouse where water is discharged to Hobbs Brook MA72-46) were evaluated. Between December 1, 2013 and December 1, 2014, three out of five Trapelo Road samples had chloride concentrations exceeding the chronic criterion (230 mg/L). Over the same period, 64% of the samples (n=50) collected at the intake gatehouse also had chloride concentrations exceeding the chronic criterion. The Aquatic Life Use of this Cambridge Reservoir AU (MA72014) will continue to be assessed as Not Supporting because of exceedances of the chronic chloride criterion.

Cambridge Reservoir, Upper Basin (MA72156)

Location:	Lincoln/Lexington.
AU Type:	FRESHWATER LAKE
AU Size:	44 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Following the public comment period for the 2016 IR, Cambridge Water Department data and USGS data collected at sites upstream and downstream of the Cambridge Reservoir Upper Basin (see Hobbs Brook MA72-45, Unnamed Tributary MA72-47, and Cambridge Reservoir MA72014) were evaluated. These data, documenting numerous exceedances of the chronic chloride criterion (230 mg/L) in the upstream and downstream water bodies, were used to make the inference that the chronic chloride criterion was also exceeded in the upper basin itself. The Aquatic Life Use of the Upper Basin of the Cambridge Reservoir AU (MA72156) will continue to be assessed as Not Supporting because of exceedances of the chronic chloride criterion in the upstream and downstream waterbodies bracketing upper basin.

Cedar Swamp Pond (MA72016)

Location:	locally known as "Milford Pond", Milford.
AU Type:	FRESHWATER LAKE
AU Size:	99 ACRES
Classification/Qualifier:	B: AQL

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

MassDEP staff collected three metals samples at station W1711 (upstream of the dam) in summer 2007. These samples did not exceed acute/chronic criteria. Charles River Watershed Association staff reported an infestation of the non-native aquatic macrophyte, *Myriophyllum heterophyllum* (variable milfoil), in Cedar Swamp Pond during their summer 2005 surveys (previously noted in the 2002-2006 WQAR). MassDEP staff identified *Myriophyllum spicatum* (Eurasian milfoil) during the 2007 and 2017 water quality surveys. DEP staff also reported *Potamogeton* sp. in 2007, but species confirmation is needed.

Without data from a complete water quality survey, the Aquatic Life Use of Cedar Swamp Pond remains assessed as Not Supporting due to historical low dissolved oxygen concentrations. Additionally, the pond remains impaired due to the presence of a Non-Native Aquatic Plant (*M. heterophyllum*) and Eurasian water milfoil is being added for this reporting cycle.

Chandler Pond (MA72017)

Location:	Boston.
AU Type:	FRESHWATER LAKE
AU Size:	11 ACRES
Classification/Qualifier:	B

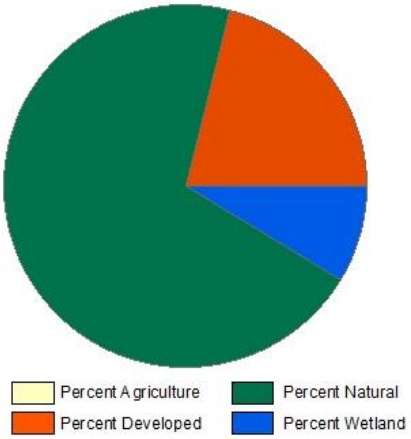
Fish, other Aquatic Life and Wildlife Use: Not Supporting
With no new data available for this reporting cycle, the Aquatic Life Use of Chandler Pond MA72017 is assessed as Not Supporting due to prior impairments for enrichment related causes.

Charles River (MA72-01)

Location:	Headwaters, outlet Echo Lake, Hopkinton to Dilla Street (just upstream of Cedar Swamp Pond), Milford.
AU Type:	RIVER
AU Size:	2.5 MILES
Classification/Qualifier:	A: PWS, ORW

Charles River - MA72-01

Watershed Area: 3.41 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	3.41	3.07	2.14	1.93
Agriculture	0.1%	0%	0%	0%
Developed	21.1%	16.5%	18.3%	13.9%
Natural	70.2%	74.8%	69.2%	73.6%
Wetland	8.6%	8.6%	12.5%	12.5%
Impervious Cover	7.6%			

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

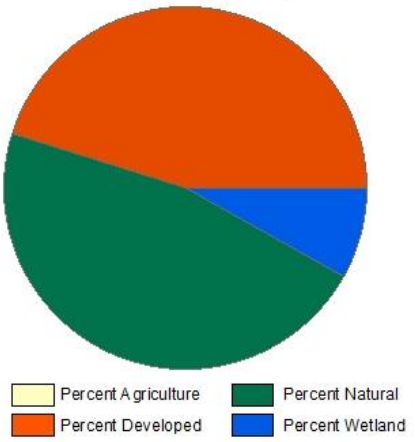
MassDEP staff conducted a water quality survey at station W1592 (Cedar St. / Route 85 crossing, Milford) in summer 2007. Sampling was conducted only in May and June because the location was dry later in the season (by October 1st, most of the state was under a drought advisory). A deployed probe measured dissolved oxygen and temperature data at the site over two 3-day periods. Temperature was <20.0 ˚C for both deployments. The minimum DO concentration was 6.28 mg/L during the May deploy and 4.32 mg/L during the June deploy (with 14.7 of 144.0 total deployed hours <5.0 mg/L). Most of the i*n situ* attended probe and grab sample data (DO, water temperature, ammonia) were generally indicative of good conditions. The maximum total phosphorus concentration (n=2) was 0.14 mg/L, but there were no biological indications of enrichment. pH ranged from 5.6-5.7 S.U. on all four May/June measurements. However, there is a substantial amount of deciduous wooded swamp in the riparian zone upstream of the site, so it is not clear whether this might be a natural condition. The Aquatic Life Use of Charles River MA72-01 remains assessed as Not Supporting due to historical dissolved oxygen and human-influenced flow issues. New for this reporting cycle, an Alert is being issued due to low pH values in a limited number of measurements.

Charles River (MA72-03)

Location:	From Milford WWTF discharge (NPDES: MA0100579), Hopedale to outlet Box Pond, Bellingham (through former 2006 segment: Box Pond MA72008).
AU Type:	RIVER
AU Size:	3.4 MILES
Classification/Qualifier:	B: WWF

Charles River - MA72-03

Watershed Area: 14.73 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	14.72	4	6.63	1.42
Agriculture	0.4%	1.3%	0.6%	2.1%
Developed	45%	33.7%	30.7%	22.3%
Natural	46.5%	55.2%	53.8%	54.9%
Wetland	8.1%	9.9%	15%	20.8%
Impervious Cover	17.4%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting

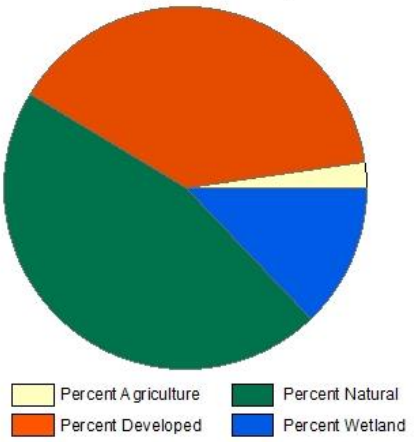
The upstream end of this AU (Charles River MA72-03) is located at the Town of Milford Wastewater Treatment Facility. Under NPDES permit #MA0100579, the Town is authorized to discharge treated sanitary wastewater via outfall 001 to the Charles River. Between July 2007 and January 2019, 48 valid whole effluent toxicity tests were conducted on the facility's effluent using *C. dubia* test organisms. The LC_{50}s were all >100% effluent. Of the 45 tests with valid CNOEC data, 39 tests (87%) had a CNOEC of 100% effluent. Six tests (October 2008, July 2010, October 2017, May 2018, July 2018, October 2018) had values ranging from 12.5-50% effluent. Although ambient water was used as the diluent in the most recent four tests (in 2017 and 2018) which failed the CNOEC permit limit (≥98%), it is of note that the ambient controls on these dates had good *C. dubia* survival rates ranging from 90-100% (ambient water was collected upstream, in AU MA72-33). CRWA collected usable TSS data at Station 59CS (Mellen St. bridge, Bellingham/ Milford/ Hopedale) in 2009 (maximum 2.8 mg/L, n=6). CRWA also collected usable total phosphorus data in 2009, 2012, and 2013 (n = 2 or 3 per index period). TP seasonal averages ranged from 0.051-0.085 mg/L. The Charles River MA72-03 AU was previously listed as impaired due to multiple indicators of enriched conditions. Limited 2009-2013 CRWA TP data may indicate that TP has slightly improved since the 2002-2005 sampling described in the 2002-2006 WQAR. However, further improvements are needed. The Aquatic Life Use of Charles River MA72-03 remains Not Supporting due to prior impairments ("Algae", "Dissolved Oxygen Supersaturation", "Organic Enrichment (Sewage) Biological Indicators", "Phosphorus, Total").

Charles River (MA72-04)

Location:	From outlet Box Pond, Bellingham to inlet Populatic Pond, Norfolk/Medway (one culverted portion approximately 350 feet (0.07mile)).
AU Type:	RIVER
AU Size:	11.5 MILES
Classification/Qualifier:	B: WWF

Charles River - MA72-04

Watershed Area: 66.14 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	66.11	10.39	20.96	2.73
Agriculture	2.3%	3.2%	2.2%	5%
Developed	39.1%	46.2%	24.7%	24.8%
Natural	45.8%	39.9%	47.4%	45.2%
Wetland	12.8%	10.7%	25.6%	25.1%
Impervious Cover	14.6%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Ambient Bioassays - Chronic Aquatic Toxicity		Added
5	5	Nutrient/Eutrophication Biological Indicators		Added
5	5	Phosphorus, Total		Added
5	5	Temperature		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Data from multiple stations along this Charles River AU (MA72-04), surveyed by MassDEP, DFG, & CRWA staff, upstream to downstream: CRWA data upstream Station 90CS (Rt 126, Bellingham). Chlorophyll *a* generally low (≤3 µg/L, n=16 2009-2013), TSS generally ≤10 mg/L (n=23; 2009-2016). Seasonal TP average 0.029-0.078mg/L (1-5 samples/year; 2009-2016). Barge electrofishing conducted by DEP biologists in Sept 2015 ~1000'upstream Rt 495, Bellingham (Sample ID6404). Top species redfin pickerel & fallfish. Same area (DEP W2509) 1 of 5 samples (2015) exceeded chronic chloride criterion. Downstream N. Bellingham Dam, sites included DEP's site W1135 (2007) & CRWA's 130S (2009), then ~800 ft downstream DEP's B0684 (2010 benthic), W2157 (2010 WQ), & DEP fish 4564 (2010). W1135 data generally indicative of good conditions (no violations of pH, DO, ammonia, metals criteria; average TP (n=5) 0.03mg/L; no dense/very dense filamentous algae; five 3-day DO probe deploy

minimum daily mean 6.2mg/L, diel shifts <3 mg/L, max saturation 116%; max DADM temp 27.8°C). CRWA site 130S average TP 0.029mg/L, low TSS. Downstream ~800' of Maple St. (Bellingham), the RBPIII status of benthic sample B0684 was "slightly impaired" (75% comparable) when compared to the Johnson Creek reference (Station B0688, Merrimack Basin). Additionally, no violations of WQ criteria at site W2157 (good pH, DO, ammonia, metals criteria data; average TP 0.05mg/L (n=4); no dense/very dense filamentous algae; 3 5-day DO probe deploy lowest mean daily minimum 5.2mg/L, diel shifts <2 mg/L, max saturation 107%). Deployed thermistor (5/6/2010; 122 days) maximum 24-hour rolling average 29.3°C (acute violation). Backpack electrofishing (sampleID 4564) most numerous species at this high gradient site was yellow bullhead. Fish samples 6404 (upper AU) & 4564 in combination were 23.14% similar to the Target Fish Community model for the Charles. Old Mill Dam (a.k.a Caryville Dam) demolished early 2017 and at that time, mercury-impacted sediment was removed. Limited TP data collected by CRWA Station 165S (Shaw St. bridge, Medway/Franklin) averaged 0.046 and 0.059mg/L (2009/2013). Downstream AU area (Walker St., Medway): DEP W0414 (2007) and ambient sampling location for CRWPCD WET tests. Although most W0414 data were indicative of good conditions (temperature, pH, DO, ammonia; average TP 0.03mg/L), there were some indications of enrichment (two observations dense/very dense filamentous algae, maximum diel DO shift during seven 2-3 day deploys 4.4mg/L, maximum saturation 125%). Between July 2007 and April 2019, survival of *C. dubia* exposed (~7 days) to river water collected at Walker Street in Medway was good (80-100%; n=47 tests), however, survival of *P. promelas* <75% in 15 of 47 tests (32%) ranging from 15-73%. Poor survival occurred across all years and quarters except July. The RBPIII status of 2007 benthic sample B0055 (~120 m downstream Walker St) was "not impaired" (95% comparable) when compared to the Stony Brook reference site (B0073). DFG biologists conducted boat electrofishing upstream of confluence with Populatic Pond) (SampleID 3998) in June 2012. The sample was primarily comprised of moderately tolerant macrohabitat generalists.

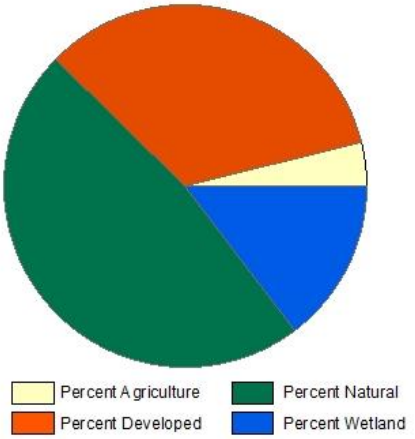
The Aquatic Life Use of this Charles River AU (MA72-04) will continue to be assessed as Not Supporting based on fish bioassessments and flow regime modification. Impairments are being added for temperature (downstream N. Bellingham Dam 24-hour maximum rolling average was 29.3°C), total phosphorus (seasonal average concentrations above 0.05mg/L in both up and downstream reaches at 90CS and 165CS although decreases noted since 2014, CRWA request 2016 IR public comment), Nutrient/Eutrophication Biological Indicators for evidence of enrichment (dense/very dense algae/diel DO shifts up to 4.4mg/L), and Ambient Bioassays – Chronic Aquatic Toxicity (previous Alert based on the frequently poor survival of *P. promelas* exposed (7-day) to river water).

Charles River (MA72-05)

Location:	From outlet Populatic Pond, Norfolk/Medway to South Natick Dam (NATID: MA00341), Natick.
AU Type:	RIVER
AU Size:	18.1 MILES
Classification/Qualifier:	B: WWF

Charles River - MA72-05

Watershed Area: 155.9 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	155.83	9.94	48.11	2.72
Agriculture	3.8%	7.6%	3.5%	6.6%
Developed	34%	30.7%	20.6%	19.6%
Natural	47.6%	48.9%	45.6%	45.1%
Wetland	14.7%	12.8%	30.4%	28.7%
Impervious Cover	12%			

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

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

MassDEP observed *Myriophyllum* sp. (downstream of Dean Street, Millis) summer 2002 & *Potamogeton* sp. in summer 2007 (W1137- Rt 27, Medfield/Sherborn AND at W1138- ~1000 ft upstream of Davis Br. confluence), but species confirmation needed. As previously reported, the non-native macrophytes, *Trapa natans* (water chestnut) & *Cabomba caroliniana* (fanwort), ID'ed in S. Natick Dam impoundment during CRWA's summer 2005 survey. CRPCD's WWTF discharges ~1000 ft downstream of Populatic Pond. Of 47 valid whole effluent toxicity (WET) tests conducted on *C. dubia* and *P. promelas* test organisms July 2007 - April 2019, no acute toxicity detected & chronic toxicity exceeding NPDES permit limit (CNOEC ≥63%) occurred in only a handful of cases. Benthic invertebrate & water quality (WQ) data collected by DEP & CRWA at multiple stations are presented upstream to downstream. Summer 2007- DEP WQ survey at W1136 (Dean St, Millis) & benthic survey ~400 ft downstream, with mixed results. No violations of criteria for pH, temperature, ammonia, or metals, & TP only slightly elevated (avg = 0.055 mg/L; n=5). However, dense or very dense filamentous algae observed 5 times, & indications of enrichment among DO data from four 2-day probe deployments (lowest mean daily min. = 4.1 mg/L, max. diel shift = 3.9 mg/L, max. saturation = 154%). Despite this, RBPIII status of July benthic sample

(B0056) determined to be "slightly impaired" (65% comparable) when compared to the Stony Br. reference (Station/Unique ID: ST01/B0073). Three CRWA stations- 229S (Rt. 115, S. of Baltimore St, Millis), 267S (Dwight St bridge, Millis/Medfield), & 290S (West St / Dover Rd, Medfield/Millis; same location as Medfield WWTF's ambient monitoring). TSS measured only in 2009 at the 2 upstream locations, while TP measured in 2009, 2012, & 2013. These data consistent with that of 290S, where chlorophyll *a* (2009-2013; ≤8 µg/L plus 1 outlier, n=18) data collected, as well as TSS (<12 mg/L plus 1 outlier, n=30) & TP (seasonal avgs 0.055-0.1 mg/L but <0.07 mg/L in the past 4 years; n=23) from 2009-2016. All but one WET ambient control (n = 44; July 2007 - April 2019) using MA72-05 water collected upstream of Medfield WWTF yielded 80-100% survival of *C. dubia* test organisms at end of ~7 days exposure. Other than a couple of tests, no acute toxicity of undiluted effluent & no exceedances of chronic toxicity limit in facility's NPDES permit (CNOEC ≥18%). Summer 2007- DEP WQ survey at W1137 (Rt. 27, Medfield/Sherborn). No violations of temperature or ammonia criteria, but pH was 6.8-8.6 SU & TP slightly elevated (avg = 0.059 mg/L; n=5). Some signs of enrichment in DO saturation data from five 2-day probe deployments (lowest mean daily min. = 6.0 mg/L, diel shifts <3 mg/L, max. saturation = 137%). No observations of excessive algae. CRWA also sampled TSS at this location (318S) in 2009 (max. = 25 mg/L; n=3) & TP in 2009, 2012, and 2013 (seasonal avgs. 0.056-0.1 mg/L; n=8). CRWA station 343S (Farm Rd. / Bridge St., Sherborn/Dover), sampled in the same years, had lower TSS & similar TP (seasonal avgs. 0.048-0.11 mg/L; n=7). Near downstream end of AU, DEP WQ survey at W1138 (~1000 ft upstream of Davis Br. confluence, Natick) during summer 2007. No violations of criteria for temperature, pH, or ammonia, & the TP avg. was 0.05 mg/L (n=5). Definite signs of enrichment in DO data from five 2-day probe deployments (lowest mean daily min. = 0.7 mg/L, max. diel shift = 8.2 mg/L, max. saturation = 154%). Two observations of dense or very dense filamentous algae.

With observations of excessive algal biomass, TP elevated (generally 0.05-0.1 mg/L), & signs of enrichment in DO data throughout the AU, the Aquatic Life Use of this Charles River AU (MA72-05) remains assessed as Not Supporting due to numerous prior impairments. Non-Native Aquatic Plants cause is being replaced by Fanwort and Water Chestnut. New Alert being identified for potential infestation of non-native *Myriophyllum* sp.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	"Non-Native Aquatic Plants" code being delisted and replaced with the specific codes, "Fanwort" and "Water Chestnut".

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

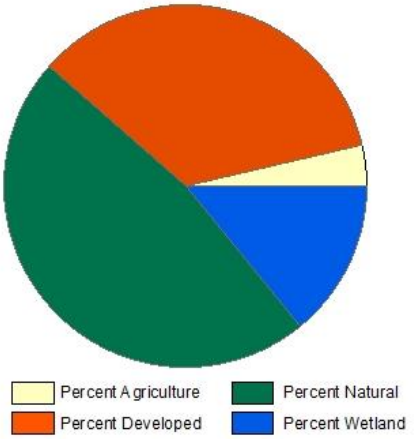
The non-native aquatic macrophytes, *Trapa natans* (water chestnut) and *Cabomba caroliniana* (fanwort), were identified in the South Natick Dam impoundment during the summer 2005 survey conducted by the Charles River Watershed Association to support development of the draft Upper Charles River Watershed TMDL (CRWA 2006). Additionally, *Myriophyllum* sp. was observed by DEP staff (downstream of Dean Street, Millis) in summer 2002 (Connors 2007) and *Potamogeton* sp. was observed in summer 2007 (at W1137- at Route 27, Medfield/Sherborn AND at W1138- approximately 1,000 feet upstream of Davis Brook confluence, Natick at informal boat launch off Route 16) (MassDEP Undated), but identification of both of these species is required. The generic "Non-Native Aquatic Plants" is being delisted and replaced with the specific codes.

Charles River (MA72-06)

Location:	From South Natick Dam (NATID: MA00341), Natick to Chestnut Street, Needham/Dover.
AU Type:	RIVER
AU Size:	8.2 MILES
Classification/Qualifier:	B: WWF

Charles River - MA72-06

Watershed Area: 186.04 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	185.9	12.14	57.3	4.51
Agriculture	3.6%	4.1%	3.4%	4.2%
Developed	35%	30.4%	21.5%	18.5%
Natural	47.4%	50.5%	46.2%	51.5%
Wetland	14%	14.9%	28.9%	25.8%
Impervious Cover	12.3%			

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

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

As was previously reported in the 2002-2006 WQAR, four non-native aquatic macrophytes- *Myriophyllum spicatum* (Eurasian water milfoil), *Myriophyllum heterophyllum* (variable water milfoil), *Cabomba caroliniana* (fanwort), and *Marsilea quadrifolia* (water shamrock)- were identified in the Charles River (MA72-06) between Elm Bank Reservation (Wellesley/Dover) and the Cochrane Dam (Needham/Dover) during the summer 2005 surveys which informed the development of the draft Upper Charles River Watershed TMDL. Additionally, in the DEP Freshwater Aquatic Invasive Species Database, there is a 2016 report of *Trapa natans* (water chestnut) and *Potamogeton crispus* (curly-leaf pondweed) observed roughly 2,000 feet upstream of the Cochrane Dam, but the *P. crispus* record should be confirmed by DEP staff. MassDEP and CRWA collected water quality (WQ) and benthic invertebrate data at multiple sites in this AU. These data are presented upstream to downstream and include usable CRWA data. CRWA collected WQ data at stations 387S (Elm Bank Reservation at Cheney Dr. bridge, Wellesley/Dover) and 400S (Charles River Street bridge, Dover/Needham). Chlorophyll *a* concentrations at 387S were ≤8.2 µg/L, with the exception of 1 outlier (n=18; 2009-2013), and were <10 µg/L at 400S (n=3; 2011 & 2013). Total suspended solids concentrations were ≤14 mg/L at 387S (n=28; 2009-2016) and ≤15 mg/L at 400S (n=16; 2009 & 2013-2016). Total phosphorus concentrations were also similar between the stations,

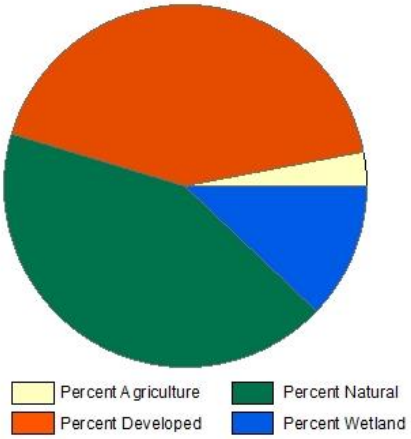
with seasonal averages of 0.05-0.1 mg/L at 387S (n=17; 2009-2016) and 0.057-0.078 mg/L at 400S (n=10; 2009 & 2013-2016). MassDEP staff conducted benthic invertebrate (B0487) and WQ surveys (W1141) in close proximity, roughly several hundred feet downstream of the Cochrane Dam (Dover/Needham) during summer 2007. The RBPIII status of B0487 was determined to be "non/slightly impaired" (80% comparable) when compared to the Stony Brook reference (Station/Unique ID: ST01/B0073). Data from probes deployed at W1141 for five 2-day periods were indicative of good conditions (lowest DO mean daily minimum = 6.5 mg/L; max DO diel shift = 1.8 mg/L; maximum DO saturation = 102%; maximum temperature = 25.3 °C). Attended probe and grab sample data (temperature, pH, DO, ammonia, TP) were indicative of good conditions. Of note, average TP was 0.045 mg/L (n=5), but there were three observations of dense or very dense filamentous algae. CRWA conducted limited WQ monitoring at station 447S (Dover gage, Mill St., Dover/Needham) in 2009. The maximum TSS concentration was 4.6 mg/L (n=2) and the seasonal average TP concentration was 0.074 mg/L (n=3). Although the 2007 benthic station B0487 had an RBPIII status of "non/slightly impaired," DEP biologists expressed that it had not changed much since it was last sampled in 2002 (despite a change of reference stations) when concern was voiced about the dominance of filter feeding organisms indicative of enriched conditions. Moreover, the observation of excessive algal growth in the vicinity, as well as TP seasonal averages often >0.05 mg/L (the criterion for rivers entering a lake/reservoir) throughout the AU necessitates that the Aquatic Life Use of Charles River MA72-06 should remain Not Supporting due to multiple prior enrichment related impairments. Although the "Non-Native Aquatic Plants" and "Eurasian Water Milfoil, Myriophyllum Spicatum" causes are remaining, the new codes "Fanwort" and "Water Chestnut" are being added to provide clarification. An Alert is being added due to a potential infestation of curly-leaf pondweed (*Potamogeton crispus*).

Charles River (MA72-07)

Location:	From Chestnut Street, Needham/Dover to Watertown Dam (NATID: MA00456), Watertown.
AU Type:	RIVER
AU Size:	24 MILES
Classification/Qualifier:	B: WWF

Charles River - MA72-07

Watershed Area: 272.64 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	272.44	16.07	83.32	2.48
Agriculture	3%	1.3%	3.1%	1.4%
Developed	42.4%	80.3%	25.5%	56.1%
Natural	42.4%	15.5%	45.3%	30.7%
Wetland	12.1%	2.9%	26.1%	11.8%
Impervious Cover	16.4%			

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
Data at multiple MassDEP*/CRWA** sites & 1 MWRA/USGS site in this Charles River AU (MA72-07) with only large data sets summarized up to downstream: 534S** (Rt 109 bridge, Dedham/Boston), W1139* (Mary Hunnewell footbridge crossing, upstream of Cordingly Dam), 609S** (downstream Finlay Dam aka Newton Lower Falls), W2156*/fish (4565), benthic (B0683) (~1800' downstream Finlay Dam), 662S** (Moody St. bridge upstream of dam, Waltham), & at the Watertown Dam footbridge 012S**, W0384*, USGS 01104615, & MWRA station 012. Downstream of Finlay Dam (mid AU) the fish sample was only 23% similar to the Target Fish Community Model & the RBPIII status of the benthic sample was moderately impaired (24% comparable) when compared to the Elizabeth Brook reference (B0686, Concord basin). Two shorter in duration algal blooms (≤20 days) in the lower half of the AU (vicinity of Charles River Canoe & Kayak, Newton/ Moody St Dam, Waltham) occurred in 2012 with excessive filamentous algae occasionally observed in different locations/years. Chlorophyll *a* generally under 16 µg/L (with several exceptions in 2012 at CRWA sites throughout the AU). TP

generally 0.05-0.09 mg/L (elevated for a river with so many impoundments). TSS, ammonia, and pH generally within acceptable ranges. Temperature data near upstream & downstream ends of the AU acceptable, but a thermistor deployed in May 2010 for 122 days downstream of Finlay Dam was elevated (max 7DADM 29.1°C, chronic criterion of 27.7 °C violated 17 times; max 24-hr rolling avg 29.1°C violated WWF acute criterion of 28.3 °C). Some indications of enrichment in the 2007 DO data from 3 or 5-day deployed probes at the upstream and downstream reaches of the Charles River in this AU with max diel shifts >4 mg/L & lower DO recorded at the downstream site (lowest mean daily minimum = 2.95 mg/L). No criteria violations among dozens of USGS pesticide samples collected near the Watertown Dam (2005-11). MWRA documented DO saturation as high as 131% (2009-2018) and occasionally elevated specific conductance (>1,000 µs/cm) when discharge was at/below 7Q10 in late summer 2016. Non-native macrophyte infestations included *Potamogeton crispus* (curly-leaf pondweed) at W2156*, *Myriophyllum spicatum* (Eurasian water milfoil) at W1139*/W2156*/W0384*, & *Trapa natans* (water chestnut, upstream of Cordingly Dam). Reports of *Cabomba caroliniana* (fanwort) in Purgatory Cove need to be confirmed. Feasibility study on removal of Watertown Dam is under review, but other dams in the AU continue to restrict/block fish passage. The biological indicators of enrichment continue: poor fish/benthic invertebrate community samples, occasional HABs, occasional elevated chlorophyll *a* and observations of dense filamentous algae. Enrichment also evident in some elevated DO diel shifts and the seasonal total phosphorus average concentrations were often >0.05 mg/L. The Aquatic Life Use of this Charles River AU (MA72-07) is assessed as Not Supporting. All prior impairments are being carried forward. Impairments are being added for Temperature (due to acute and chronic criteria exceedances downstream of Finlay Dam) and Benthic Macroinvertebrates (due to moderately impaired sample downstream of Finlay Dam). Alerts are being identified for the potential non-native *Cabomba* infestation and chloride (elevated specific conductance occurring when discharge was below/near 7Q10 in late summer 2016 which may be indicative of estimated chloride exceeding the chronic criterion). The Non-Native Aquatic Plants impairment is being delisted and replaced by species specific impairments (curly-leaf pondweed, water chestnut).
Primary Contact Recreation Use: Not Supporting
The Primary Contact Recreational Use of this Charles River AU (MA72-07) will continue to be assessed as Not Supporting with the Escherichia Coli (E. Coli) and Harmful Algal Blooms impairments being carried forward. The Non-Native Aquatic Plants impairment is being delisted and replaced by species specific impairments (curly-leaf pondweed (Potamogeton crispus), and Water Chestnut (Trapa natans).
Secondary Contact Recreation Use: Not Supporting
The Secondary Contact Recreational Use of this Charles River AU (MA72-07) will continue to be assessed as Not Supporting with the Harmful Algal Blooms impairment being carried forward. The Non-Native Aquatic Plants impairment is being delisted and replaced by species specific impairments (curly-leaf pondweed (Potamogeton crispus), and Water Chestnut (Trapa natans).
Aesthetic Use: Not Supporting
The Aesthetics Use of this Charles River AU (MA72-07) will continue to be assessed as Not Supporting with the Harmful Algal Blooms impairment being carried forward. The Non-Native Aquatic Plants impairment is being delisted and replaced by species specific impairments (curly-leaf pondweed (Potamogeton crispus), and Water Chestnut (Trapa natans).

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

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

DEP field staff reported the presence of the non-native aquatic macrophytes, *Potamogeton crispus* (curly-leaf pondweed, WQ station W2156, 2010) and *Myriophyllum spicatum* (Eurasian milfoil, WQ stations W1139/W2156/W0384, 2010, 2017) in the Charles River A.U. MA72-07 (MassDEP Undated). Additionally, *Trapa natans* (water chestnut) was reported upstream of the Mary Hunnewell footbridge (and the Cordingly Dam) in Wellesley in August 2002 (Connors 2007).

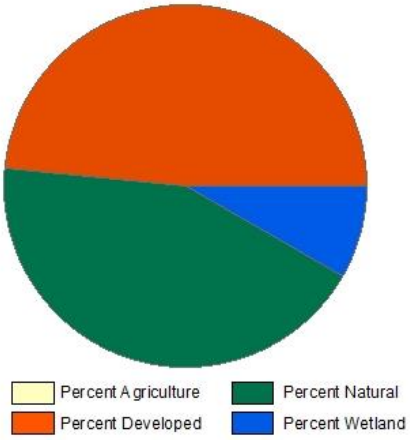
Purgatory Cove is located in the Charles River Lakes District on the Waltham/Newton border and is connected via culvert to the Maple Cove section of Charles River A.U. MA72-07. In the DEP Herbicide Database, DCR applied for permits in 2002, 2015, and 2016 to treat *Myriophyllum spicatum* (Eurasian milfoil), *Cabomba caroliniana* (fanwort), and *Potamogeton crispus* (curly-leaf pondweed) (MassDEP 2017). The generic "Non-Native Aquatic Plants" is being delisted and replaced with the specific codes "Fanwort" and "Water Chestnut".

Charles River (MA72-33)

Location:	From outlet Cedar Swamp Pond, Milford to the Milford WWTF discharge (NPDES: MA0100579), Hopedale (formerly part of 2006 segment: Charles River MA72-02) (two culverted portions totaling approximately 1100 feet (0.21mile) (as of 2008 excluding the approximately 0.8 mile through segment: Cedar Swamp Pond MA72016).
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B: AQL

Charles River - MA72-33

Watershed Area: 11.76 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	11.75	4.98	5.53	1.27
Agriculture	0.1%	0%	0.2%	0%
Developed	48.4%	68%	32.8%	50.2%
Natural	43.3%	25.2%	52.1%	30.6%
Wetland	8.2%	6.8%	15%	19.2%
Impervious Cover	18.3%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting

CRWA staff collected usable chlorophyll *a* (2009-2013), total suspended solids, and total phosphorus (both 2009-2016) data from this Charles River AU (MA72-33) at station 35CS (Central St. bridge, Milford). These data were generally indicative of good conditions. The maximum chlorophyll *a* concentration was <3 µg/L. Seasonal TP averages of limited data (n = 1-3 samples per year) were <0.05 mg/L, with the one exception of 0.084 mg/L in the 2016 seasonal which occurred during a historic drought. TSS concentrations were ≤15 mg/L, except for one outlier (76 mg/L in April 2009). MassDEP staff deployed a thermistor in the river at Site W1721 [approximately 315 feet north of Howard Street (just downstream of the Saint Gobain Containers outfall, MAG250911), Milford] for 68 days starting July 24, 2007. The maximum temperature recorded was 25.4°C. MassDEP staff also conducted clean metals sampling at this site (W1712) during the summer 2007. One sample (of two uncensored samples) slightly exceeded the chronic criterion for copper (1.18TU). Further downstream water from the Charles River was collected approximately 10 feet upstream of the Milford WWTF treated effluent discharge outfall 001 (~790 feet upstream of Howard Street, Hopedale) for use as a diluent/control in 47 *C. dubia* whole effluent toxicity tests conducted on the Milford WWTP effluent between July 2007 and January 2019. Survival of *C. dubia* exposed (~7 days) to the river water was excellent (≥90%). The Town of Milford is authorized to discharge treated sanitary wastewater from its Wastewater Treatment Facility (NPDES MA0100579), via outfall 001 to the Charles River at the downstream end of AU MA72-33). Because the data collected by CRWA at Central Street in Milford (Station 35CS) were generally indicative of good conditions (including low chlorophyll *a*

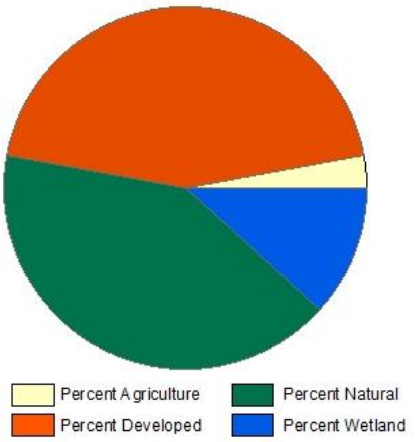
and generally low TP), it may be time to reevaluate water quality at the downstream Howard Street crossing, where historical data were collected and previously used to impair Charles River MA72-33 for "Nutrient/ Eutrophication Biological Indicators." For the time being, the Aquatic Life Use of this Charles River AU (MA72-33) will remain assessed as Not Supporting due to this impairment, as well as "Physical substrate habitat alterations".

Charles River (MA72-36)

Location:	From Watertown Dam (NATID: MA00456), Watertown to the Boston University Bridge, Boston/Cambridge (formerly part of 2006 segment: Charles River MA72-08).
AU Type:	RIVER
AU Size:	6.1 MILES
Classification/Qualifier:	B: WWF, CSO

Charles River - MA72-36

Watershed Area: 282.46 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	282.24	6.99	84.54	0.99
Agriculture	2.9%	0%	3%	0%
Developed	44.2%	92.7%	26%	59.7%
Natural	41.1%	7.1%	45.2%	38.8%
Wetland	11.7%	0.3%	25.8%	1.6%
Impervious Cover	17.7%			

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

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

Water quality data were collected by MassDEP*, MWRA**, and CRWA in this Charles River AU (MA72-36) (large data sets discussed below). CRWA feasibility study on Watertown Dam removal under DCR review. RBPIII analysis of benthic community ~100m downstream Watertown Dam (B0059*, July 2007) was slightly impaired (70% comparable to Stony Brook reference site B0073). DO, temperature, pH, specific conductance (SC) surface/bottom collected 2009-2018 at 6 sites** - 001 (Newton Yacht Club), 144 (S of Arsenal Complex closed CSO BOS032) & 002 (10m downstream closed CSO BOS033), 003 just downstream of active CSO CAM005. Most DO >5mg/L and <125% saturation but some very low bottom DO measured: 144 (1.4 mg/L), 002 (1.7mg/L), 003 (0.86mg/L) & surface saturations high 001 (136%), 144 (137%), 002 (163%) & 003 (176%). Temperature >28.3°C at surface on 2 of 12 (17%) measurements at 144, 002, and 003 in 2010 highest 30.33°C at 144 in July 2010. Surface pH sometimes high 8.97SU at 001 in 2016 17% of surface samples (n=29) >8.3SU & 15% of surface samples (n=27) at station 144 >8.3SU. Four-day avg SC surface data >994µS/cm (the chronic criterion for

estimated chloride plus a 10% margin of error) during summer 2016 at 144 (1569 & 1287µs/cm) & 002 (1063-2313 µs/cm, 4 avgs.). Downstream of an active CSO outfall, the max 4-day average SC at 003 was 3110 µs/cm. Downstream of both CAM005 & CAM007 CSOs, CRWA collected chlorophyll *a* (2009-13), total suspended solids, and total phosphorus (2009-16) data at station 743S (Western Ave., Cambridge/Allston). Chl-*a* occasionally >16µg/L in some years, with 3 exceedances in 2012 (max 25.8µg/L). TSS generally ≤8mg/L. TP seasonal averages 0.047-0.090mg/L. Moving downstream, 004** (downstream River St bridge) & 005** (upstream Cottage Farm/closed CAM011 CSO) were sampled 2009-2018. DO <4.0mg/L 10-29% of bottom measurements at 004 (min 1.1mg/L), but no DO concentration exceedances at 005. DO max saturations generally <125%, but bottom max at 004 was 172% & surface max at 005 was 139%. Temperature >28.3°C for >10% of surface measurements at 004 in 2010 & 2013 & in 2013 at 005. pH >8.3SU in 15% of 2016 surface measurements at 004 (n=27) & 005 (n=53). At least 5 sets of 4-day avg SC data >994 µS/cm during summer 2016 at stations 004 (max avg = 2721 µs/cm) & 005 (max avg = 3792 µs/cm). Station 004 also had 2 sets of averages >994µS/cm during summer 2015 (1081 & 1392µs/cm) & station 005 had 2 sets in 2014 (1123 & 1302 µs/cm) & 2015 (1167 & 1570 µs/cm). Corroborating chloride data are needed since these sites are downstream of CSO outfalls. One of 3*metals samples (2007, adjacent to Riverside Boat Club parking lot, Cambridge) had a selenium concentration exceeding the chronic criterion (TU = 1.95). A *thermistor was deployed (W1720, railroad bridge at Boston University Bridge, Cambridge/Boston) on the border of this AU & the downstream MA72-38 AU for 80 days beginning 07/12/2007 (max 7DADM 27.8°C, >27.7°C on 2 days, max 24-hour rolling average 27.4°C). Except for one test each species WET tests conducted with *C. dubia* (n=15) & *P. promelas* (n=17) from September 2008 to November 2018 on MRWA's Cottage Farm CSO treatment facility discharge had LC_{50}'s >100% effluent. In addition to the non-native Asian clam (*Corbicula fluminea*) identified in the Charles River (MA72-36) and confirmed by MassDEP biologists, while water chestnut (*Trapa natans*) & curly-leaf pondweed (*Potamogeton crispus*) (needs confirmation) have also been reported.
The Aquatic Life Use of this Charles River AU (MA72-36) is assessed as Not Supporting with all prior impairments, including Asian clam, being maintained. The Non-Native Aquatic Plants is being delisted & replaced with Non-Native Fish/Shellfish/ Zooplankton and Water Chestnut is being added. New Alerts for Temperature, potential infestation of curly-leaf pondweed, and chloride are being added.

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	The Charles River Watershed 2002-2006 Water Quality Assessment Report documented the impairment of the Charles River MA72-36 AU by an infestation of Asian clam (Corbicula fluminea). The generic phrase "non-native aquatic species" was listed in the Designated Uses Summary table of that document. It should have been converted to "Non-Native Fish/Shellfish/ Zooplankton" but was inadvertently converted to "Non-Native Aquatic Plants." At this time, "Non-Native Aquatic Plants" is being delisted and replaced with "Non-Native Fish/Shellfish/Zooplankton".

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

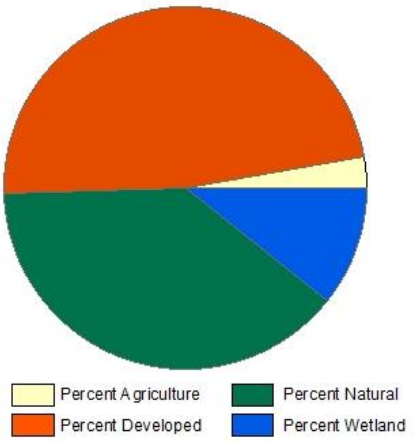
There are reports of water chestnut (*Trapa natans*) and curly-leaf pondweed (*Potamogeton crispus*) in the USGS Nonindigenous Aquatic Species database, in this Charles River AU (MA72-36) which informs the DEP Freshwater Aquatic Invasive Species database (MassDEP Undated). The presence of curly-leaf pondweed should be confirmed by DEP staff. The generic "Non-Native Aquatic Plants" is being delisted and replaced with the specific codes "Water Chestnut".

Charles River (MA72-38)

Location:	From Boston University Bridge, Boston/Cambridge to mouth at the New Charles River Dam (NATID: MA01092), Boston (formerly part of 2006 segment: Charles River MA72-08).
AU Type:	RIVER
AU Size:	3.1 MILES
Classification/Qualifier:	B: WWF, CSO

Charles River - MA72-38

Watershed Area: 312.83 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	310.13	9.23	86.16	0.9
Agriculture	2.7%	0.1%	3%	0.9%
Developed	47.8%	90.2%	26.3%	48.4%
Natural	38.8%	9.6%	45.3%	49.8%
Wetland	10.7%	0.1%	25.3%	0.8%
Impervious Cover	20.7%			

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

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

Water quality data were collected in this Charles River AU (MA72-38) by MWRA*, MassDEP & CRWA. In the upstream area temperature (~12 readings/site/summer), DO, pH & specific conductance (~2 dozen readings/site/year) from 2009-2018 at 006* (downstream Cottage Farm, MWR201), 007* (MIT Crew Boathouse) & 145* (Stony Brook outfall, MWR023). Temp data generally <28.3°C (max 29.09°C at 006 in 2010) but >10% of DO bottom measurements <4.0mg/L in multiple years at all 3 sites (all years at 007). DO saturation usually <125%, but in 2 years at 007 & 145 was elevated twice. The pH was >8.3SU in >1 year for >10% of measurements at stations 007/145 with max pH >8.8 SU in 3 years at 007 & 1 year at 145. All 3 stations had >1 year of surface data with ≥2 sets of SC 4-day avg >994µS/cm (the chronic criterion for estimated chloride plus a 10% margin of error). A short way downstream at Mass Ave bridge (763S), CRWA usable data included chlorophyll *a* (2009-13), as well as TSS & TP (2009-16) collected several times per year. Chl-*a*: usually <16µg/L; TSS all <25mg/L (most <12mg/L); TP seasonal avg 0.065-0.099mg/L. Slightly further downstream data at 008* (downstream Harvard Bridge/Mass. Ave), 009* (between Harvard & Longfellow Bridges), 010* (downstream Longfellow Bridge), 210* (downstream CAM017 CSO) & 166* (landing in back of Science Museum), plus nutrient data at 166*. Chl-*a* & TP only for station 166: 2-7 summer chl-*a* samples (n =10/11) >16µg/L with annual max

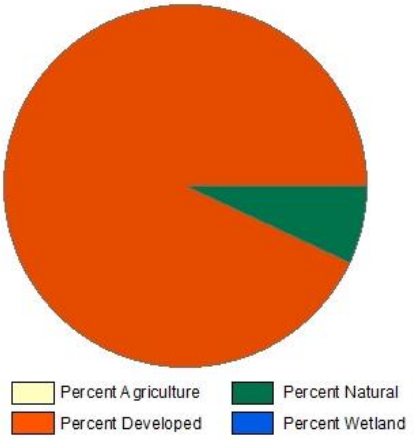
often ~50µg/L. TP seasonal avg 0.047-0.071mg/L (n = 10/11). All 5 sites no temp >30.3°C, but >10% of measurements >28.3°C in 2010 at station 009, in 2010 at 010 & in 2010-2012 plus 2015 at 166. More than 10% DO bottom measurements <4.0mg/L in most years at stations 008, 009 & 010. DO surface saturation >125% 2-4 times/year several years at all stations. More than 10% of pH measurements >8.3SU in >1 year & max was >8.8SU in multiple years at stations 008, 009 & 010. All stations (except 210 which only had 1 year of data) had >1 year of surface data with ≥2 sets of SC 4-day avg >994µS/cm. Nearby, DEP deployed thermistors for 80 days beginning 12 July 2007 halfway down the narrow boat channel going past the Museum of Science (W1718) & also in the river underneath the museum parking garage (W1719). The chronic criterion (7-DADM 27.7°C) was violated 32 & 34 times, respectively, while the max 24-hr rolling averages were 30.6°C & 30.7°C (violating the acute 28.3°C criterion). Between the Science Museum & Zakim Bridge (011*) water quality data was similar to 009, but with higher SC (likely influenced by salt wedge in the lower Charles). Survival of *C. dubia* & *P. promelas* exposed to river water collected beneath the Leverett connector was good (≥90%) in WET tests conducted for MBTA North Station Railroad Terminal from July 2010 - July 2018. CRWA measured chlorophyll *a* (2009-13) and TSS & TP (2009-16) several times/summer at the New Charles River Dam (784S). Here Chl-*a* was usually <16µg/L (2 exceedances up to 40µg/L in 2012), TSS ≤18mg/L, TP seasonal avg 0.058-0.091mg/L. According to DMF biologists, operational characteristics of the New Charles River Dam limit passage of rainbow smelt & river herring (passage score 5 = restricted passage). DPH reports Harmful Algal Blooms >20 days in duration occurred in 4 years from 2009-14 (max = 88 days in 2012). A report of the non-native macrophyte *P. crispus* (downstream Mass. Ave) needs confirmation. Water quality data collected during this reporting cycle indicate that issues remain with temperature and enrichment related indicators such as HABs, excessive chlorophyll *a*, low DO & elevated TP & pH. The Aquatic Life Use of this Charles River AU (MA72-38) will continue to be assessed as Not Supporting with all prior impairments carried forward. A Fish Passage Barrier impairment is being added due to operational flaws in the New Charles River Dam. Alerts are being added for a potential *P. crispus* infestation and chloride.

Cheese Cake Brook (MA72-29)

Location:	Emerges south of Route 16, Newton to mouth at confluence with the Charles River, Newton.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

Cheese Cake Brook - MA72-29

Watershed Area: 2.96 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.96	2.96	0.32	0.32
Agriculture	0%	0%	0%	0%
Developed	92.8%	92.8%	86.4%	86.4%
Natural	6.9%	6.9%	13.3%	13.4%
Wetland	0.3%	0.3%	0.2%	0.2%
Impervious Cover	40.7%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	5	Fish Bioassessments		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting
DFG biologists conducted backpack electrofishing in Cheese Cake Brook in July 2012 at the Cross Street crossing in Newton (Sample 4003). Only 12 common carp (which are known to tolerate low oxygen and polluted environments) were collected. The comments indicate that the site was “fairly shallow” and channelized. The Aquatic Life Use of Cheese Cake Brook (MA72-29) is assessed as Not Supporting due to prior habitat-related and water quality impairments, as well as “Fish Bioassessments” (new for this reporting cycle).

Chestnut Hill Reservoir (MA72023)

Location:	Boston.
AU Type:	FRESHWATER LAKE
AU Size:	82 ACRES
Classification/Qualifier:	B

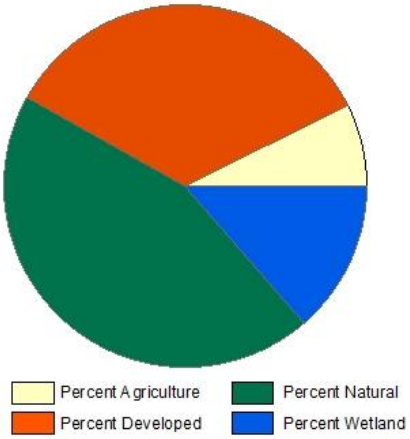
Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available for Chestnut Hill Reservoir (MA72023), the Aquatic Life Use is Not Assessed.

Chicken Brook (MA72-34)

Location:	Source, outlet Waseeka Sanctuary Pond, Holliston to mouth at confluence with the Charles River, Medway.
AU Type:	RIVER
AU Size:	7.4 MILES
Classification/Qualifier:	B

Chicken Brook - MA72-34

Watershed Area: 7.19 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.18	4.07	2.33	1.27
Agriculture	7.3%	8.6%	7.7%	10.5%
Developed	34.6%	39%	22.7%	23.3%
Natural	44.5%	37.9%	42.7%	37.8%
Wetland	13.6%	14.5%	26.9%	28.3%
Impervious Cover	10.6%			

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

Water quality sampling in Chicken Brook was conducted by MassDEP staff during summer 2007 at station W1583 (approximately 400 feet downstream of Winthrop St., Medway). A multiprobe was deployed for five 3-day periods. These data were generally indicative of good conditions (lowest mean of the daily minimum dissolved oxygen concentration 6.12mg/L, maximum temperature 26.0°C). For the last four deploys, the diel DO shifts and maximum saturation values were good (maximum shift 2.82 mg/L, maximum saturation 92.5%). There was some evidence of enrichment during the May deploy (maximum diel shift 4.1mg/L, saturation 120%). Attended probe and grab sample data (ammonia, total phosphorus, DO, temperature, pH) did not exceed any applicable criteria. The TP average/maximum concentrations were 0.045/0.072 mg/L, respectively. During the summer 2010, MassDEP staff conducted additional water quality and biological sampling a short way downstream (~970 feet downstream of Winthrop St., Medway - W2152 and B0690) as part of the pilot year of the probabilistic monitoring program. This sampling reach was wider and more sluggish in comparison to further upstream. The RBPIII status of the benthic sample was determined to be "non-impaired" (100% comparable) when compared to the Johnson Creek reference (Station B0688) in the Merrimack basin. A multiprobe was deployed for three 5-day periods (W2152). The central region of the state was under a drought advisory from August 1 – November 19 (2010) and examination of field sheets revealed that the July deploy (when DO concentration was lowest) was actually conducted under stagnant conditions. Excluding the July deploy, the DO mean daily minima ranged from 3.6-4.6 mg/L. Diel shifts were <1.8mg/L and saturations were not elevated. A thermistor was deployed for 122 days, starting May 6th. The maximum 7-DADM was 26.7°C and the maximum 24-hour rolling average was 25.6°C. Some of the attended probe and grab sample data (temperature, pH, ammonia) were indicative of good conditions- there were no violations of chronic/acute ammonia criteria and pH ranged from 6.4-6.8 SU. Total phosphorus was elevated, with an average/maximum

concentration of 0.12/0.19 mg/L, but there were no observations of dense or very dense filamentous algae. DEP biologists conducted backpack electrofishing (4546) in this area in August 2011. The sample was dominated by moderately tolerant macrohabitat generalist species and did not include any fluvial species. It is likely that the location of the site almost immediately upstream of Park Pond influenced the fish community composition.

The Aquatic Life Use of Chicken Brook is assessed as Fully Supporting based primarily on the benthic data. The prior pH and temperature Alerts are being removed but Alerts for the absence of fluvial fish species, low DO during low flow conditions, and elevated TP will remain. New alerts include the effect of the Medway Park and Milk Pond dams on the fish community composition and some evidence of enrichment (occasional elevated DO diel shifts) in the vicinity of station W1583.

Crystal Lake (MA72030)

Location:	Newton.
AU Type:	FRESHWATER LAKE
AU Size:	27 ACRES
Classification/Qualifier:	B

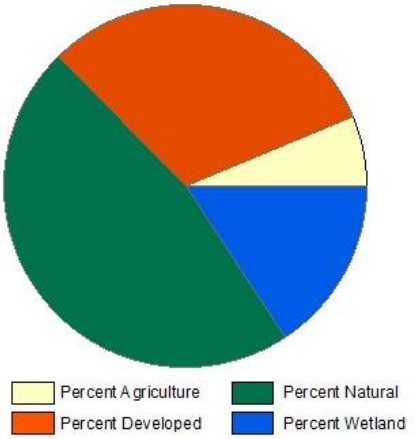
Fish, other Aquatic Life and Wildlife Use: Not Supporting
The DPH Harmful Algal Bloom database indicates that Crystal Lake was posted for HABs on 47 days in 2012. The prior Alert status for Harmful Algal Blooms is being removed and the Aquatic Life Use of Crystal Lake MA72030 is now assessed as Not Supporting for HABs.

Dopping Brook (MA72-40)

Location:	Headwater outlet small unnamed pond on Holliston/Sherborn border to mouth at confluence with Bogastow Brook, Holliston/Sherborn.
AU Type:	RIVER
AU Size:	2.6 MILES
Classification/Qualifier:	B

MILL BROOK - MA72-40

Watershed Area: 2.05 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.05	2.05	0.54	0.54
Agriculture	6.2%	6.2%	6.3%	6.3%
Developed	31.1%	31.1%	16.6%	16.6%
Natural	46.9%	46.9%	41.5%	41.5%
Wetland	15.7%	15.7%	35.6%	35.6%
Impervious Cover	9.5%			

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

In the middle of the Dopping Brook AU, DFG collected a fish sample (#1599) in July 2006 and DEP conducted a water quality survey (W1589) during summer 2007 at the Brook Street crossing (Holliston/Sherborn). The only fish species collected was redfin pickerel, a moderately tolerant macrohabitat generalist. During most of the 2007 sampling season, the region was in a pre-drought condition and a Drought Advisory was declared as of October 1st for most of the state. Field sheet notes for site W1589 indicated water velocity was "~0" for events in late August and early October, so these data are not considered representative and thus they are not being discussed here. A multiprobe was deployed for three 2-day periods (earlier in the summer) at W1589. The maximum temperature from all this data was 20.1 ˚C. The mean of the daily minimum dissolved oxygen concentration ranged from 4.72-4.92 mg/L. Maximum DO saturation ranged from 54.7-66.1% and the diel shift ranged from 0.54-0.96 mg/L. Given the cold temperature and consistently low DO concentration, Dopping Brook is likely heavily influenced by ground water, and this is probably more pronounced in 2007 due to the pre-drought conditions. Additionally, the stream buffer just upstream of site W1589 is heavily wetland dominated. This is reflected in pH data ranging from 6.4-6.8 S.U. during May-July measurements. There were no ammonia violations and TP averaged 0.11 mg/L (n=3; range = 0.053-0.17 mg/L) during these months. Dense filamentous algae was observed once in July. Moving downstream to the Whitney Street crossing in Holliston, DFG again collected fish (#1658) in July 2006, and DEP again conducted a water quality survey (W0416) during summer 2007. This downstream fish sample contained four species including the intolerant banded sunfish and creek chubsucker (the latter also a fluvial specialist). Because water velocity at W0416 again was recorded as "~0" during August and October visits, discussion is again being limited to those data collected May through July. A multiprobe was deployed for three 2-day periods, with a maximum temperature of 22.1 ˚C recorded during the July survey. The mean of the daily minimum dissolved oxygen concentration ranged from 5.84-6.77 mg/L.

Maximum DO saturation ranged from 80-87% and the diel shifts were all 1.5 mg/L or less. The stream buffer upstream of these sites contains wetlands, but not to the degree of the upstream (Brook St.) sampling location. Accordingly, there were no exceedances of the 6.5-8.3 pH criterion. Additionally, there were no observations of filamentous algae, no ammonia violations, and TP averaged 0.09 mg/L (n=3; range = 0.053-0.13 mg/L) for May-July measurements. Several hundred feet downstream of fish site 1658 and water quality site W0416, a benthic community survey was conducted (site B0613) in July 2007. The RBP III status was determined to be "slightly impaired" (60% comparable) when compared to the Stony Brook reference (B0073). The entire AU proper lies within the Zone II Wellhead Protection Area for two Town of Holliston drinking water supply wells. The competing influences of water withdrawal, groundwater baseflow, and pre-drought conditions cannot be separated out in this dataset.

Based primarily on the benthic macroinvertebrate sample and two fish samples, the Aquatic Life Use of Dopping Brook (MA72-40) is being assessed as Fully Supporting. However Alerts are being added for low DO and indicators of nutrient enrichment (elevated diel DO shift and elevated total phosphorus) which occurred when the brook was nearly stagnant (not summarized above).

Dug Pond (MA72034)

Location:	Natick.
AU Type:	FRESHWATER LAKE
AU Size:	50 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Curly-leaf Pondweed*)		Added
4c	4c	(Non-Native Aquatic Plants*)		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting
It was previously reported in the Charles River Watershed 2002-2006 Water Quality Assessment Report that the DEP Herbicide database documented applications for treatment of the non-native aquatic macrophyte, *Potamogeton crispus* (curly-leaf pondweed, as well as native aquatic macrophytes), in Dug Pond every year from 2004-2013. With no new data available for this reporting cycle, the Aquatic Life Use of Dug Pond MA72034 remains not supporting due to the presence of this non-native species. The cause code "Non-Native Aquatic Plants" is being delisted and replaced with the more specific "Curly-leaf Pondweed".

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	Impairment changed from the generic "Non-Native Aquatic Plants" to the specific macrophyte "Curly-leaf Pondweed" (Potamogeton crispus).

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

The DEP Herbicide database documented applications for treatment of the non-native aquatic macrophyte, *Potamogeton crispus* (curly-leaf pondweed, in Dug Pond as well as native aquatic macrophytes), every year from 2004-2013 (MassDEP 2017).

Echo Lake (MA72035)

Location:	Milford/Hopkinton.
AU Type:	FRESHWATER LAKE
AU Size:	72 ACRES
Classification/Qualifier:	A: PWS, ORW

Fish, other Aquatic Life and Wildlife Use: Not Assessed (Alert)
No new data are available to assess the Aquatic Life Use of Echo Lake (MA72035) so it is Not Assessed. The former Alert for evidence of dissolved oxygen depletion (2002 data) is being carried forward.

Factory Pond (MA72037)

Location:	Holliston.
AU Type:	FRESHWATER LAKE
AU Size:	10 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
It was previously reported that MassDEP staff recorded the presence of the non-native aquatic macrophyte, *Myriophyllum heterophyllum* (variable water milfoil), in Factory Pond during a 1997 synoptic survey. Upon closer examination of the field sheets, a comment of "very likely" present was noted. The presence of this species should be confirmed when flowering heads are present. For now, Factory Pond MA72037 will remain assessed as Not Supporting due to the presence of variable water milfoil (Non-Native Aquatic Plants cause code).

Farm Pond (MA72039)

Location:	Sherborn.
AU Type:	FRESHWATER LAKE
AU Size:	125 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
MassDEP staff collected water quality data at the deep hole (station W1297) of Farm Pond in September 2005. DO dropped below 5 mg/L between 11.5 and 13.5 meters (37.7 feet and 44.3 feet, respectively). Bathymetry data indicate that the area of the pond at 40 feet in depth encompasses roughly 12% of the area at the surface. pH ranged from 6.2 SU at the surface down to 5.9 SU near the bottom of the epilimnion (depth of 6.5 meters) and dropped as low as 5.2 SU in the hypolimnion (this is considered a natural condition). A surface grab sample for total phosphorus had a concentration of 0.01 mg/L and a near bottom sample had a concentration of 0.29 mg/L. However, TP can be released from sediments in anoxic conditions (such as at the bottom of a pond). A depth integrated chlorophyll sample had a low concentration of 2.6 mg/m^3 (equivalent to µg/L). The Town of Sherborn used 319 Nonpoint Source Pollution Competitive Grant funding (Project #11-04/319) to construct nine different stormwater BMPs in the Farm Pond sub-watershed. The project was completed as of June 2014. Given the age of water quality data, similar land use patterns in 2005 and 2015, and qualifiers on DO data, an impairment decision is not being made at this time. There is currently Insufficient Information to assess the Aquatic Life Use of Farm Pond (MA72039) but an Alert is being identified for low DO at depth.

Franklin Reservoir Northeast (MA72095)

Location:	Franklin.
AU Type:	FRESHWATER LAKE
AU Size:	21 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

In the DEP Freshwater Aquatic Invasive Species database, there is a report of the non-native aquatic macrophyte, *Trapa natans* (water chestnut), infesting Franklin Reservoir Northeast sometime between 2003 and 2016.

The Aquatic Life Use for Franklin Reservoir Northeast (MA72095) is assessed as Not Supporting because of the presence water chestnut.

Franklin Reservoir Southwest (MA72032)

Location:	Franklin.
AU Type:	FRESHWATER LAKE
AU Size:	13 ACRES
Classification/Qualifier:	B

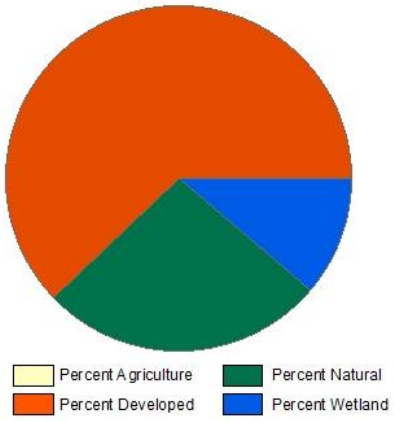
Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available for this reporting cycle, the Aquatic Life Use of Franklin Reservoir Southwest (MA72032) remains Not Assessed.

Fuller Brook (MA72-18)

Location:	Headwater south of Route 135, Needham to mouth at confluence with Waban Brook, Wellesley (one culverted portion approximately 360 feet (0.07mile)).
AU Type:	RIVER
AU Size:	4.3 MILES
Classification/Qualifier:	B

Fuller Brook - MA72-18

Watershed Area: 5.51 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	5.88	5.88	1.27	1.27
Agriculture	0.9%	0.9%	2.4%	2.4%
Developed	61.6%	61.6%	37.4%	37.4%
Natural	26.4%	26.4%	32.8%	32.8%
Wetland	11.1%	11.1%	27.4%	27.4%
Impervious Cover	24%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting

MassDEP staff conducted a water quality survey in Fuller Brook at station W0409 (Dover Road, Wellesley) in summer 2007. Multiprobes were deployed for five 2-day periods and these data were indicative of good conditions (lowest mean daily minimum DO 6.6 mg/L, maximum DO diel shift 2.1 mg/L, maximum DO saturation 104%, maximum temperature 21.9°C). A thermistor was deployed to measure temperature for 94 days beginning June 28. The maximum temperature was 24.5°C. Attended probe and grab sample data (temperature, pH, DO, ammonia, total phosphorus, metals) fell within criteria and were indicative of good conditions (seasonal average/maximum total phosphorus concentrations 0.046/0.079 mg/L and there were no observations of dense or very dense filamentous algae). The Town of Wellesley used 319 Nonpoint Source Pollution Competitive Grant funding (project #15-03/319) to construct multiple BMPs in the upper Caroline Brook watershed (not an AU, but a tributary to Fuller Brook), including construction of two bioretention basins, installation of deep sump catch basins, and stream bank stabilization. The project was completed as of June 2016.

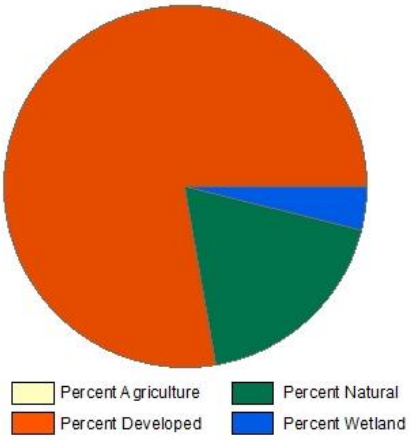
Although water quality data measured at Dover Road (Wellesley) during summer 2007 were indicative of good conditions, the Aquatic Life Use of Fuller Brook was previously impaired for Nutrient/Eutrophication Biological Indicators and other sediment related issues. A poor benthic macroinvertebrate sample was collected at the Cameron Street crossing (roughly ¾ mile upstream of Dover Road) and was determined to be symptomatic of enrichment likely due to waterfowl feeding at the Wellesley Town Hall duck pond (discussed in the 1997/1998 Charles River Watershed WQAR) which drains to an unnamed tributary of Fuller Brook just upstream of Cameron Street. Without new benthic macroinvertebrate data, the Aquatic Life Use of Fuller Brook will remain assessed as Not Supporting.

Godfrey Brook (MA72-51)

Location:	Perennial portion, South Main Street, Milford to mouth at confluence with the Charles River, Milford.
AU Type:	RIVER
AU Size:	0.7 MILES
Classification/Qualifier:	B

Godfrey Brook - MA72-51

Watershed Area: 2.06 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.06	2.06	0.35	0.35
Agriculture	0%	0%	0%	0%
Developed	77.7%	77.7%	76.6%	76.6%
Natural	18.5%	18.5%	11.9%	11.9%
Wetland	3.8%	3.8%	11.5%	11.5%
Impervious Cover	29.4%			

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

MassDEP staff surveyed Godfrey Brook at station W1585 (Vernon Street, Milford) during the summer of 2007. Multiprobe data (dissolved oxygen and temperature) were collected during four 3-day deploys and one 2-day period. Although there was some evidence of enrichment during the May deploy (maximum DO saturation128%; maximum diel shift 4.1 mg/L; observation of very dense filamentous algae a few days later), the minimum DO during that survey was good (7.7 mg/L). Furthermore, the data for the later three deploys were all indicative of good conditions (maximum temperature 25.5˚C; minimum DO 5.6mg/L, maximum DO saturation 96%, maximum diel shift 2.4 mg/L). In-situ attended probe (DO, temperature, pH, specific conductivity) and grab sample (total phosphorus, ammonia, total suspended solids) data were also indicative of good quality (in particular, maximum total phosphorus concentration only 0.029mg/L). It should be noted that this is a very small headwater stream (drainage area only 2.06mi^2, and much of the AU lies within a Zone II Wellhead Protection Area) which may affect flow conditions.

The Aquatic Life Use of Godfrey Brook is assessed as Fully Supporting based on the summer of 2007 water quality survey data. An Alert is being noted due to some evidence of enrichment during the May survey despite good DO and low total phosphorus concentrations. A recommendation will be made to conduct additional sampling including the biological community.

Halls Pond (MA72043)

Location:	Brookline.
AU Type:	FRESHWATER LAKE
AU Size:	0.6 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available, the Aquatic Life Use of Halls Pond (MA72043) is Not Assessed.

Hammond Pond (MA72044)

Location:	Newton.
AU Type:	FRESHWATER LAKE
AU Size:	22 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed (Alert)
No data are available for Hammond Pond (MA72044) in this reporting cycle, so the Aquatic Life Use is Not Assessed. The prior Alert status (due to the potential that a dense macrophyte biovolume is the result of anthropogenic sources, as noted in the 2002-2006 Charles WQAR) remains.

Hardys Pond (MA72045)

Location:	Waltham.
AU Type:	FRESHWATER LAKE
AU Size:	43 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Non-Native Aquatic Plants*)		Removed
4a	4a	(Water Chestnut*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting
As was previously reported, the non-native aquatic macrophyte, *Trapa natans* (water chestnut), was identified in Hardys Pond during the MassDEP 1997 synoptic survey. The Aquatic Life Use of Hardys Pond (MA72045) remains Not Supporting because of the infestation of Water Chestnut (the Non-Native Aquatic Plants impairment is being delisted and replaced with this specific code) and the other algae and total phosphorus impairments are being carried forward.
Primary Contact Recreation Use: Not Supporting
The Primary Contact Recreational Use of Hardys Pond (MA72045) remains assessed as Not Supporting with the algae and turbidity impairments being carried forward. The generic "Non-Native Aquatic Plants" is being delisted and replaced with the specific code Water Chestnut (Trapa natans).
Secondary Contact Recreation Use: Not Supporting
The Secondary Contact Recreational Use of Hardys Pond (MA72045) remains assessed as Not Supporting with the algae and turbidity impairments being carried forward. The generic "Non-Native Aquatic Plants" is being delisted and replaced with the specific code Water Chestnut (Trapa natans).
Aesthetic Use: Not Supporting
The Aesthetics Use of Hardys Pond (MA72045) remains assessed as Not Supporting with the algae and turbidity impairments being carried forward. The generic "Non-Native Aquatic Plants" is being delisted and replaced with the specific code Water Chestnut (Trapa natans).

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	The generic "Non-Native Aquatic Plants" is being replaced by the specific macrophyte "Water Chestnut" (Trapa natans).

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

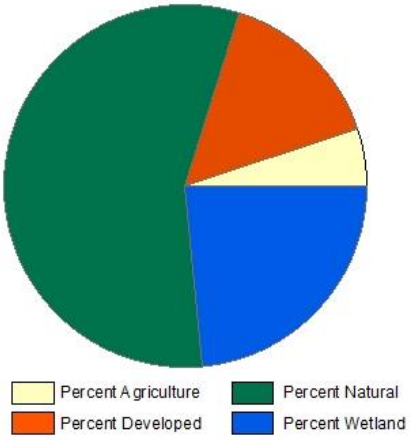
The non-native aquatic macrophyte, *Trapa natans* (water chestnut), was identified in Hardys Pond during the 1997 synoptic survey (MassDEP 1997).

Hobbs Brook (MA72-45)

Location:	Headwaters west of Bedford Road, Lincoln to inlet Cambridge Reservoir, Upper Basin, Lincoln
AU Type:	RIVER
AU Size:	2.4 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Hobbs Brook - MA72-45

Watershed Area: 2.05 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.05	2.05	1.27	1.27
Agriculture	5.1%	5.1%	3.9%	3.9%
Developed	15.1%	15.1%	10.6%	10.6%
Natural	56.3%	56.3%	49.4%	49.4%
Wetland	23.5%	23.5%	36.1%	36.1%
Impervious Cover	6.7%			

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

DFG biologists attempted to conduct backpack electrofishing sample (Sample ID 3771) downstream of the Bedford Road crossing (Lincoln) on July 11, 2011. No fish were collected and the comments read "Low water, may dry up seasonally". This sub-basin does not contain any permitted groundwater withdrawals and 2011 was not a drought year. Following the public comment period for the 2016 IR, USGS data were added to the 2016 repository indicating that estimated continuous chloride concentrations exceeded the chronic criterion 4.37% of the time between December 1, 2013 and December 1, 2014 at USGS station 01104405 (Hobbs Brook upstream of Cambridge Reservoir near Mill Street culvert, Lincoln). Additionally, total phosphorus was measured at the station during both baseflow (n=17) and wet weather conditions (n=15) during water years 2009-2015 (please note, the "2009 water year" runs from October 1, 2008 to September 30, 2009). The 2013-2015 summer seasonal averages ranged from 0.066-0.077 mg/L (n= 2-5). However, baseflow seasonal averages (0.033-0.066; n= 1-2) were generally lower than stormflow seasonal averages (0.11-0.12; n= 2-3). Samples were collected at the same USGS station twice in 2006 and measured for the pesticide carbaryl, but there were no violations of criteria (concentration was "non-detect").

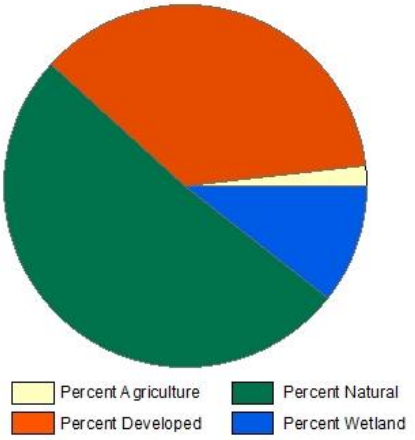
The Aquatic Life Use of this Hobbs Brook AU (MA72-45) is assessed as Not Supporting because of elevated chloride. Without any other indicators suggesting a nutrient enrichment problem, an Alert is being identified because of slightly elevated total phosphorus data measured by USGS.

Hobbs Brook (MA72-46)

Location:	From outlet Cambridge Reservoir, Waltham to mouth at confluence with Stony Brook, Weston.
AU Type:	RIVER
AU Size:	1.8 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Hobbs Brook - MA72-46

Watershed Area: 8.42 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	8.42	3.64	4.16	1.42
Agriculture	1.8%	0.7%	1.9%	1.2%
Developed	36.5%	41.2%	30%	39.3%
Natural	51.1%	53.1%	47.8%	47.6%
Wetland	10.6%	5%	20.3%	12%
Impervious Cover	18.4%			

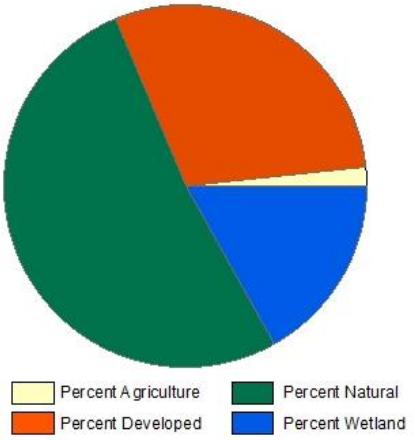
Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
Following the public comment period for the 2016 IR, USGS data were evaluated indicating that continuous estimated chloride concentrations exceeded the chronic criterion 4.37% of the time between December 1, 2013 and December 1, 2014 at USGS station 01104430 (Hobbs Brook below Cambridge Reservoir, near Kendall Green). Additionally, total phosphorus was measured periodically at the station (n=18) during water years 2009-2015. The average/maximum TP concentrations were 0.011/0.015 mg/L. Samples were collected at the same USGS station twice in 2006 and measured for the pesticide, carbaryl, but there were no violations of criteria (concentration was "non-detect"). In July 2011, DFG biologists conducted a fish survey of Hobbs Brook at the end of Drabbington Way, Weston (Sample 3729). The small sample (n = 10 individuals) included white sucker (a fluvial dependent species) and largemouth bass. The Aquatic Life Use of this Hobbs Brook AU (MA72-46) will continue to be assessed as Not Supporting based on chronic chloride criterion exceedances. An Alert is being identified because of the lack of diversity in the fish community, likely because this AU is sandwiched between and divided by multiple impoundments.

Hopping Brook (MA72-35)

Location:	Source in Cedar Swamp, Holliston to mouth at confluence with the Charles River, Bellingham/Medway.
AU Type:	RIVER
AU Size:	4.9 MILES
Classification/Qualifier:	B

Hopping Brook - MA72-35

Watershed Area: 11.01 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	11	4.68	3.18	1.21
Agriculture	1.7%	1.8%	2.4%	1.9%
Developed	29.7%	35.8%	19.9%	23.6%
Natural	51.9%	48.4%	47.6%	41.3%
Wetland	16.8%	14.1%	30.1%	33.2%
Impervious Cover	8.6%			

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

MassDEP biologists conducted backpack electrofishing in Hopping Brook at station 819 [West Street, upstream to power lines, Medway] in August 2003, which had not been reported on previously. The sample contained a stocked brown trout, as well as a fluvial dependent white sucker and intolerant macrohabitat generalist swamp darter. Closer to the confluence with the Charles River, a water quality survey was conducted at station W1584 [Hartford Ave., Bellingham] during the summer of 2007. Multiprobe data (dissolved oxygen and temperature) were collected during five 3-day deploys. The maximum temperature was 22.7˚C. DO measurements during the first three deploys (May, June, July) were indicative of good conditions (mean minima ≥6.78 mg/L, diel shifts <1.0 mg/L, maximum saturation 91%). In August and September, flow at the Medway gage on the Charles River was approaching or had dropped below 7Q10, and by October, most of the state was under a Drought Advisory. Therefore the deployed probe data collected in late August and September 2007 indicating low DO conditions (minimum DO 1.2mg/L) were excluded from further evaluation because of the extreme drought condition. *In-situ* attended probe (DO, temperature, pH) and grab sample (total phosphorus, ammonia) data collected throughout the summer were generally indicative of good water quality (in particular, pH 6.4-7.1 SU, seasonal average total phosphorus concentration 0.051mg/L, no observations of dense or very dense filamentous algae). The Aquatic Life Use of Hopping Brook is assessed as Fully Supporting based primarily on the early summer 2007 water quality data as well as the fish sample (although dated) collected in August 2003. The prior Alert status for low flow conditions is being carried forward. A recommendation is being made to conduct a water quality survey during a typical year (i.e., non-drought)

Houghton Pond (MA72050)

Location:	Holliston.
AU Type:	FRESHWATER LAKE
AU Size:	17 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Non-Native Aquatic Plants*)		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting (Alert)
MassDEP staff observed *Myriophyllum* sp. in Houghton Pond during a 1997 synoptic survey and indicated the species identity needed to be confirmed to determine whether the plants are non-native or native, therefore the alert is being revived. The Aquatic Life Use of Houghton Pond (MA72050) will continue to be assessed as Not Supporting due to Algae and the non-native aquatic plant impairment is being delisted (see additional information in removal comment) since it was an error.
Primary Contact Recreation Use: Not Supporting (Alert)
MassDEP staff observed *Myriophyllum sp.* in Houghton Pond during a 1997 synoptic survey and indicated the species identity needed to be confirmed to determine whether the plants were non-native or native, therefore the alert is being revived. The Primary Contact Recreational Use of Houghton Pond (MA72050) will continue to be assessed as Not Supporting with the algae and turbidity impairments being carried forward. The non-native aquatic plant impairment is being delisted (was an error).
Secondary Contact Recreation Use: Not Supporting (Alert)
MassDEP staff observed *Myriophyllum sp.* in Houghton Pond during a 1997 synoptic survey and indicated the species identity needed to be confirmed to determine whether the plants were non-native or native, therefore the alert is being revived. The Secondary Contact Recreational Use of Houghton Pond (MA72050) will continue to be assessed as Not Supporting with the algae and turbidity impairments being carried forward. The non-native aquatic plant impairment is being delisted (was an error).
Aesthetic Use: Not Supporting (Alert)
MassDEP staff observed *Myriophyllum sp.* in Houghton Pond during a 1997 synoptic survey and indicated the species identity needed to be confirmed to determine whether the plants were non-native or native, therefore the alert is being revived. The Aesthetics Use of Houghton Pond (MA72050) will continue to be assessed as Not Supporting with the algae and turbidity impairments being carried forward. The non-native aquatic plant impairment is being delisted (was an error).

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Data and/or information lacking to determine WQ status; original basis for listing was incorrect	MassDEP staff observed Myriophyllum sp. in Houghton Pond during a 1997 synoptic survey and noted that the species identity needed to be confirmed to determine whether the plants were native or non-native. At that time, an Alert status was given to Houghton Pond which

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
		was erroneously changed to a Non-Native Aquatic Plants impairment during the 2008 reporting cycle. This impairment is therefore being delisted and the Alert status will be revived.

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

The 1997 synoptic survey field sheet (MassDEP 1997) for Houghton Pond documents the presence of *Myriophyllum* sp., suspected to be the non-native *M. heterophyllum* (variable water milfoil). The presence of this species needs to be confirmed so an impairment decision was not warranted and needs to be removed.

Jamaica Pond (MA72052)

Location:	Boston.
AU Type:	FRESHWATER LAKE
AU Size:	67 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

As part of the 2005 Nutrient Criteria Study, MassDEP staff conducted a depth profile of Jamaica Pond at the deep hole location (W0973) in September. pH ranged from a low of 6.1 SU at 13.0 meters (the greatest depth at which measurements were recorded) to basic conditions closer to the surface, with the highest measurement of 9.9 SU recorded at 5.5 meters in depth. This kind of pattern is a sign of eutrophication. Dissolved oxygen ranged from anoxic at the bottom (<0.2 mg/L) to 17.7 mg/L at 5.5 meters, with a correspondingly high saturation value (193%), again indicating enriched conditions. DO dropped below 5 mg/L between 7.5 meters (9.3 mg/L; equivalent depth of 24.6 feet) and 8.5 meters (3.1 mg/L; equivalent depth of 27.9 feet). The area of the pond at 25 feet in depth (the bathymetry line in between these two DO measurements) encompasses roughly 58% of the area at the surface. Specific conductance ranged from 458 to 535 µs/cm through most of the profile and was 708 µs/cm at 13.0 meters. A depth integrated chlorophyll *a* sample had a concentration of 7.9 mg/m3. Total phosphorus was 0.01 mg/L at the surface and 0.76 mg/L near the bottom, indicating that total phosphorus was being released in the anoxic hypolimnion. MassDEP staff identified the non-native aquatic macrophyte, *Myriophyllum spicatum* (Eurasian water milfoil), in Jamaica Pond during water quality surveys conducted in 2007 and 2017.

Since DO and total phosphorus data collected during this reporting cycle support the continued impairment of Jamaica Pond (MA72052), the Aquatic Life Use remains assessed as Not Supporting. New for this cycle, an impairment is being added due to an infestation of the non-native Eurasian water milfoil (*Myriophyllum spicatum*).

Jennings Pond (MA72053)

Location:	Natick.
AU Type:	FRESHWATER LAKE
AU Size:	7 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Insufficient Information
MassDEP staff deployed a multiprobe (at a depth of 1.2 m) to measure dissolved oxygen and temperature in Jennings Pond at station W1260 over a period of roughly 48 hours in August 2004. The minimum DO was 7.8 mg/L and the maximum temperature was 28.2 °C during this time. Too limited data (such as a depth profile) are available to assess the Aquatic Life Use of Jennings Pond (MA72053) so it is identified as having Insufficient Information.

Kendrick Street Pond (MA72055)

Location:	Needham.
AU Type:	FRESHWATER LAKE
AU Size:	39 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
There are no data available for Kendrick Street Pond so the Aquatic Life Use is Not Assessed.

Kingsbury Pond (MA72056)

Location:	Norfolk.
AU Type:	FRESHWATER LAKE
AU Size:	15 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
There are no new data available for Kingsbury Pond (MA72056), so the Aquatic Life Use remains assessed as Not Supporting with the dewatering impairment carried forward.

Lake Archer (MA72002)

Location:	Wrentham.
AU Type:	FRESHWATER LAKE
AU Size:	77 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
DCR Lakes and Ponds staff documented the presence of the non-native aquatic macrophyte, *Egeria densa* (South American waterweed), in Lake Archer in 2002 and 2003. The Aquatic Life Use of Lake Archer remains assessed as Not Supporting due to the presence of a Non-Native Aquatic Plant.

Lake Pearl (MA72092)

Location:	Wrentham.
AU Type:	FRESHWATER LAKE
AU Size:	237 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Infestations of the non-native aquatic macrophytes, *Myriophyllum spicatum* (Eurasian water milfoil) and *Myriophyllum heterophyllum* (variable water milfoil), were reported in a 2000 survey of Lake Pearl commissioned by the Town of Wrentham. With no new data available for this reporting cycle, the Aquatic Life Use of Lake Pearl (MA72092) will remain assessed as Not Supporting because of low dissolved oxygen and the presence of the non-native species mentioned above (Eurasian water milfoil as well as variable water milfoil, the latter of which falls under cause code Non-Native Aquatic Plants).

Lake Waban (MA72125)

Location:	Wellesley.
AU Type:	FRESHWATER LAKE
AU Size:	109 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Fanwort*)		Added

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

During the 1997 synoptic survey, DEP staff observed infestations of the non-native aquatic macrophytes, *Myriophyllum spicatum* (Eurasian water milfoil) and *Cabomba caroliniana* (fanwort), in Lake Waban. According to the DCR database of non-native aquatic species, ACT, Inc. (consultants) observed *Marsilea quadrifolia* (water shamrock) in the lake in 2005. There is one mention of variable milfoil (*Myriophyllum heterophyllum*) in a 2000 record in the DEP Herbicide Database. The presence of *Myriophyllum heterophyllum* should be confirmed. With no new data available for this reporting cycle, the Aquatic Life Use of Lake Waban remains assessed as Not Supporting due to the presence of the non-natives, Eurasian water milfoil, fanwort (new cause code being added to provide clarification), and water shamrock ("Non-Native Aquatic Plants" cause code). An Alert is being added for a potential infestation of variable milfoil.

Lake Winthrop (MA72140)

Location:	Holliston.
AU Type:	FRESHWATER LAKE
AU Size:	131 ACRES
Classification/Qualifier:	B

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Infestations of the non-native aquatic macrophytes, *Myriophyllum heterophyllum* (variable water milfoil) and *Cabomba caroliniana* (fanwort), were previously reported in Lake Winthrop during a MassDEP 1997 synoptic survey. With no new data available for this reporting cycle, the Aquatic Life Use of Lake Winthrop (MA72140) remains assessed as Not Supporting due to the presence of fanwort, as well as variable water milfoil (the latter of which falls under cause code Non-Native Aquatic Plants).

Linden Pond (MA72063)

Location:	Holliston.
AU Type:	FRESHWATER LAKE
AU Size:	1 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
There are no data available for Linden Pond (MA72063) so the Aquatic Life Use is Not Assessed.

Little Farm Pond (MA72064)

Location:	Sherborn.
AU Type:	FRESHWATER LAKE
AU Size:	24 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use of Little Farm Pond (MA72064) so it is Not Assessed.

Louisa Lake (MA72068)

Location:	Milford.
AU Type:	FRESHWATER LAKE
AU Size:	8 ACRES
Classification/Qualifier:	A: PWS, ORW

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	4c	(Non-Native Aquatic Plants*)		Added

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

DCR staff reported an infestation of the non-native aquatic macrophyte, *Utricularia inflata* (swollen bladderwort), in Louisa Lake. The DEP Herbicide Database recorded applications for treatment of *Myriophyllum heterophyllum* (variable milfoil) in 2003, 2006, and 2014-2016, but identification of this species should be confirmed by MassDEP biologists.

Due to the presence of the non-native *U. inflata* (cause code Non-Native Aquatic Plants), the Aquatic Life Use of Louisa Lake is assessed as Not Supporting. An Alert is being issued for the potential *M. heterophyllum* infestation.

Lymans Pond (MA72070)

Location:	Dover.
AU Type:	FRESHWATER LAKE
AU Size:	4 ACRES
Classification/Qualifier:	B

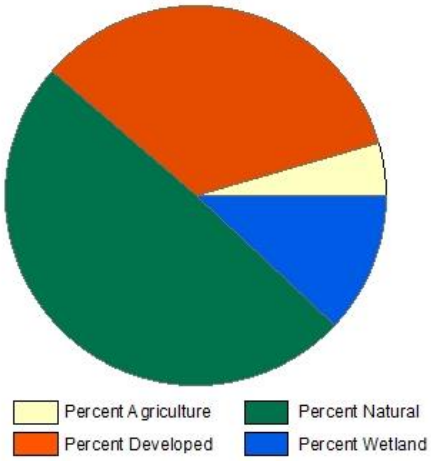
Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available for Lymans Pond (MA72070) so the Aquatic Life Use is Not Assessed

Mill Brook (MA72-39)

Location:	Source wetlands, Pine Street, Medfield to mouth at confluence with the Charles River, Medfield.
AU Type:	RIVER
AU Size:	3.7 MILES
Classification/Qualifier:	B

Mill Brook - MA72-39

Watershed Area: 4.18 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.18	3.95	1.39	1.32
Agriculture	4.5%	4.8%	4.5%	4.8%
Developed	34.1%	34.9%	23.1%	22.5%
Natural	49.3%	48.3%	46.8%	46.7%
Wetland	12%	12%	25.6%	26%
Impervious Cover	10.9%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting

In the upper third of the Mill Brook MA72-39 AU, DFG biologists conducted a fish survey at site 4791 (North St., Medfield) in August 2013. The sample included pumpkinseed and redfin pickerel, both moderately tolerant macrohabitat generalists. Further downstream, on the same date, DFG collected sample 4790 (Harding St., Medfield), which was again dominated by redfin pickerel, but contained additional species, including the intolerant macrohabitat generalist, banded sunfish. Near the downstream end of the AU, a short way upstream of North Meadows Road (Medfield), MassDEP staff conducted a benthic survey (site B0612) in July 2007 and collected water quality data throughout that summer at the actual North Meadows Road crossing (site W1586). The RBP III status of the benthic sample was considered non/slightly impaired (80% comparable) in comparison with the Stony Brook reference location (B0073). A multiprobe was deployed for four 2-day periods and one 1-day period. These data were indicative of good water quality (minimum dissolved oxygen concentration = 6.49 mg/L; maximum diel shift = 1.55 mg/L; maximum DO saturation = 104.9%; maximum temperature = 22.6 ˚C). *In situ* attended probe measurements and grab sample data were also indicative of good water quality (in particular, total phosphorus average/maximum = 0.034/0.045 mg/L and there were no violations of DO, temperature, pH, or ammonia criteria). There was one observation of dense or very dense filamentous algae. It should be noted that Mill Brook lies completely within the Zone II Wellhead Protection Area for a number of Medfield municipal wells.

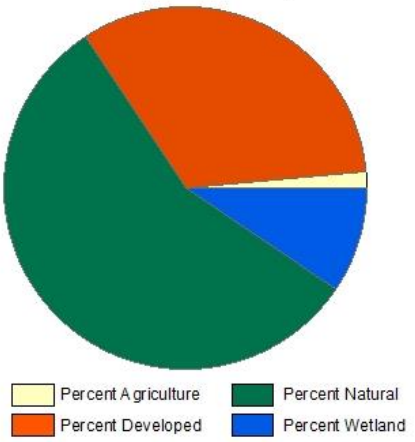
The Aquatic Life Use of Mill Brook (MA72-39) is assessed as Fully Supporting based on the evidence of good biological and water quality conditions documented during the summers of 2007 and 2013.

Mill River (MA72-15)

Location:	Headwaters, outlet Bush Pond, Norfolk to mouth at confluence with the Charles River, Norfolk.
AU Type:	RIVER
AU Size:	3.5 MILES
Classification/Qualifier:	B

Mill River - MA72-15

Watershed Area: 16.03 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	16.01	6.55	3.73	1.7
Agriculture	1.4%	2.6%	2.1%	3.3%
Developed	32.9%	34.8%	18.5%	16.7%
Natural	56.3%	51.8%	53.1%	50.7%
Wetland	9.4%	10.8%	26.3%	29.3%
Impervious Cover	11.7%			

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

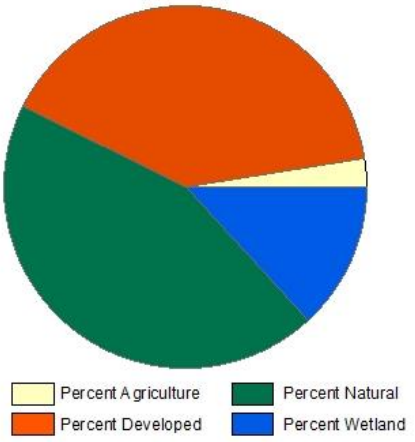
Fish, other Aquatic Life and Wildlife Use: Not Supporting
MassDEP staff reported infestations of the non-native aquatic macrophytes, *Potamogeton crispus* (curly-leaf pondweed) and *Myriophyllum aquaticum* (parrot feather), during summer 2015 surveys of Mill River MA72-15. With no other new data available for this reporting cycle, the Aquatic Life Use of Mill River (MA72-15) remains Not Supporting for temperature and impairments are being added for the non-native species mentioned above ("Curly-leaf Pondweed" and "Non-Native Aquatic Plants" for *M. aquaticum*).

Mine Brook (MA72-14)

Location:	Headwaters in Franklin State Forest, Franklin to mouth at confluence with the Charles River, Franklin (through former 2006 segment: Mine Brook Pond MA72077) (HQW applies upstream of former Franklin WWTP discharge, approximately 4 miles upstream of mouth (note: Franklin WWTP tied into Medway (CRWPCD) on 15 January 1980)).
AU Type:	RIVER
AU Size:	8.9 MILES
Classification/Qualifier:	B: WWF, HQW* (*HQW qualifier applies to portion of river upstream of former Franklin WWTP)

Mine Brook - MA72-14

Watershed Area: 15.72 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	15.72	4.55	3.99	1.06
Agriculture	2.5%	0.8%	2.2%	1.5%
Developed	40.2%	44.1%	20.6%	17.3%
Natural	44.1%	38.6%	42.9%	37.1%
Wetland	13.1%	16.5%	34.2%	44.1%
Impervious Cover	16.8%			

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

MassDEP staff conducted a water quality survey of Mine Brook at two stations during summer 2007--W1588 [West Central St. / Rt 140, Franklin] in the middle of the AU, and W1147 [Pond St., Franklin] in the downstream portion of the AU. A thermistor was deployed at W1588 to measure temperature for 94 days, beginning on June 28, and a multiprobe was deployed to measure dissolved oxygen for five 3-day periods. These data were all indicative of good water quality (minimum DO 7.48 mg/L, maximum diel shift 1.12 mg/L, maximum DO saturation 101%; maximum 7-DADM temperature 24.8 ˚C). *In situ* attended probe (DO, temperature, pH) and grab sample (total phosphorus, ammonia) data were also generally indicative of good water quality (in particular, pH 6.8-7.4 SU; seasonal average total phosphorus 0.018 mg/L; no observations of dense or very dense filamentous algae). However, one individual measurement and one average of paired specific conductance measurements exceeded the chronic criterion for estimated chloride (but were within the 10% margin of error needed to account for model uncertainty). Further downstream it is noted that much of the stream buffer upstream of station W1147 is classified as deep marsh and staff noted on field sheets for this site that there is a beaver dam upstream. Therefore, water quality data from this location are considered to reflect a wetland influence (i.e., natural conditions). The DO mean daily minima from five 3-day multiprobe deployments at this sampling location was low (range 1.3-3.7 mg/L). The maximum diel shift (3.5 mg/L) occurred during the May deploy, but the others were ~≤2.0 mg/L. The maximum DO saturations were all <80%, so were not indicative of enrichment. The maximum temperature from these deploys was 26.3˚C. Additionally, the seasonal average total phosphorus concentration

was 0.049 mg/L and pH ranged from 6.3-6.7 SU. There was one observation of dense filamentous algae. Two averaged sets of specific conductance measurements exceeded the estimated chloride chronic criterion (904 µs/cm) but were within the 10% margin of error needed to account for model uncertainty. Three metals samples were collected at this site and there were no exceedances of any acute or chronic criterion. The Town of Franklin used 319 Nonpoint Source Pollution Competitive Grant funding (awarded in Fiscal Year 2007 under project #07-05/319) to construct BMPs at two locations- Panther Way and Lockewood Drive in the Mine Brook subwatershed. The Town received a second 319 grant (awarded in Fiscal Year 2015 under project #15-01/319) to construct BMPs at three additional locations in the Mine Brook subwatershed- the Remington and Jefferson Schools, along Panther Way, and along Cottage Street.

The Aquatic Life Use of Mine Brook remains assessed as Not Supporting due to the historical Habitat Assessment impairment. The temperature impairment is also being carried forward until more recent data are collected to confirm the appropriateness of delisting. An Alert is being added due to elevated specific conductance measurements which may indicate elevated chloride.

Mirror Lake (MA72078)

Location:	Wrentham/Norfolk.
AU Type:	FRESHWATER LAKE
AU Size:	62 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Curly-leaf Pondweed*)		Added
4a	4a	(Non-Native Aquatic Plants*)		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting
MassDEP staff documented an infestation of *Potamogeton crispus* (curly-leaf pondweed) in Mirror Lake during the 1997 synoptic survey. With no new data available for this reporting cycle, Mirror Lake (MA72078) remains assessed as Not Supporting due to historical enrichment related impairments, as well as the presence of a non-native species. The cause code "Non-Native Aquatic Plants" is being changed to the specific macrophyte "Curly-leaf Pondweed" (*Potamogeton crispus*).

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	Impairment changed from the generic "Non-Native Aquatic Plants" to the specific macrophyte "Curly-leaf Pondweed" (Potamogeton crispus).

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

DEP staff documented an infestation of *Potamogeton crispus* (curly-leaf pondweed) in Mirror Lake during the 1997 synoptic survey (MassDEP 1997).

Morses Pond (MA72079)

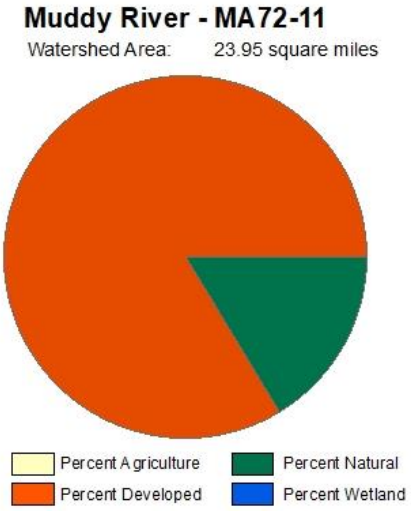
Location:	Wellesley/Natick.
AU Type:	FRESHWATER LAKE
AU Size:	112 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Fanwort*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting
As was previously reported in the 2002-2006 Charles River Watershed Water Quality Assessment Report, the non-native aquatic macrophytes, *Myriophyllum spicatum* (Eurasian water milfoil), *Myriophyllum heterophyllum* (variable water milfoil), and *Cabomba caroliniana* (fanwort), were documented in Morses Pond during DEP's 1997 synoptic survey. With no new data available for this reporting cycle, the Aquatic Life Use of Morses Pond remains Not Supporting due to the presence of these non-natives. The new cause code, "Fanwort" is being added to provide clarification.

Muddy River (MA72-11)

Location:	Headwaters, outlet Ward Pond in Olmstead Park, Boston through Leverett Pond, Boston/Brookline to confluence with Charles River, Boston (four culverted portions totaling approximately 2200 feet (0.42mile)).
AU Type:	RIVER
AU Size:	3.6 MILES
Classification/Qualifier:	B(CSO): WWF



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	21.52	8.24	1.28	0.65
Agriculture	0.7%	0.3%	1.1%	2.2%
Developed	82.5%	91.6%	49.2%	62.5%
Natural	16%	8%	44.3%	34.1%
Wetland	0.8%	0.1%	5.4%	1.2%
Impervious Cover	43.2%			

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

In the uppermost portion of the Muddy River sub-basin, a 319 Nonpoint Source Pollution Competitive Grant (#04-17/319 awarded in Fiscal Year 2004) project was completed in June 2010 by co-recipients, the Patriot Resource Conservation & Development Area Council, Inc., as well as the Mass Audubon Society's Boston Nature Center and the Olmsted Green housing development. The goals of the project were to prevent new stormwater pollution of Canterbury Brook (not an AU) from the development occurring at Olmsted Green, and to demonstrate compost-based BMPs on a large-scale urban construction site as an educational tool. Canterbury Brook discharges to Stony Brook (downstream of AU MA72-37) via an underground culvert, which then discharges to Muddy River. According to a web article released by the Army Corps of Engineers, Phase I of the Muddy River Restoration Project began in January 2013 and was completed in June 2016 at a cost of $35.2 million. "The work consisted of removal of undersized culverts with new Riverway and Brookline Avenue Culverts, daylighting of the former Sears Parking Lot and area upstream of Avenue Louis Pasteur to construct the FRM channel, removal of 2 feet of accumulated sediment from Upper Fens Pond, and the construction of the Avenue Louis Pasteur culvert extension." Phase II began in June 2020 and is expected to take roughly three years to complete. Phase II is to include dredging one to eight feet of sediment for flow conveyance in the Back Bay Fens and Riverway sections of the Muddy River, excavation of the sandbar and island at Leverett Pond, and the removal of some phragmites from the wetland and riparian areas of the Back Bay Fens and Riverway (only those which affect flow conveyance). After removal of sediments and phragmites, restoration of the river's shoreline in construction areas will consist of planting emergent wetland plants and restoring riparian vegetation in upland areas by planting trees and shrubs. MassDEP staff collected three water samples in the Muddy River at Agassiz Road in

Boston (W1713) in 2007. These were analyzed for metals and there were no violations of any chronic/acute criteria. CRWA staff collected three grab samples at Station 760T (Muddy River at Commonwealth Ave., Boston) in 2009. The average/maximum total phosphorus concentrations of the samples were 0.12/0.18 mg/L and the average/maximum total suspended solids concentrations were 12/25 mg/L. In the USGS Nonindigenous Aquatic Species database, which informs the DEP Freshwater Aquatic Invasive Species database, there is a 2001 report of *Potamogeton crispus* (curly-leaf pondweed) at the mouth of the Muddy River, but species confirmation by MassDEP staff is needed.

The Aquatic Life Use for the Muddy River (MA72-11) will continue to be assessed as Not Supporting with all former impairments being carried forward. An Alert is being added due to a potential infestation of curly-leaf pondweed at the mouth of the river.

Noannet Pond (MA72084)

Location:	Westwood/Dover.
AU Type:	FRESHWATER LAKE
AU Size:	50 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Supporting
It was previously reported in the 2002-2006 Charles River WQAR that MassDEP staff documented the non-native aquatic macrophyte, *Myriophyllum heterophyllum* (variable water milfoil), during a 1997 synoptic survey of Noannet Pond. The Aquatic Life Use of Noannet Pond will remain assessed as Not Supporting due to the presence of Non-Native Aquatic Plants.

Nonesuch Pond (MA72085)

Location:	Natick/Weston.
AU Type:	FRESHWATER LAKE
AU Size:	39 ACRES
Classification/Qualifier:	B

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Curly-leaf Pondweed*)		Added
4c	4c	(Non-Native Aquatic Plants*)		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting
The DEP Herbicide Database documented applications for treatment of the non-native aquatic macrophyte, *Potamogeton crispus* (curly-leaf pondweed), as well as native aquatic macrophytes, in Nonesuch Pond every year between 2004 and 2016. This impairment was previously noted in the Charles River Watershed 2002-2006 WQAR and recorded as "Non-Native Aquatic Plants". The Aquatic Life Use of Nonesuch Pond will continue to be assessed as Not Supporting because of the infestation of the non-native aquatic macrophyte Curly-leaf Pondweed. The generic non-native aquatic plant impairment will be changed to the specific species (Curly-leaf Pondweed).

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Non-Native Aquatic Plants	Clarification of listing cause	Impairment changed from the generic "Non-Native Aquatic Plants" to the specific macrophyte "Curly-leaf Pondweed" (Potamogeton crispus)

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

The DEP Herbicide Database documented applications for treatment of the non-native aquatic macrophyte, *Potamogeton crispus* (curly-leaf pondweed), as well as native aquatic macrophytes, in Nonesuch Pond every year between 2004 and 2016 (MassDEP 2017).

Norumbega Reservoir (MA72086)

Location:	[North Basin] Weston.
AU Type:	FRESHWATER LAKE
AU Size:	14 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available so the Aquatic Life Use of this Norumbega Reservoir AU (MA72086) is Not Assessed.

Norumbega Reservoir (MA72087)

Location:	[South Basin] Weston.
AU Type:	FRESHWATER LAKE
AU Size:	38 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available so the Aquatic Life Use of this Norumbega Reservoir AU (MA72087) is Not Assessed.

Populatic Pond (MA72096)

Location:	Norfolk.
AU Type:	FRESHWATER LAKE
AU Size:	42 ACRES
Classification/Qualifier:	B: WWF

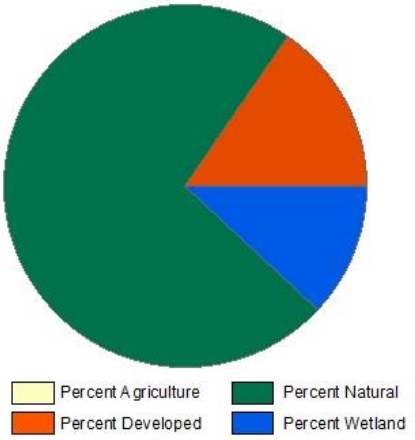
Fish, other Aquatic Life and Wildlife Use: Not Supporting
CRWA conducted regular water quality monitoring at Station 199S (Populatic Pond boat launch, Norfolk). Data meeting DEP assessment usability guidelines are summarized below. Chlorophyll *a* was sampled 2-3 times per year from 2009-2013. In 2010, both samples exceeded 30 µg/L, in 2012 one sample was 57 µg/L, and in 2013 a sample was right at 16 µg/L (the criterion). Total phosphorus seasonal averages (mostly 2-4 seasonal samples per year) ranged from 0.060-0.117 mg/L between 2009-2016. Total suspended solids samples collected from 2009-2016 generally contained concentrations <20.0 mg/L, and only one sample collected in 2012 exceeded 25 mg/L (Sept. 18, 27.5 mg/L). The Aquatic Life Use of Populatic Pond remains Not Supporting due to historic impairment causes related to Algae, low Dissolved Oxygen, DO supersaturation, and Nutrient/Eutrophication Biological Indicators (this covers the elevated total phosphorus and chlorophyll *a* data).

Powissett Brook (MA72-20)

Location:	Headwaters, outlet Noannet Pond, Westwood to mouth at confluence with the Charles River, Dover.
AU Type:	RIVER
AU Size:	1.9 MILES
Classification/Qualifier:	B

Powissett Brook - MA72-20

Watershed Area: 1.67 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.61	1.61	0.74	0.74
Agriculture	1%	1%	0%	0%
Developed	15.3%	15.3%	11%	11%
Natural	71.8%	71.8%	72.8%	72.8%
Wetland	11.9%	11.9%	16.2%	16.2%
Impervious Cover	3.9%			

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

In 2007, MassDEP staff conducted a water quality survey (W0407) of Powissett Brook at the Wilsondale St. crossing (Dover). A multiprobe was deployed for five 2-day periods. The mean daily minimum DO concentration ranged from 3.9-7.9 mg/L (with lower concentrations measured later in the summer when much of the state was in pre-drought conditions; a drought advisory was issued as of October 1st). The maximum diel shift was 1.5 mg/L and the maximum DO saturation was 90%. The maximum temperature was 27.5 °C. Attended probe measurements for DO and temperature were in line with unattended measurements. pH ranged from 6.1-6.6 SU (n=10). Grab sample data were satisfactory (no ammonia chronic/acute violations, seasonal average total phosphorus/maximum 0.03/0.04 mg/L). In August 2008, DFG biologists conducted backpack electrofishing (Sample ID#2525) in Powissett Brook immediately downstream of Wilsondale Street. The habitat comment indicated that the site was "very shallow" and only two fish were collected, a largemouth bass and a brown bullhead. Further downstream, DFG biologists sampled another site (2524) on the same day at the Dedham Street crossing (Dover). This site was also considered "shallow" but six macrohabitat generalist species (30 total individuals) were collected, including the moderately tolerant largemouth bass, pumpkinseed, and black crappie.

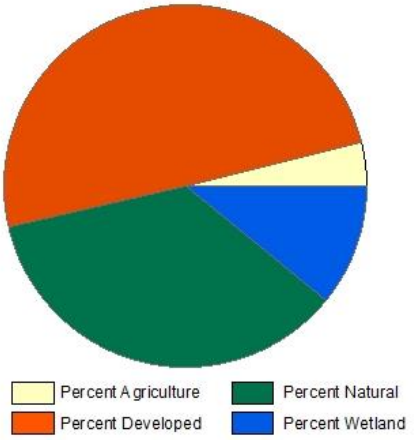
The Aquatic Life Use of Powissett Brook continues to be assessed as Not Supporting for Combined Biota/Habitat Bioassessments. This impairment code was originally applied due to a moderately impacted benthic community (along with habitat limitations) at the Wilsondale Street crossing and now should also be applied due to a poor fish community observed at this location in a non-drought year. An Alert is being issued for low DO (although this was likely exacerbated by low flow conditions in the brook just below the unnamed dam at Wilsondale Street during a pre-drought period in the summer of 2007).

Rock Meadow Brook (MA72-21)

Location:	Headwaters, Fisher Meadow, Westwood to mouth at confluence with the Charles River, Dedham.
AU Type:	RIVER
AU Size:	3.8 MILES
Classification/Qualifier:	B

Rock Meadow Brook - MA72-21

Watershed Area: 2.68 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.67	2.56	0.82	0.81
Agriculture	3.8%	4%	6.6%	6.7%
Developed	49.8%	50.5%	31.5%	31.8%
Natural	35.4%	34.2%	35.1%	34.4%
Wetland	10.9%	11.2%	26.8%	27.1%
Impervious Cover	12.2%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Organic Enrichment (Sewage) Biological Indicators		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

DFG biologists conducted backpack electrofishing in Rock Meadow Brook downstream of the Dover Road crossing, Westwood (Sample 2522) in August 2008. The comments indicate that this was the only area not impacted by beaver dams. The only species collected was golden shiner (22 individuals), a tolerant macrohabitat generalist. Further downstream, in the vicinity of Summer Street (Westwood), benthic/water quality surveys (samples B0111/W0406) were conducted by MassDEP biologists during summer 2007. The RBPIII status of the benthic sample was determined to be "non/slightly" impaired (80% comparable) when compared to the Stony Brook reference (B0073). A multiprobe was deployed for five 3-day periods and these data were indicative of good conditions (lowest mean daily minimum DO 7.1 mg/L, maximum diel shift 1.3 mg/L, maximum saturation 94%, maximum temperature 25.0°C). Unattended probe and grab sample data (temperature, DO, pH, ammonia, total phosphorus) were also indicative of good conditions (pH >6.5 and <8.3 SU criteria; seasonal average/maximum total phosphorus concentrations 0.02/0.04 mg/L, and there were no observations of dense/very dense filamentous algae).

The Aquatic Life Use of Rock Meadow Brook will remain assessed as Not Supporting with the former impairments being carried forward. Although there has been improvement in the benthic community RBPIII status since the

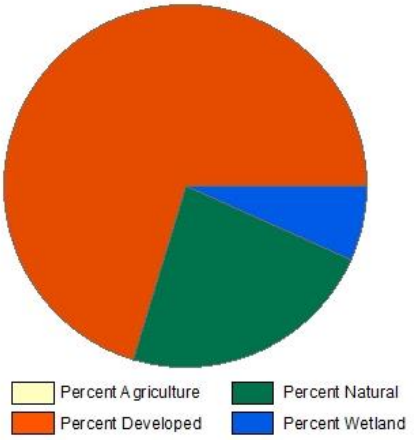
2002 sample (when RBPIII analysis indicated moderately impaired conditions), because there has been development pressure in the watershed in the past ten years, a delisting decision is not appropriate at this time. Updated biological and water quality data are needed.

Rosemary Brook (MA72-25)

Location:	Headwaters, outlet Rosemary Lake, Needham to mouth at confluence with the Charles River, Wellesley.
AU Type:	RIVER
AU Size:	3.3 MILES
Classification/Qualifier:	B

Rosemary Brook - MA72-25

Watershed Area: 3.74 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	3.74	3.59	0.88	0.88
Agriculture	0.6%	0.6%	0.7%	0.7%
Developed	70%	69.5%	43.7%	43.7%
Natural	22.9%	23.1%	33.5%	33.5%
Wetland	6.6%	6.7%	22%	22%
Impervious Cover	26.1%			

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

DFG biologists conducted backpack electrofishing in Rosemary Brook at the West Street crossing (Needham) in the upper part of the watershed in July 2012 (Sample 4027). Although the large sample (156 individuals) was composed of majority bluegill sunfish, it also included the moderately tolerant macrohabitat generalist pumpkinseed, redfin pickerel, and redbreast sunfish. There are at least three dams on Rosemary Brook (including Wellesely Avenue Dam and Longfellow Pond Dam downstream of this reach), and they likely contribute to the lack of fluvial species at this upstream sampling location. Near the confluence with the Charles River, MassDEP staff conducted a water quality survey at the Barton Road crossing (Wellesley) during summer 2007 (W1156). A multiprobe was deployed for five 3-day periods. The mean of the daily dissolved oxygen minima ranged from 3.7 mg/L (in September) to 5.9 mg/L (in June). Although the maximum daily DO shifts were usually <2.2 mg/L, there was evidence of enrichment in the May maximum diel shift of 5.4 mg/L and the maximum saturation was 125% during this deploy. The maximum temperature during the five deployments was 25.1°C. Attended probe and grab sample data (temperature, pH, DO, ammonia, total phosphorus) were also collected at the site. Of note, pH ranged from 6.4-7.2 S.U. and the total phosphorus maximum concentration was 0.051 mg/L (excluding a sample which did not meet field duplicate precision QA/QC requirements). There were no observations of dense or very dense filamentous algae. Additionally, two of five averaged pairs of specific conductance data exceeded either the chronic criterion for estimated chloride (904 µs/cm) or the criterion with 10% margin of error (994 µs/cm) which accounts for model uncertainty. Because a Drought Advisory was in effect for this part of the state as of October 1, 2007 (reduced flow would have the twin effects of concentrating total phosphorus and increasing the proportion of groundwater flow, which has lower DO concentrations), it is difficult to say whether there have been any improvements in DO or total phosphorus concentrations since these impairments were first noted in the 2002 IR cycle.

The Aquatic Life Use of Rosemary Brook (MA72-25) will continue to be assessed as Not Supporting with the former impairments carried forward. An Alert is being identified for occasional elevated DO diel shifts, DO saturation, and elevated estimated chloride.

Sandy Pond (MA72105)

Location:	Lincoln.
AU Type:	FRESHWATER LAKE
AU Size:	157 ACRES
Classification/Qualifier:	A: PWS, ORW

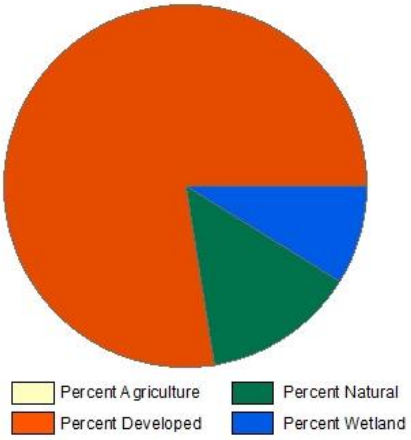
Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available so the Aquatic Life Use of Sandy Pond (MA72105) is Not Assessed.

Sawmill Brook (MA72-23)

Location:	Headwaters, Newton to mouth at confluence with the Charles River, Boston.
AU Type:	RIVER
AU Size:	2.4 MILES
Classification/Qualifier:	B

Sawmill Brook - MA72-23

Watershed Area: 2.99 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.99	2.99	0.34	0.34
Agriculture	0%	0%	0%	0%
Developed	77.7%	77.7%	46%	46%
Natural	13.6%	13.6%	21.1%	21.1%
Wetland	8.8%	8.8%	33%	33%
Impervious Cover	29.5%			

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

DFG biologists conducted backpack electrofishing in Sawmill Brook (Sample 3326) at the upstream end of the AU (Vine St xing DS, next to Wayne Rd, Newton) in August 2010. The small sample (7 individuals) included the moderately tolerant macrohabitat generalist species, redfin pickerel and pumpkinseed. The same day, DFG attempted to collect another sample a short way downstream (Sample 3343, upstream of Marla Circle @ Newton Conservation Land) and was unable to. Comments indicate that the brook was flowing but it was very shallow between pools. Although the lack of fish at Marla Circle and small number of fish at Vine Street, Newton is concerning, this part of the state was under a Drought Advisory as of August 1st.

The Aquatic Life Use of Sawmill Brook will continue to be assessed as Not Supporting due to historical chloride and enrichment related impairments. An Alert is being added due to the small fish community sample collected in 2010.

Scarboro Golf Course Pond (MA72107)

Location:	Boston.
AU Type:	FRESHWATER LAKE
AU Size:	6 ACRES
Classification/Qualifier:	B

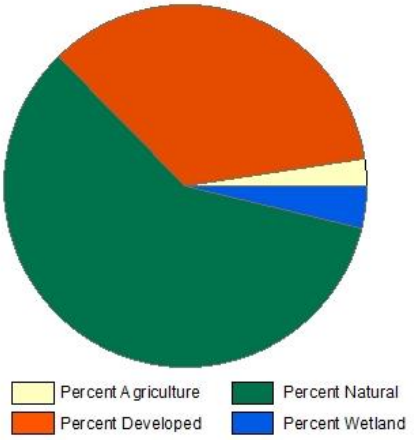
Fish, other Aquatic Life and Wildlife Use: Not Supporting
According to the 2002-2006 Charles River Watershed Water Quality Assessment Report, MassDEP staff noted the presence of the non-native aquatic macrophyte, *Nymphoides peltata* (water fringe), in Scarboro Golf Course Pond during the 1997 synoptic survey. The field sheet for this pond was not located during the validation process, however, so confirmation is needed. The Aquatic Life Use of Scarboro Golf Course Pond (MA72107) will continue to be assessed as Not Supporting due to the presence of this non-native species *Nymphoides peltata*.

Seaverns Brook (MA72-44)

Location:	Headwaters outlet Norumbega Reservoir, Weston to mouth at confluence with the Charles River, Weston.
AU Type:	RIVER
AU Size:	1.6 MILES
Classification/Qualifier:	B

SEAVERNS BROOK - MA72-44

Watershed Area: 2.49 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.49	2.49	1.04	1.04
Agriculture	2.4%	2.4%	1.7%	1.7%
Developed	35%	35%	31.1%	31.1%
Natural	58.9%	58.9%	61.6%	61.6%
Wetland	3.7%	3.7%	5.5%	5.5%
Impervious Cover	12.6%			

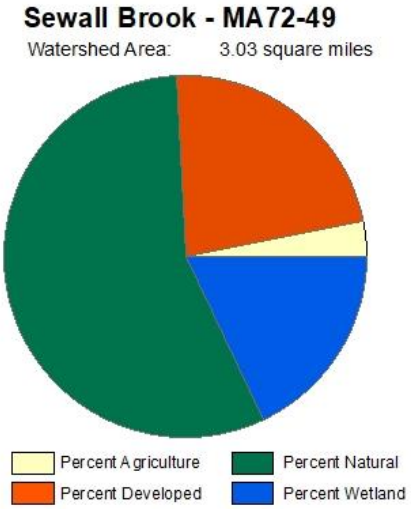
Fish, other Aquatic Life and Wildlife Use: Fully Supporting (Alert)

DFG biologists conducted backpack electrofishing in Seaverns Brook at two locations in August 2009. Samples 3121 and 3120 from the Linden Circle crossing (Weston) and Ridgeway Road crossing (Weston), respectively, were small and included only the fluvial dependent white sucker. Further downstream, MassDEP biologists surveyed the fish community 350 meters downstream of Park Road, between the I-90 on-ramp and South Avenue (Weston) in August 2007 (Sample 4459; this is near the I-90 and Rt 128 interchange). Here, too, white sucker was the only species collected, although the sample was larger (32 individuals). The field sheet comments noted "Brook follows major interstate interchange. Evidence of large amounts of stormwater impacting brook. Large storm pipe". During summer 2007, MassDEP staff conducted a water quality survey of Seaverns Brook at site W1590 (approximately 1100 feet downstream of Park Road, Weston; vicinity of fish sample 4459). A multiprobe was deployed for four 3-day periods and its data were indicative of good conditions (lowest mean daily minimum dissolved oxygen 7.2 mg/L, maximum DO diel shift 1.6 mg/L, maximum saturation 105%, maximum temperature 24.4°C). A thermistor was also deployed for 88 days starting June 28th. The maximum 7 DADM was 25.5°C and the maximum 24-hour rolling average temperature was 26.2°C. Attended probe and grab sample data (temperature, pH, DO, ammonia, total phosphorus) were also indicative of good water quality. The pH ranged from 7.1 to 7.8SU, ammonia did not exceed calculated criteria, and the seasonal average/maximum total phosphorus concentrations were low 0.016/0.036 mg/L (n=4). There were no observations of dense or very dense filamentous algae.

The Aquatic Life Use of Seaverns Brook (MA72-44) is assessed as Fully Supporting based on the presence of a fluvial dependent species at multiple stations and good water quality at the downstream fish site. An Alert is being identified, however, due to the lack of diversity in the fish community (only white sucker were present).

Sewall Brook (MA72-49)

Location:	Headwaters outlet Washington Street Pond, south off Route 16 (Washington Street), Sherborn to mouth at confluence with Charles River, Sherborn.
AU Type:	RIVER
AU Size:	3 MILES
Classification/Qualifier:	B



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	3.03	3.03	0.72	0.72
Agriculture	3.1%	3.1%	1.8%	1.8%
Developed	22.7%	22.7%	12.7%	12.7%
Natural	56.3%	56.3%	43.3%	43.3%
Wetland	17.9%	17.9%	42.2%	42.2%
Impervious Cover	6.9%			

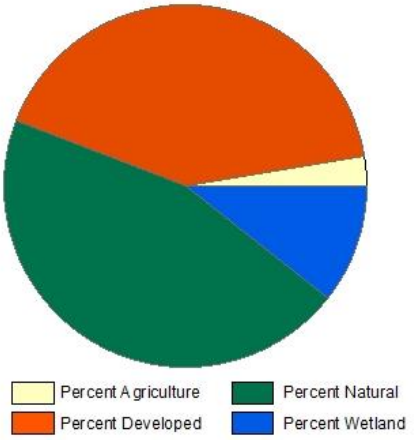
Fish, other Aquatic Life and Wildlife Use: Insufficient Information
DFG biologists conducted backpack electrofishing in Sewall Brook at Goulding Road, Sherborn (Sample 1600) in July 2006. The sampling time was limited and only 13 redfin pickerel were collected. MassDEP staff deployed a thermistor early in summer 2010 (Site W2154, approximately 350 feet downstream of Forest Street, Sherborn), but retrieved it less than a month later because flow was stagnant due to a natural beaver impoundment. Too limited data are available to assess the Aquatic Life Use of Sewall Brook (MA72-49) so it is identified as having Insufficient Information.

Shepards Brook (MA72-50)

Location:	Perennial portion, north of Brook Street, Franklin to mouth at confluence with Charles River, Franklin.
AU Type:	RIVER
AU Size:	2.3 MILES
Classification/Qualifier:	B

Shepards Brook - MA72-50

Watershed Area: 4.07 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.07	4.07	1.06	1.06
Agriculture	2.7%	2.7%	3.8%	3.8%
Developed	41.5%	41.5%	20.7%	20.7%
Natural	45.3%	45.3%	49.4%	49.4%
Wetland	10.6%	10.6%	26.2%	26.2%
Impervious Cover	10.8%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting

DFG biologists conducted backpack electrofishing in Shepards Brook in Franklin at Brook Street (Sample ID 2567), Partridge Street (Sample ID 2566), and Elm Street (Sample ID 2559) in August 2008, and roughly 400-500 m upstream of the confluence with the Charles River (Sample ID 2799) in September 2007. The most upstream sample (2567) included multiple age classes of Eastern brook trout, while the three downstream samples included a number of creek chubsucker, an intolerant fluvial specialist. Sites 2567 and 2799 included white sucker, a fluvial dependent species, and 2566 also included swamp darter, an intolerant macrohabitat generalist. The Town of Franklin used 319 Nonpoint Source Pollution Competitive Grant funding to construct BMPs at multiple locations in the Charles River basin, one of which (High Ridge circle) is located in the Shepards Brook sub-watershed. The project, designed to treat nitrogen, phosphorus, and total suspended solids, was completed as of August 2011.

The Aquatic Life Use of Shepards Brook (MA72-50) is assessed as Fully Supporting based on the presence of a reproducing Eastern brook trout population in the upper watershed and the presence of other fluvial specialist/dependant species. MA DFG considers Shepards Brook a Coldwater Fisheries Resource. It is a high priority for water temperature monitoring to aid in a potential designation of the brook as cold water in a future revision of the Water Quality Standards.

South End Pond (MA72109)

Location:	Millis.
AU Type:	FRESHWATER LAKE
AU Size:	30 ACRES
Classification/Qualifier:	B

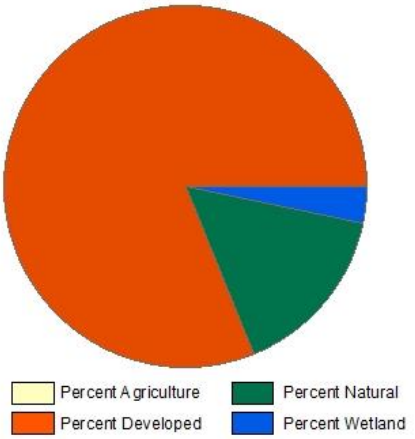
Fish, other Aquatic Life and Wildlife Use: Not Assessed
There are no data available for South End Pond MA72109 so the Aquatic Life Use is Not Assessed.

South Meadow Brook (MA72-24)

Location:	From emergence west of Parker Street, Newton to mouth at confluence with the Charles River, Newton (three culverted portions totaling approximately 2870 feet (0.54mile)).
AU Type:	RIVER
AU Size:	1.7 MILES
Classification/Qualifier:	B

South Meadow Brook - MA72-24

Watershed Area: 2.95 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.95	2.95	0.21	0.21
Agriculture	0.1%	0.1%	0%	0%
Developed	81.2%	81.2%	88.8%	88.8%
Natural	15.5%	15.5%	8.2%	8.2%
Wetland	3.3%	3.3%	3%	3%
Impervious Cover	36.4%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	5	Fish Bioassessments		Added
4a	5	Trash		Changed

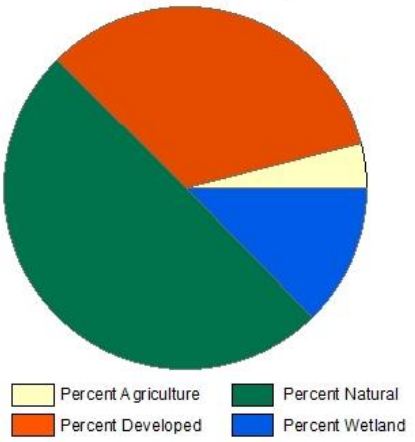
Fish, other Aquatic Life and Wildlife Use: Not Supporting
DFG biologists attempted backpack electrofishing in South Meadow Brook in July 2012 (Sample 4058) at the end of Selwyn Road (Newton) (upper part of this AU). No fish were collected and comments indicate the brook was very shallow and completely channelized. The Aquatic Life Use for South Meadow Brook is assessed as Not Supporting based on the lack of fish and the channelization in addition to historical impairments in the lower portion of the watershed which are being carried forward.

Stony Brook (MA72-26)

Location:	Headwaters, outlet Beaver Pond, Lincoln to mouth at inlet Stony Brook Reservoir, Waltham/Weston (mileage includes length of braid).
AU Type:	RIVER
AU Size:	5.1 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Stony Brook - MA72-26

Watershed Area: 22.04 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	22.02	10.76	11.1	4.9
Agriculture	4%	2.3%	3.7%	1.9%
Developed	33.5%	40.6%	26.3%	33.6%
Natural	49.8%	46.5%	48%	44.3%
Wetland	12.7%	10.6%	21.9%	20.3%
Impervious Cover	14.2%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	5	Temperature		Added

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

DFG biologists conducted a fish survey (Sample 3113; off Terrace Rd heading west, off Rt 117, Weston) in August 2009 and documented a reproducing brook trout population. The small sample (10 individuals) also contained redfin pickerel, American eel, and yellow bullhead. Almost a mile downstream, USGS periodically measured total phosphorus and chloride (n=19 of each) at station 01104370 (Stony Brook at Viles Street, near Weston) during water years 2009-2015 (please note, the "2009 water year" runs from October 1, 2008 to September 30, 2009). The average/maximum concentrations were 78/118 mg/L for chloride and 0.022/0.049 mg/L for total phosphorus. Approximately 50 meters downstream/southeast of Church Street, Weston, MassDEP staff conducted a benthic survey (sample B0073) in July 2007. This location was considered not impaired and was used as the reference site for all the benthic surveys conducted in the Charles basin in 2007. A short way downstream at site 01104390 (Stony Brook at Kendal Green, Weston), USGS collected two samples each for total phosphorus, chloride, and the pesticide, carbaryl, during 2006. There were no violations of chloride or carbaryl criteria, and the average/maximum total phosphorus concentrations were 0.029/0.039 mg/L. At Route 20 in Waltham (station 01104460), USGS collected periodic chloride and total phosphorus samples (n=17 of each) during water years 2009-2015. The average/maximum concentrations were 151/221 mg/L for chloride and 0.024/0.12 mg/L for total

phosphorus. Twenty-four samples from this location were also analyzed for the pesticide, carbaryl, between November 2005 and September 2007. All samples yielded "non-detect" results. Roughly 500 feet downstream off Sibley Road, and just upstream of the Stony Brook Reservoir, DFG (sample 2571) and MassDEP biologists each conducted a fish survey (sample 4478) on the same day in October 2007. Both groups collected small samples including young of the year brook trout, as well as white sucker and American eel. Additionally, DEP staff conducted water quality surveys near Sibley Road throughout summer 2007 (W1157). A multiprobe was deployed for five 3-day periods. The lowest mean of the daily minimum DO concentrations was 6.71 mg/L, the maximum DO diel shift was 1.24 mg/L, and the maximum DO saturation was 99%. The maximum rolling 24-hour average temperature was 23.8°C. A thermistor was deployed for 94 days over the index period, beginning on June 28. The maximum rolling 24-hour average temperature was 23.7 °C. Attended probe and grab sample data (temperature, pH, DO, ammonia, total phosphorus) were generally indicative of good water quality except for the maximum temperature (22.1°C). Total phosphorus average/maximum concentrations were 0.019/0.03 mg/L. There were no observations of dense or very dense filamentous algae (9 site visits). There were no exceedances of any metals criteria among the three samples collected at W1157.

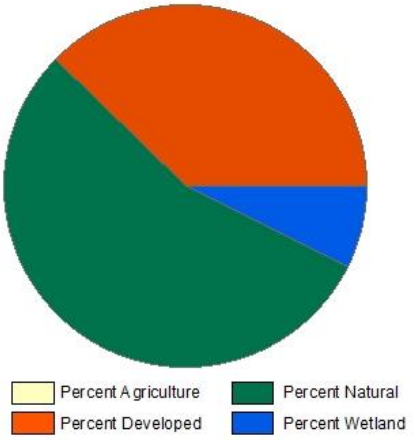
Although this Stony Brook AU (MA72-26) is not classified as Cold Water, it is being assessed as a Tier 1 Existing Use Cold Water based on the presence of multiple age classes and YOY Eastern brook trout. While Stony Brook was used as the reference site for the 2007 benthic surveys in the Charles Basin and water quality was generally excellent, water temperature exceeded the acute criterion for cold water fisheries (23.5°C) so the Aquatic Life Use of this Stony Brook AU (MA72-26) is being assessed as Not Supporting for temperature. The small size of all three fish samples is noted as an Alert but the prior Alert for an absence of brook trout is being removed.

Stony Brook (MA72-37)

Location:	Headwaters, outlet Turtle Pond, Boston to culvert entrance, Boston (two culverted portions totaling approximately 740 feet (0.14mile)).
AU Type:	RIVER
AU Size:	1.6 MILES
Classification/Qualifier:	B

Stony Brook - MA72-37

Watershed Area: 1.23 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.22	1.22	0.28	0.28
Agriculture	0%	0%	0%	0%
Developed	37.7%	37.7%	24.7%	24.7%
Natural	55%	55%	59.6%	59.6%
Wetland	7.3%	7.3%	15.7%	15.7%
Impervious Cover	18.3%			

Fish, other Aquatic Life and Wildlife Use: Insufficient Information
DFG biologists attempted to collect a fish community sample (Sample ID 3779) along Turtle Pond Parkway (roughly 500 feet downstream of Turtle Pond) on 7/12/2011. However, sample comments indicate "Entire brook is dry". There are no known groundwater withdrawals in this extremely small drainage area (1.2 mi^2) and 2011 was not a drought year. There is Insufficient Information to assess the Aquatic Life Use of Stony Brook AU (MA72-37) at this time.

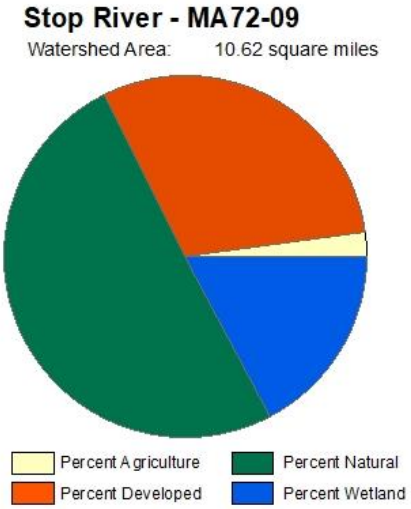
Stony Brook Reservoir (MA72114)

Location:	Waltham/Weston.
AU Type:	FRESHWATER LAKE
AU Size:	64 ACRES
Classification/Qualifier:	A: PWS, ORW

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available, so the Aquatic Life Use of Stony Brook Reservoir (MA72114) is Not Assessed.

Stop River (MA72-09)

Location:	Headwaters south of Route 1A, Wrentham to Norfolk-Walpole MCI discharge (NPDES: MA0102253), Norfolk (through former 2006 segment: Highland Lake MA72047).
AU Type:	RIVER
AU Size:	4.9 MILES
Classification/Qualifier:	B



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	10.61	7.6	3.06	2.33
Agriculture	2.1%	2%	2%	2.5%
Developed	30.3%	29.1%	17.2%	16.7%
Natural	50.4%	49.4%	45.7%	44.3%
Wetland	17.2%	19.5%	35%	36.5%
Impervious Cover	10.6%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting

DFG biologists conducted backpack electrofishing in this Stop River AU (MA72-09) at station 1921 [Dedham St. / Rt 1A, Norfolk] in July 2006. The sample was composed of 80% moderately tolerant macrohabitat generalist species (pumpkinseed, redfin pickerel, largemouth bass). The Wrentham Developmental Center (WDC formerly the Wrentham State School) operates a wastewater treatment facility which discharges to an unnamed tributary of the Stop River (whose confluence occurs due East of the Marshall Street / Route 115 intersection in Norfolk). Some degree of chronic toxicity was apparent in *C. dubia* tests for 25% (out of 48 valid tests) of the facilities WET tests conducted between January 2005 and January 2019. All but one of similar tests utilizing *P. promelas* met the permit limit. In the lower portion of the AU, downstream of the Highland Lake impoundment, MassDEP staff collected water quality data (dissolved oxygen, temperature, pH, ammonia, total phosphorus) at station W1150 [Campbell St., Norfolk], during the summer 2007. These data were indicative of good conditions (minimum DO measured during five 2-day deploys was 6.73 mg/L, the maximum diel DO shift was 0.55 mg/L, and the maximum saturation was 102.1%, the maximum temperature was 27.0˚C, and the seasonal average total phosphorus concentration was 0.071 mg/L (maximum 0.088 mg/L)). There was one observation of dense or very dense filamentous algae. A benthic sample (B0066) collected roughly 120 meters downstream of the water quality station in July 2007 had an RBP III status that was determined to be slightly impaired (60% comparable) in comparison to the Stony Brook reference site (B0073). Lastly, the MCI-Norfolk Water Pollution Control Facility (MA0102253) is collected water from the river just upstream of the facility's outfall for use as a diluent/control in the facilities *C. dubia* WET tests. Between July 2007 and April 2019, survival of *C. dubia* exposed (~7-days) to the river water was good, ranging from 80-100% (n = 47 tests). While MCI-Norfolk is not required to utilize *P. promelas* test organisms under the current permit, it ran 5 WET tests with this species between July 2007 and July 2008

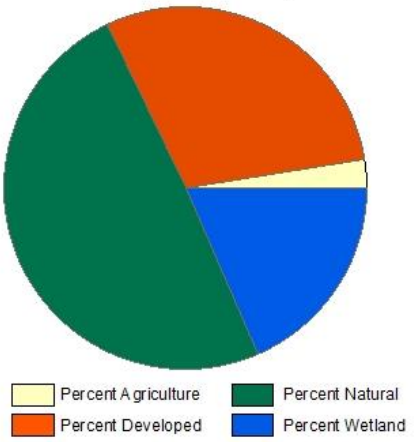
(shortly before the current permit was issued). Four of these tests exhibited chronic toxicity to *P. promelas* in the river samples, with ~7-day survival rates ranging from 5-70% while there was 100% survival at 48 hours of exposure).
The Aquatic Life Use of this Stop River AU (MA72-09) remains assessed as Not Supporting since the 2007 and 2008 *P. promelas* WET testing data for the MCI-Norfolk Water Pollution Control Facility continued to show poor *P. promelas* survival for river water samples so the "Ambient Bioassays - Chronic Aquatic Toxicity" impairment will remain. Although improved DO and TP concentrations that are meeting CALM criteria have been documented, the impairments for DO and TP are being carried forward until more recent data are collected to confirm the appropriateness of their delisting.

Stop River (MA72-10)

Location:	From Norfolk-Walpole MCI discharge, Norfolk to confluence with Charles River, Medfield.
AU Type:	RIVER
AU Size:	4.2 MILES
Classification/Qualifier:	B

Stop River - MA72-10

Watershed Area: 17.09 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	17.07	7.16	4.99	2.15
Agriculture	2.5%	3.4%	2.5%	3%
Developed	29.6%	28.9%	15.1%	13.5%
Natural	49.4%	47.9%	44.3%	42.2%
Wetland	18.4%	19.8%	38.1%	41.3%
Impervious Cover	10.3%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	4a	Temperature		Removed

Fish, other Aquatic Life and Wildlife Use: Not Supporting

The upstream border of the Stop River MA72-10 AU occurs at the MCI – Norfolk Water Pollution Control Facility's discharge. The facility is required to utilize *Ceriodaphnia dubia* test organisms in four whole effluent toxicity tests per year (January, April, July, October) with an acute LC_{50} ≥100% and a chronic NOEC ≥80%. Between July 2007 and April 2019, the LC_{50} of all valid tests (n=47) was >100% effluent and the CNOEC of most tests (94%) ranged from 80-100% effluent. In the middle of the AU, at Noon Hill Road (Medfield), MassDEP staff conducted a benthic survey (B0067) and a water quality survey (W1151) during summer 2007. The RBP III status of the benthic sample was considered slightly impaired (70% comparable) in comparison with the Stony Brook reference (B0073). Dissolved oxygen was measured at W1151 during four 2-day deployments. During the June deploy, the minimum concentration was 3.87 mg/L (the mean minimum was 4.08 mg/L) and the max diel shift was 4.61 mg/L. During the August deploy, the diel shift was 4.49 mg/L. All other DO data were indicative of good conditions. A thermistor was deployed to measure temperature for 94 days, beginning 6/28/07. The 7-DADM exceeded 27.7 ˚C on 7 occasions and the maximum 24-hour rolling average was 27.5 ˚C. Data from other attended probe measurements, as well as grab samples (pH, ammonia, TP, metals) were indicative of good conditions. In particular, the average TP concentration was 0.052 mg/L, the maximum was 0.063 mg/L (n=5), and there were no observations of dense or very dense filamentous algae. Further downstream, DEP staff collected grab samples for ammonia and TP once at station W1716 [Causeway St., Medfield] with no exceedances of criteria. CRWA collected

usable Total Suspended Solids (max = 2.3 mg/L in 2009) and TP data (seasonal average concentration = 0.074 mg/L in 2009 & 0.091 mg/L in 2012) at station 269T (at Causeway St.).
Although it appears that TP concentrations have decreased from those measured in 2002, a recommendation is being made to conduct more monitoring in the vicinity of the Noon Hill Road (Medfield) crossing to confirm further improvement following implementation of a more stringent seasonal TP limit as required in the 2008 MCI-Norfolk NPDES permit.
The Aquatic Life Use of this Stop River AU (MA72-10) remains assessed as Not Supporting due to Total Phosphorus and Organic Enrichment Biological Indicators. The Temperature impairment is being delisted because the 2007 DEP data indicate that it should not be considered impaired per 2018 CALM guidance (see Removal Comment for detailed rationale).

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Temperature	Applicable WQS attained, according to new assessment method	This Stop River AU (MA72-10) was first listed as impaired for Water Temperature in the 2008 IR cycle due an analysis of CRWA continuous probe data collected at Noon Hill Road, Medfield (station 269T2) from July 2002 through December 2005. When the data were recently reanalyzed using the large thermistor dataset criteria in the 2018 CALM, there were no exceedances of the acute criterion (maximum 24-hour average 27.9˚C in 2005), nor the chronic criterion (there were <11 exceedances of the 7-DADM criterion of 27.7 ˚C every year). Additionally, MassDEP staff collected continuous temperature data over a 94-day period in 2007, beginning June 28. The 7-DADM exceeded 27.7˚C on 7 occasions with a max 24-hour rolling average of 27.5˚C. It is noted that the 2002 data were collected under a drought watch, while most of the summer 2007 data were collected just prior to a drought advisory that was issued as of October 1st. Based upon the reevaluation CRWA continuous probe temperature data collected between 2002 and 2005 using the updated methods in the 2018 CALM guidance document, as well as the temperature in the summer of 2007 which documented the 7-DADM exceeded 27.7 ˚C on 7 occasions (exceedances allowed up to 11 times) and the maximum 24-hour rolling average was only 27.5˚C (below the maximum 24-hour guideline of 28.3˚C) temperature is being delisted as a cause of impairment for this Stop River AU (MA72-10).

Supporting Information for Delisted Impairments

Temperature

Reanalysis of CRWA 2002-2005 Stop River temperature data according to the 2018 CALM criteria (MassDEP Undated, CRWA 2004, CRWA 2006):

Maximum Daily Average Temperature by year for each brook.										
Max of Avg			Waterbody							
Year	Month	Day	BogastowBrook	ChickenBrook	FullerBrook	HoppingBrook	MillRiver	MineBrook	StopRiver	TroutBrook	WabanBrook
⊞2002			26.2	26.7	23.7	24.3	29.3	29.0	27.2	18.9	30.0
⊞2003			24.2	25.3	23.2	22.4	25.8	25.3	26.7	20.1	27.9
⊞2004			23.8	24.1	22.3	21.1	24.5	25.3	26.5	20.8	26.2
⊞2005			25.8	27.1	23.5	23.5	25.8	26.5	27.9	19.4	27.9
⊞2006			7.9	6.5	8.3						

Reanalysis of CRWA 2002-2005 temperature data according to the 2018 CALM criteria (MassDEP Undated, CRWA 2004, CRWA 2006):

Number of Times With a 7-DADM >27.7 ˚C	
Year	Stop River
2002	7
2003	0
2004	3
2005	9

2007 Multiprobe Data of MassDEP Water Quality Site W1151 Stop River [Noon Hill Road, Medfield] (MassDEP Undated):

Unique ID	Gear Type	Project Name	OWMIDs Used to Build File	
W1151	Data Sonde (Multi-Probe)	Charles (2007)	72-0780, 72-0876, 72-1037, 72-1196, 72-1354	
Station ID	Station Description	Mile Point	Latitude (dec-degrees)	Longitude (dec-degrees)
W1151	[Noon Hill Road, Medfield]	2.065	42.15866554	-71.30280983
Watershed	SARIS_PALIS_CAMIS	Water Body		
Charles	7239925	STOP RIVER/		
Station File Start Time	5/14/2007 2:30 PM			
Station File End Time	10/3/2007 9:30 AM			
Total Station File Duration (Hours)	3403.0			
Total Station File Count	6807			
	Analytes			
	Temperature (Celsius)	DO (mg/L)	DOsat (%)	
Observed Deployment Time (Hours)	177.5	177.5	177.5	
Observed Count	359	359	359	
Avg*	20.3	7.0	78	
SD*	3.5	1.4	17	
Min*	15.1	3.9	45	
Max*	26.1	9.6	114	
Median*	21.1	7.0	75	
IQR*	7.1	1.7	24	
Mean of the Daily Mean*	20.0	6.9		
Mean of the Daily Min*	18.6	5.5		
Mean of the Daily Max*	21.6	8.7		
MWAT*	--			
Amount of Time > 20 deg. C (Hours)	96.2			
Max Duration > 20 deg. C (Hours)	45.5			
Avg Daily Amount of Time > 20 deg. C (Hours)	12.0			
Amount of Time > 28.3 deg. C (Hours)	0.0			
Max Duration > 28.3 deg. C (Hours)	0.0			
Avg Daily Amount of Time > 28.3 deg. C (Hours)	0.0			
Amount of Time > 29.4 deg. C (Hours)	0.0			
Max Duration > 29.4 deg. C (Hours)	0.0			
Avg Daily Amount of Time > 29.4 deg. C (Hours)	0.0			
Amount of Time < 3.0 mg/L (Hours)		0.0		
Max Duration < 3.0 mg/L (Hours)		0.0		
Avg Daily Amount of Time < 3.0 mg/L (Hours)		0.0		
Amount of Time < 4.0 mg/L (Hours)		3.8		
Max Duration < 4.0 mg/L (Hours)		2.2		
Avg Daily Amount of Time < 4.0 mg/L (Hours)		0.0		
Amount of Time < 5.0 mg/L (Hours)		20.5		
Max Duration < 5.0 mg/L (Hours)		8.2		
Avg Daily Amount of Time < 5.0 mg/L (Hours)		3.1		
Amount of Time < 6.0 mg/L (Hours)		39.3		
Max Duration < 6.0 mg/L (Hours)		11.4		
Avg Daily Amount of Time < 6.0 mg/L (Hours)		5.6		
*Units are those of the analyte listed. SD is unitless.				

2007 Temperature Probe Data of MassDEP Site W1151 Stop River [Noon Hill Road, Medfield] (MassDEP Undated):

Unique ID	Gear Type	Project Name	OWMIDs Used to Build File	
W1151	Temperature Logger	Charles (2007)	72-0998	
Station ID	Station Description	Mile Point	Latitude (dec-degrees)	Longitude (dec-degrees)
W1151	[Noon Hill Road, Medfield]	2.065	42.15866554	-71.30280983
Watershed	SARIS_PALIS_CAMIS	Water Body		
Charles	7239925	STOP RIVER/		
Station File Start Time	6/28/2007 4:30 PM			
Station File End Time	10/24/2007 11:30 AM			
Total Station File Duration (Hours)	2827.0			
Total Station File Count	5655			
	Analytes			
	Temperature (Celsius)	DO (mg/L)	DOsat (%)	
Observed Deployment Time (Hours)	2827.0	0.0	0.0	
Observed Count	5655	0	0	
Avg*	21.3	--	--	
SD*	3.7	--	--	
Min*	12.2	--	--	
Max*	29.0	--	--	
Median*	21.8	--	--	
IQR*	5.4	--	--	
Mean of the Daily Mean*	21.3	--		
Mean of the Daily Min*	20.0	--		
Mean of the Daily Max*	22.7	--		
MWAT*	26.4			
Amount of Time > 20 deg. C (Hours)	1837.0			
Max Duration > 20 deg. C (Hours)	903.1			
Avg Daily Amount of Time > 20 deg. C (Hours)	15.6			
Amount of Time > 28.3 deg. C (Hours)	21.9			
Max Duration > 28.3 deg. C (Hours)	8.7			
Avg Daily Amount of Time > 28.3 deg. C (Hours)	0.2			
Amount of Time > 29.4 deg. C (Hours)	0.0			
Max Duration > 29.4 deg. C (Hours)	0.0			
Avg Daily Amount of Time > 29.4 deg. C (Hours)	0.0			
Amount of Time < 3.0 mg/L (Hours)		--		
Max Duration < 3.0 mg/L (Hours)		--		
Avg Daily Amount of Time < 3.0 mg/L (Hours)		--		
Amount of Time < 4.0 mg/L (Hours)		--		
Max Duration < 4.0 mg/L (Hours)		--		
Avg Daily Amount of Time < 4.0 mg/L (Hours)		--		
Amount of Time < 5.0 mg/L (Hours)		--		
Max Duration < 5.0 mg/L (Hours)		--		
Avg Daily Amount of Time < 5.0 mg/L (Hours)		--		
Amount of Time < 6.0 mg/L (Hours)		--		
Max Duration < 6.0 mg/L (Hours)		--		
Avg Daily Amount of Time < 6.0 mg/L (Hours)		--		
*Units are those of the analyte listed. SD is unitless.				

Data Source (MassDEP Undated):

The STOP RIVER (W1151) was sampled beginning on 06/28/07 and lasting 94 days over the index period. The maximum 7 DADM was 28.1 °C (with 7 exceedances of 27.7 °C from 7/30 – 8/05). The maximum mean daily temperature was 27.4 °C.

Unique ID	Water body	AU Class	Qualifier	Date	Max 7 DADM	Max 7 DADA	Index Period Days	Days CWF Tier1 Chronic Violated	Days Tier 2 Chronic Violated	Days WWF Chronic Violated	Max Daily Mean Acute	Max Daily Max
W1151	STOP RIVER	B		06/28/07	28.1	26.4	94	83	70	7	27.4	29

Temperature Rolling Data						
	AU_ID_1	OWMID	Start	Stop	Result Count	Max 24hr Rolling
534	MA72-10	72-0876	6/18/2007 2:30:00 PM	6/20/2007 10:30:00 AM	41	23.8
535	MA72-10	72-0998	6/28/2007 4:30:00 PM	10/24/2007 11:30:00 AM	5607	27.5
536	MA72-10	72-1196	8/27/2007 12:30:00 PM	8/29/2007 10:00:00 AM	44	23.9
537	MA72-10	72-1354	10/1/2007 1:00:00 PM	10/3/2007 9:30:00 AM	42	16.1
538	MA72-10	72-0780	5/14/2007 2:30:00 PM	5/16/2007 10:00:00 AM	40	18.2

Todd Pond (MA72117)

Location:	Lincoln.
AU Type:	FRESHWATER LAKE
AU Size:	9 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

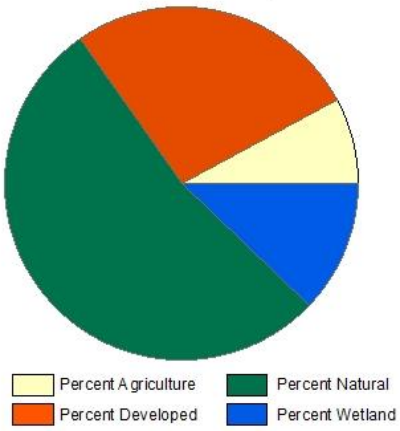
Fish, other Aquatic Life and Wildlife Use: Not Assessed
With no data available, the Aquatic Life Use of Todd Pond (MA72117) is Not Assessed.

Trout Brook (MA72-19)

Location:	Headwaters, outlet Channings Pond, Dover to mouth at confluence with the Charles River, Dover.
AU Type:	RIVER
AU Size:	2.8 MILES
Classification/Qualifier:	B

Trout Brook - MA72-19

Watershed Area: 4.56 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.56	4.44	1.64	1.63
Agriculture	7.8%	7.7%	5.9%	5.8%
Developed	27%	26.6%	17.3%	17.2%
Natural	53.2%	53.4%	52%	52.2%
Wetland	12.1%	12.3%	24.7%	24.8%
Impervious Cover	8.4%			

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

MassDEP biologists conducted benthic (B0069) and water quality (W0408) surveys in Trout Brook in the vicinity of Haven Street, Dover during summer 2007. The RBPIII status of the benthic macroinvertebrate sample was determined to be "slightly impaired" (75% comparable) when compared to the Stony Brook reference (B0073). A multiprobe was deployed for four 2-day periods. Although the mean of the daily minima DO concentrations were low (range 3.2 to 5.0 mg/L), there were no signs of enrichment (maximum DO diel shift 1.4 mg/L; maximum saturation 63%). It is noted since multiple age classes of Eastern brook trout were collected by MassDEP biologists in this same reach of the brook in August 2002 it is being assessed as an Existing Use Tier 1 cold water. The maximum 24-hour rolling average for temperature data recorded during the summer 2007 multiprobe deploys was 19.7°C. A thermistor was also deployed for 94 days starting June 28. Temperature during this deploy exceeded the chronic Tier 1 criterion (7-DADM ≤20.0°C) 51 times (maximum 7-DADM 23.5°C). The maximum daily average was 23.4°C slightly below the acute Tier 1 criterion of 23.5°C). Although water temperatures were not ideal for brook trout, the temperatures were nonetheless relatively cool (in comparison with other Charles River watershed AUs) and this, in combination with low DO concentrations, is indicative of ground water influence. There are also extensive wooded swamp wetlands upstream of the site, which likely effect the instream DO concentrations. Low DO is considered to be a natural condition at this location on Trout Brook. Grab sample data (ammonia, total phosphorus) were indicative of good conditions (seasonal average/maximum total phosphorus concentration 0.03/0.048 mg/L) and ammonia-nitrogen concentrations from 0.02 to 0.15mg/L. There was one observation of dense filamentous algae. Attended probe data (DO, temperature) were similar to the unattended data and pH ranged from 6.4 to 6.7SU.

The Aquatic Life Use of Trout Brook will continue to be assessed as impaired because of elevated temperature since the Tier 1 Cold Water chronic criterion 7-DADM ≤20.0°C was exceeded 51 times during the summer of 2007. The Nutrient/Eutrophication Biological Indicators impairment is also being carried forward until more recent data

are collected to confirm the appropriateness of this delisting. An Alert status is being added for low DO concentrations.

Uncas Pond (MA72122)

Location:	Franklin.
AU Type:	FRESHWATER LAKE
AU Size:	17 ACRES
Classification/Qualifier:	B

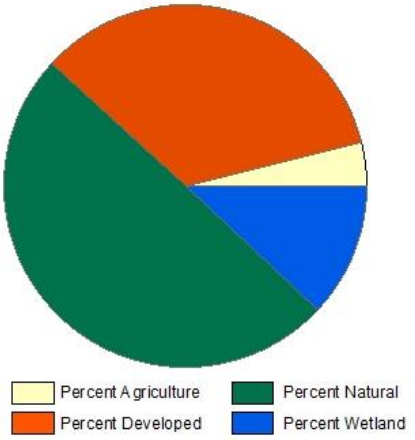
Fish, other Aquatic Life and Wildlife Use: Not Supporting
DCR Lakes and Ponds staff reported an infestation of the non-native aquatic macrophyte, *Myriophyllum heterophyllum* (variable water milfoil), in Uncas Pond in 2003. The Aquatic Life Use of Uncas Pond will continue to be assessed as Not Supporting due to the historical impairments for low dissolved oxygen and the presence of Non-Native Aquatic Plants.

Unnamed Tributary (MA72-27)

Location:	Headwaters, outlet Stony Brook Reservoir, Waltham/Weston to mouth at confluence with the Charles River, Waltham/Weston.
AU Type:	RIVER
AU Size:	0.2 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA72-27

Watershed Area: 23.61 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	23.6	7.75	11.9	3.7
Agriculture	3.9%	2.4%	3.4%	1.2%
Developed	34.3%	46%	27.1%	38.4%
Natural	49.8%	42.9%	48.6%	44.3%
Wetland	12%	8.8%	20.8%	16.1%
Impervious Cover	14.3%			

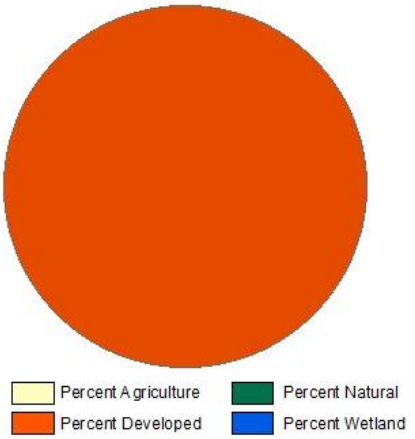
Fish, other Aquatic Life and Wildlife Use: Not Supporting
The Aquatic Life Use of this Unnamed Tributary AU (MA72-27) will continue to be assessed as Not Supporting due to Dewatering and Flow Regime Modification.

Unnamed Tributary (MA72-30)

Location:	Locally known as "Laundry Brook" - emerges north of California Street, Watertown to mouth at confluence with the Charles River, Watertown (stream not depicted on 1987 Newton USGS map).
AU Type:	RIVER
AU Size:	0.02 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA72-30

Watershed Area: 0.1 square miles

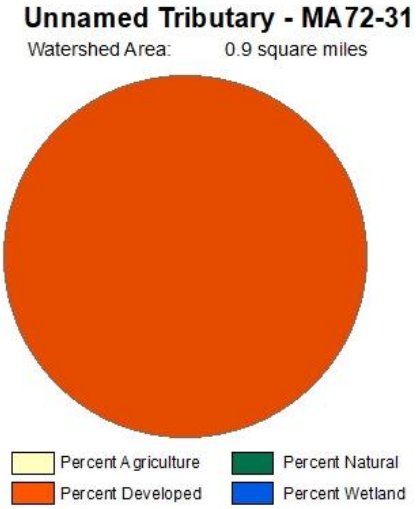


Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.11	0.11	0	0
Agriculture	0%	0%	0%	0%
Developed	99.9%	99.9%	96.7%	96.7%
Natural	0.1%	0.1%	3.3%	3.3%
Wetland	0%	0%	0%	0%
Impervious Cover	53.8%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting
No recent data are available so the Aquatic Life Use of this Unnamed Tributary AU (MA72-30) ("Laundry Brook") will continue to be assessed as Not Supporting for "Phosphorus, Total" and "Physical substrate habitat alterations".

Unnamed Tributary (MA72-31)

Location:	Locally known as "Millers River" - from emergence near Route 93, Cambridge/Boston to mouth at confluence with the Charles River, Cambridge.
AU Type:	RIVER
AU Size:	0.2 MILES
Classification/Qualifier:	B



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.9	0.9	0.03	0.03
Agriculture	0%	0%	0%	0%
Developed	99.7%	99.7%	89.7%	89.7%
Natural	0.3%	0.3%	10.3%	10.3%
Wetland	0%	0%	0%	0%
Impervious Cover	89.5%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Metals		Removed
5	5	Trash		Changed
5	5	Unspecified Metals in Sediment		Added

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

The MBTA Commuter Rail Maintenance Facility discharges treated stormwater via outfall 001 to unnamed tributary MA72-31 (locally known as the Millers River) under NPDES permit #MA0003590 (issued 11 June 2007). The facility is required to utilize *Ceriodaphnia dubia* and *Pimephales promelas* test organisms in one whole effluent toxicity test per year, with reporting requirements for the acute LC_{50} value and the chronic endpoint of each test. All LC_{50} values were 100% effluent for *Ceriodaphnia dubia* and *Pimephales promelas* test organisms exposed to effluent during WET tests (n = 9 tests for each species) conducted between August 2008 and July 2018. The CNOECs were generally 100% effluent for both species as well (n = 8 tests for *C. dubia* and n = 7 tests for *P. promelas*). Water was collected (west of southbound Charlestown Avenue, Cambridge/Boston) a little upstream of the MA72-31 AU for use as a diluent/control in the WET tests (n = 9 tests for both species). Survival of test organisms exposed (~7 days) to the river water was generally good, ranging from 85-100% for all but 1 test. MassDEP had metals concentrations analyzed in three water column samples staff collected at station W1714 (approximately 50 feet from a large, gated culvert outlet beneath Route 93, Boston/Cambridge) during summer

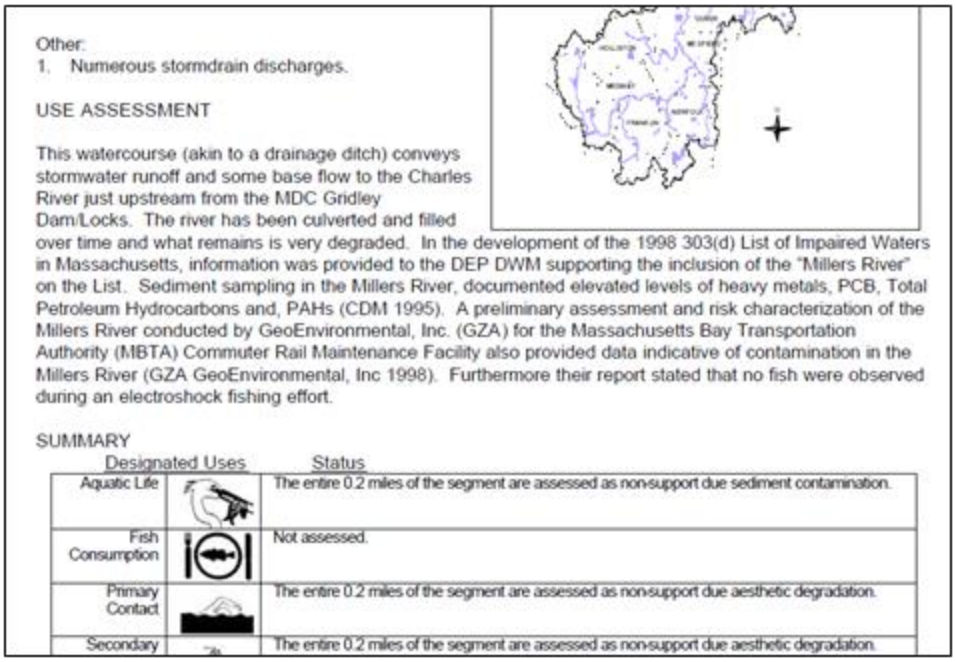
2007. Although there were no violations of the criteria for most metals analyzed, two of the three samples (with concentrations of 6.4 and 7.7 µg/L) exceeded the USEPA's 1999 chronic Aquatic Life Ambient Water Quality Criterion for Selenium in freshwater (4.61 µg/L when converted to a dissolved criterion).
Boston Sand and Gravel discharges a combination of stormwater runoff, road sweeping water, boiler blowdown water, and truck wash-off and wash-out water though outfall 001 to Unnamed Tributary MA 72-31. This is authorized under NPDES permit #MA0000531 (issued 28 September 2007). The facility is required to utilize *Ceriodaphnia dubia* and *Pimephales promelas* test organisms in one whole effluent toxicity test per year, with reporting requirements for the acute LC_{50} value and the chronic endpoint of each test. Between December 2007 and September 2016, eight valid WET tests were conducted on the effluent using *C. dubia*, while nine valid tests were conducted using *P. promelas*. The LC_{50}s of the *C. dubia* tests ranged from 18.9 to >100% effluent and the CNOECs ranged from 6.25-50% effluent. The LC_{50}s of the *P. promelas* tests were all >100% effluent and the CNOECs were all 100% effluent. Water was collected from MA72-31 (approximately 100 feet upstream of Boston Sand and Gravel outfall 001) for use as a diluent/control in *C. dubia* (n = 8 tests) and *P. promelas* (n = 9 tests) whole effluent toxicity tests. Survival of *C. dubia* exposed (~7 days) to the river water was excellent, at 100% of the test organisms (n = 8 tests), and that of *P. promelas* was good, ranging from 88-100% of the test organisms (n = 9 tests).
During this reporting cycle, limited data were available, including WET testing data from the MBTA Commuter Rail Maintenance Facility and Boston Sand and Gravel. Because selenium concentrations in two of three metals samples collected in 2007 exceeded the chronic criterion, an Alert is being issued.
The Aquatic Life Use of Unnamed Tributary ("Millers River") MA72-31 remains assessed as Not Supporting due to multiple impairments related to contaminated sediments. The prior impairment code "Metals" is being delisted and replaced with the more specific "Unspecified Metals in Sediment".

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Metals	Clarification of listing cause	"Metals" is being delisted and replaced with the more specific "Unspecified Metals in Sediment".

Supporting Information for Delisted Impairments

Metals

Information from 1997/1998 Charles River Watershed WQAR about prior impairments (Fiorentino, Kennedy and Weinstein 2000):



Other:
1. Numerous stormdrain discharges.

USE ASSESSMENT

This watercourse (akin to a drainage ditch) conveys stormwater runoff and some base flow to the Charles River just upstream from the MDC Gridley Dam/Locks. The river has been culverted and filled over time and what remains is very degraded. In the development of the 1998 303(d) List of Impaired Waters in Massachusetts, information was provided to the DEP DWM supporting the inclusion of the "Millers River" on the List. Sediment sampling in the Millers River, documented elevated levels of heavy metals, PCB, Total Petroleum Hydrocarbons and, PAHs (CDM 1995). A preliminary assessment and risk characterization of the Millers River conducted by GeoEnvironmental, Inc. (GZA) for the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail Maintenance Facility also provided data indicative of contamination in the Millers River (GZA GeoEnvironmental, Inc 1998). Furthermore their report stated that no fish were observed during an electroshock fishing effort.

SUMMARY

Designated Uses	Status
Aquatic Life	The entire 0.2 miles of the segment are assessed as non-support due sediment contamination.
Fish Consumption	Not assessed.
Primary Contact	The entire 0.2 miles of the segment are assessed as non-support due aesthetic degradation.
Secondary	The entire 0.2 miles of the segment are assessed as non-support due aesthetic degradation.

Since the original impairment was related to sediment contamination, the impairment code is being clarified. Furthermore, the water column data collected in August and October 2007 were all below criteria and/or impairment decision criteria.
Data Source (MassDEP Undated):

Acute Metals- CMC Relate Data- for W1714 (approximately 50 feet from large, gated culvert outlet beneath Route 93, Boston/Cambridge)

Unique ID	Water Body	Year	Count	Cd..CMC	Cr..CMC	Cu..CMC	Pb..CMC	Ni..CMC	Ag..CMC	Zn..CMC	As..CMC	Al..CMC
W1714	Unnamed Tributary	2007	3	0	0	0	0	0	0	0	0	0

Chronic Metals- CCC Relate Data

Unique ID	Water Body	Year	Count	Cd..CCC	Cr..CCC	Cu..CCC	Pb..CCC	Ni..CCC	Zn..CCC	As..CCC	Al..CCC	Se..CCC
W1714	Unnamed Tributary	2007	3	0	0	0	0	0	0	0	0	2

Dissolved Selenium Concentrations for 3 Samples Collected from W1714 in 2007 (MassDEP Undated):

UNIQUE ID	QAQC Type	Start Date	Start Time	FLOWSTAT	DWM Name	DWM Units	Result	DWM Qualifier	Violation*
W1714	Routine Sample	8/9/2007	5:35:00 PM	Stagnant	Selenium - Dissolved	µg/L	4.0		No
W1714	Routine Sample	8/30/2007	3:20:00 PM	Stagnant	Selenium - Dissolved	µg/L	6.4		Yes
W1714	Routine Sample	10/4/2007	12:30:00 PM	Flowing	Selenium - Dissolved	µg/L	7.7		Yes

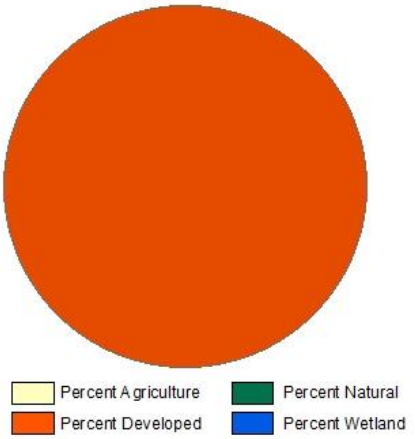
* As noted in Table E1 (Page E3) of the 2018 CALM, the 1999 Criterion Continuous Concentration (chronic criterion) for total selenium converted to a dissolved selenium criterion is 4.61 µg/L (MassDEP 2018, USEPA 2016).

Unnamed Tributary (MA72-32)

Location:	Locally known as "Sawins Brook" - emerges east of Elm Street, Watertown to mouth at confluence with the Charles River, Watertown (one culverted portion approximately 360 feet (0.07mile)).
AU Type:	RIVER
AU Size:	0.5 MILES
Classification/Qualifier:	B

Unnamed tributary - MA72-32

Watershed Area: 0.56 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.56	0.56	0.07	0.07
Agriculture	0%	0%	0%	0%
Developed	98.2%	98.2%	86.1%	86.1%
Natural	0.9%	0.9%	7.2%	7.2%
Wetland	0.9%	0.9%	6.7%	6.7%
Impervious Cover	59.2%			

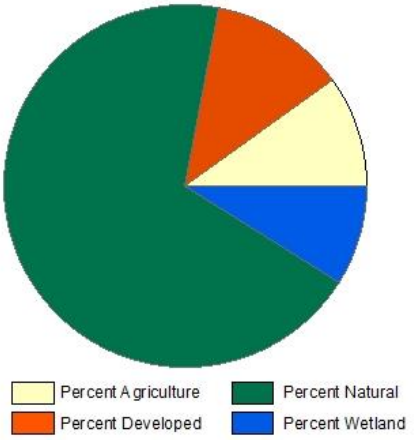
Fish, other Aquatic Life and Wildlife Use: Not Assessed
No recent data are available so the Aquatic Life Use of this Unnamed Tributary AU (MA72-32) (“Sawins Brook”) is Not Assessed.

Unnamed Tributary (MA72-41)

Location:	Unnamed tributary to the Charles River, outlet Lymans Pond, Dover to mouth at confluence with the Charles River, Dover.
AU Type:	RIVER
AU Size:	0.5 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA72-41

Watershed Area: 0.67 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.67	0.67	0.2	0.2
Agriculture	9.9%	9.9%	9.2%	9.2%
Developed	12.1%	12.1%	8.9%	8.9%
Natural	69.1%	69.1%	65.7%	65.7%
Wetland	8.9%	8.9%	16.2%	16.2%
Impervious Cover	3.8%			

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

During 2010, MassDEP staff conducted a benthic survey (B0678) and a fish survey (4545) in August, and also collected water quality data (W2155) throughout the summer roughly 50 meters downstream of Farm Street in Dover. The benthic sample was 80% comparable (on the border between "non" and "slightly impaired") to the Johnson Creek reference station (B0688 in the Merrimack basin). The small fish sample included largemouth bass and redbreast sunfish (both moderately tolerant macrohabitat generalists). A multiprobe was deployed for three 5-day periods over the summer and a thermistor was deployed for 122 days, starting May 6th. These data were indicative of good water quality (lowest daily mean minimum DO = 7.19 mg/L, daily DO diel shifts all <1.4 mg/L, maximum DO saturation = 93.5%, maximum temperature = 23.7 ˚C). Attended probe measurements and grab sample data (DO, temperature, pH, ammonia, total phosphorus, metals) did not violate any applicable criteria and were therefore indicative of good conditions as well. In particular, average/maximum TP concentrations were 0.02 and 0.034 mg/L, respectively. There was one observation of dense or very dense filamentous algae.

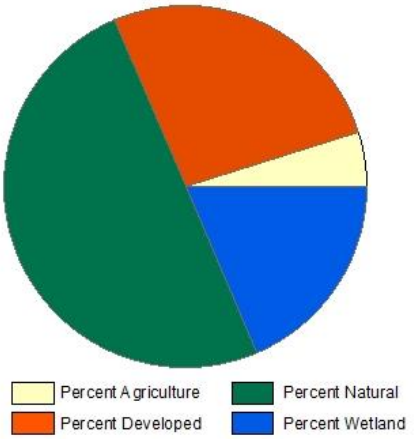
The Aquatic Life Use of this Unnamed Tributary AU (MA72-41) is assessed as Fully Supporting based primarily on the benthic and water quality data collected during the summer of 2010. An Alert is being identified because the fish sample was small and did not contain any fluvial species. Since the stream is small and the Farm Street sampling location is sandwiched between Lymans Pond and a small unnamed pond, fluvial fish may have a difficult time repopulating this reach following periodic low flow events (i.e. during drought conditions).

Unnamed Tributary (MA72-42)

Location:	Unnamed tributary to the Charles River, from outlet unnamed pond north of South Street, Natick to mouth at confluence with the Charles River, Natick.
AU Type:	RIVER
AU Size:	0.3 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA72-42

Watershed Area: 3.75 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	3.75	3.75	0.97	0.97
Agriculture	4.8%	4.8%	2.5%	2.5%
Developed	26.6%	26.6%	16.5%	16.5%
Natural	50.1%	50.1%	39.4%	39.4%
Wetland	18.5%	18.5%	41.6%	41.6%
Impervious Cover	8%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	5	Benthic Macroinvertebrates		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

MassDEP staff conducted water quality and benthic surveys of Unnamed Tributary MA72-42 at station W1587/B0615 (in the vicinity of South Street, Natick) during summer 2007. The RBP III status of the benthic sample was determined to be moderately impaired (35% comparable) in comparison with the Stony Brook reference (B0073). However, the habitat score was only 127 (or partially supporting when compared to the reference) and given the proximity of an upstream impoundment, as well as extensive wetlands in the upper reaches of the watershed, it is unclear whether local habitat or upstream influences constitute the dominant impact on the RBP III status. A multiprobe was deployed for five 2-day periods. The maximum temperature for these data was 27.4 °C. Because 2-day deploys do not fit into a particular measurement class, the DO data will be discussed in the context of the criteria for both the instantaneous and 3-5 day continuous datasets. All DO concentrations were >4.0 mg/L (the criterion for instantaneous data sets) with a maximum saturation of 113%. Although the mean of the daily minima got as low as 4.63 mg/L (the CALM criterion is 5.0 mg/L for 3-5 day continuous datasets) and the maximum diel shift was 3.36 mg/L (the criterion is ≤3 mg/L) these slight exceedances occurred the end of August and beginning of October, respectively, when the stream likely would have already been responding to pre-drought conditions (by the end of August, streamflow at the Dover, MA USGS gage on the Charles River, the closest gage to this location, was being exceeded by 96% of measurements

and a drought advisory was declared for most of the state as of October 1st). Additionally, field sheets indicated that there was lots of beaver activity in the vicinity of the sampling location. Attended probe and grab sample data (temperature, pH, DO, ammonia, total phosphorus) were generally indicative of good conditions. The pH data ranged from 6.4-7.1 SU, seasonal average/maximum total phosphorus concentrations were 0.05/0.066 mg/L, and there were no violations of chronic/acute ammonia criteria. DO dropped from 8.7 to 4.6 mg/L over the course of the summer, consistent with the analysis of the unattended probe data. There were no observations of dense or very dense filamentous algae.

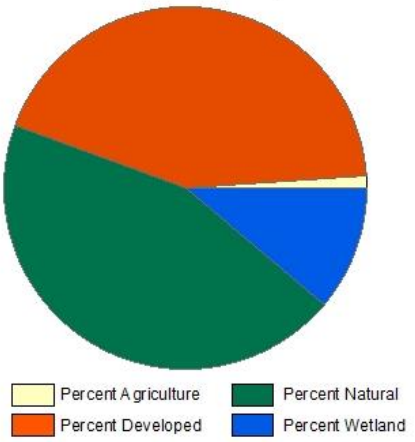
The Aquatic Life Use of this Unnamed Tributary AU (MA72-42) is being assessed as Not Supporting although natural conditions (from the upstream wetlands, as well as beaver activity and pre-drought climatological conditions) and habitat limitations might have contributed to the moderately impaired RBP III status of the benthic sample.

Unnamed Tributary (MA72-43)

Location:	Unnamed tributary to Morses Pond, headwaters outlet Reeds Pond, Wellesley to mouth at confluence with Morses Pond, Wellesley.
AU Type:	RIVER
AU Size:	0.2 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA72-43

Watershed Area: 7.16 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.15	6.97	2	1.97
Agriculture	1.1%	1.1%	1.4%	1.5%
Developed	43.4%	44.1%	30.3%	30.6%
Natural	44.5%	43.5%	45.6%	45.1%
Wetland	11.1%	11.3%	22.7%	22.9%
Impervious Cover	16.8%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting

MassDEP staff conducted a water quality survey of this Unnamed Tributary AU (MA72-43) at station W1582 [between Bogle Brook/Reeds Pond and Morses Pond, Wellesley (just upstream of culverting under parking lot)] during summer 2007. A multiprobe was deployed for five 2-day periods, generating data that were indicative of good water quality (lowest mean daily minimum dissolved oxygen concentration 6.96 mg/L, maximum DO diel shift 0.9 mg/L, maximum DO saturation 93%; maximum temperature 23.8°C). Grab sample and attended probe data (temperature, pH, DO, ammonia, total phosphorus) were also indicative of good conditions. Of note, the seasonal average/maximum total phosphorus concentrations were 0.024/0.038 mg/L (n=5) and there were no observations of dense or very dense filamentous algae.

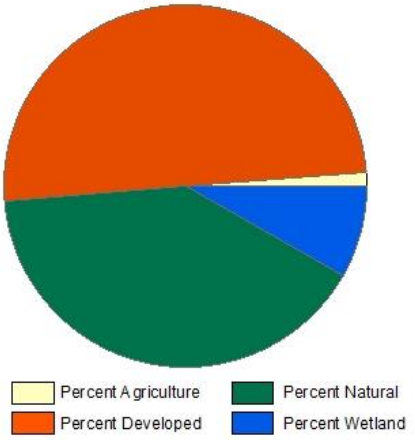
The Aquatic Life Use of this Unnamed Tributary AU (MA72-43) is assessed as Fully Supporting based on water quality data collected during the summer of 2007.

Unnamed Tributary (MA72-47)

Location:	Headwaters west of Forbes Road, Lexington to mouth at confluence with Hobbs Brook, Lincoln.
AU Type:	RIVER
AU Size:	0.8 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Unnamed Tributary - MA72-47

Watershed Area: 0.98 square miles

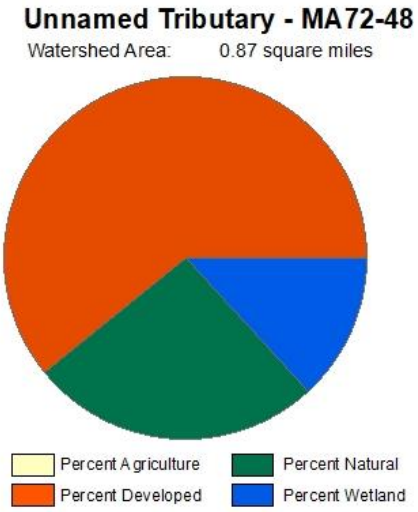


Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.98	0.98	0.6	0.6
Agriculture	1.2%	1.2%	1.5%	1.5%
Developed	50.1%	50.1%	38.5%	38.5%
Natural	40.5%	40.5%	47.1%	47.1%
Wetland	8.2%	8.2%	12.9%	12.9%
Impervious Cover	22.6%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Following the public comment period for the 2016 IR, USGS data were evaluated and estimated continuous chloride concentrations exceeded the chronic criterion 76.5% of the time between December 1, 2013 and December 1, 2014 at USGS station 01104410 (Cambridge Reservoir, unnamed tributary 1, near Lexington). Additionally, total phosphorus was measured at the station during both baseflow and wet weather conditions (n=17) during water years 2009-2015. The average/maximum concentrations were 0.02/0.05 mg/L. The Aquatic Life Use of this Unnamed Tributary AU (MA72-47) will continue to be assessed as Not Supporting based on the estimated chronic chloride criterion exceedances.

Unnamed Tributary (MA72-48)

Location:	Headwaters northeast of the Trapelo Road/Smith Street intersection, Waltham to mouth at inlet Cambridge Reservoir, Lexington.
AU Type:	RIVER
AU Size:	0.9 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.87	0.87	0.44	0.44
Agriculture	0.2%	0.2%	0%	0%
Developed	60.8%	60.8%	47.1%	47.1%
Natural	25.9%	25.9%	28.3%	28.3%
Wetland	13.1%	13.1%	24.6%	24.6%
Impervious Cover	28.7%			

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

Following the public comment period for the 2016 IR, USGS data were evaluated and the estimated continuous chloride concentrations exceeded the chronic criterion 91% of the time between December 1, 2013 and December 1, 2014 at USGS station 01104420 (Cambridge Reservoir "unnamed tributary 3", 20 ft downstream of State Highway 128 culvert, off Tracer Lane, Waltham, near Lexington). Additionally, total phosphorus was measured at the station during both baseflow (n=17) and wet weather conditions (n=15) during water years 2009-2015 (please note, the "2009 water year" runs from October 1, 2008 to September 30, 2009). The 2013-2015 summer seasonal averages ranged from 0.13-0.18 mg/L (n= 3-5). However, baseflow seasonal averages (0.053-0.11; n= 2 each year) were lower than stormflow seasonal averages (0.19-0.38; n= 1-3). Samples were collected at the same USGS station twice in 2006 and measured for the pesticide carbaryl, but there were no violations of criteria (concentration was "non-detect").

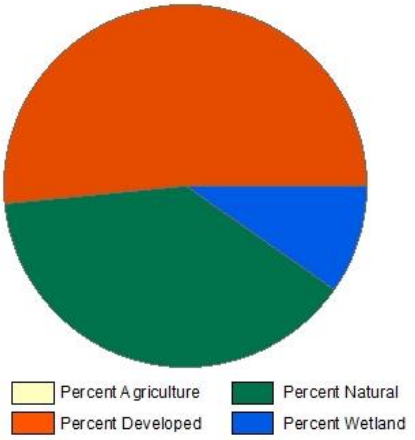
The Aquatic Life Use of this Unnamed Tributary AU (MA72-48) will continue to be assessed as Not Supporting based primarily on the estimated chronic chloride criterion exceedances. An Alert is being identified due to elevated total phosphorus samples collected by USGS.

Waban Brook (MA72-17)

Location:	Headwaters, outlet Lake Waban, Wellesley to mouth at confluence with the Charles River, Wellesley.
AU Type:	RIVER
AU Size:	0.7 MILES
Classification/Qualifier:	B

Waban Brook - MA72-17

Watershed Area: 15.9 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	16.26	11.88	3.93	2.72
Agriculture	0.9%	0.7%	1.5%	1.2%
Developed	51.1%	55.4%	35.6%	39%
Natural	38.5%	34.8%	41%	38.7%
Wetland	9.5%	9.1%	21.9%	21.1%
Impervious Cover	19.4%			

Fish, other Aquatic Life and Wildlife Use: Not Supporting
Since no data are available the Aquatic Life Use of Waban Brook will continue to be assessed as Not Supporting for Temperature.

Walker Pond (MA72126)

Location:	Millis.
AU Type:	FRESHWATER LAKE
AU Size:	9 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
Since no data are available the Aquatic Life Use of Walker Pond (MA72126) is Not Assessed.

Waseeka Sanctuary Pond (MA72155)

Location:	Holliston.
AU Type:	FRESHWATER LAKE
AU Size:	17 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
Since no data are available the Aquatic Life Use for Waseeka Sanctuary Pond is Not Assessed.

Weld Pond (MA72131)

Location:	Dedham.
AU Type:	FRESHWATER LAKE
AU Size:	27 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
As was previously mentioned in the 2002-2006 Charles River Watershed Water Quality Assessment Report, a suspected non-native aquatic macrophyte species (*Myriophyllum* sp., "probably *heterophyllum*) was observed in Weld Pond during a 2002 survey conducted by DEP. There is Insufficient Information to assess the Aquatic Life Use for Weld Pond since no new data were collected. The former alert for the possible presence of a non-native aquatic macrophyte infestation is being carried forward.

Weston Reservoir (MA72134)

Location:	Weston.
AU Type:	FRESHWATER LAKE
AU Size:	59 ACRES
Classification/Qualifier:	B

Fish, other Aquatic Life and Wildlife Use: Not Assessed
Since no data are available the Aquatic Life Use of Weston Reservoir (MA72134) is Not Assessed.

Weston Station Pond (MA72135)

Location:	Weston.
AU Type:	FRESHWATER LAKE
AU Size:	38 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Fish, other Aquatic Life and Wildlife Use: Not Assessed
Since no data are available the Aquatic Life Use of Weston Station Pond (MA72135) is Not Assessed.

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