Appendix 21
Parker River Watershed and Coastal Drainage Area Assessment and Listing Decision Summary

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

CN: 505.1

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Table of Contents

2018/20 Cycle Impairment Changes 3
Baldpate Pond (MA91001) 4
Supporting Information for Delisted Impairments 4
Bull Brook (MA91-04) 5
Bull Brook Reservoir (MA91002) 6
Central Street Pond (MA91003) 7
Crane Pond (MA91004) 8
Dow Brook Reservoir (MA91005) 9
Eagle Hill River (MA91-06) 10
Egypt River (MA91-13) 11
Egypt River (MA91-14) 12
Jackman Brook (MA91-07) 13
Little Crane Pond (MA91007) 14
Little River (MA91-11) 15
Mill River (MA91-08) 16
Supporting Information for Delisted Impairments 17
Mill River (MA91-09) 19
Ox Pasture Brook (MA91-10) 20
Paine Creek (MA91-03) 21
Parker River (MA91-01) 22
Parker River (MA91-02) 23
Penn Brook (MA91-16) 24
Pentucket Pond (MA91010) 26
Supporting Information for Delisted Impairments 26
Plum Island River (MA91-15) 27
Plum Island Sound (MA91-12) 28
Quills Pond (MA91011) 29
Rock Pond (MA91012) 30
Rowley River (MA91-05) 31
Sperrys Pond (MA91013) 32
State Street Pond (MA91014) 33
Supporting Information for Delisted Impairments 33

Wilson Pond (MA91017) 34
References 35

2018/20 Cycle Impairment Changes

Waterbody	AU_ID	2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Baldpate Pond	MA91001	5	5	(Curly-leaf Pondweed*)		Added
Baldpate Pond	MA91001	5	5	(Fanwort*)		Added
Baldpate Pond	MA91001	5	5	(Non-Native Aquatic Plants*)		Removed
Bull Brook Reservoir	MA91002	3	4c	(Fish Passage Barrier*)		Added
Egypt River	MA91-13	3	4c	(Fish Passage Barrier*)		Added
Mill River	MA91-08	5	5	Benthic Macroinvertebrates		Removed
Mill River	MA91-08	5	5	(Fish Passage Barrier*)		Added
Mill River	MA91-08	5	5	(Non-Native Aquatic Plants*)		Removed
Mill River	MA91-08	5	5	(Water Chestnut*)		Added
Parker River	MA91-01	4c	4c	(Fish Passage Barrier*)		Added
Penn Brook	MA91-16	2	5	Benthic Macroinvertebrates		Added
Penn Brook	MA91-16	2	5	Dissolved Oxygen		Added
Pentucket Pond	MA91010	5	5	(Fanwort*)		Added
Pentucket Pond	MA91010	5	5	(Non-Native Aquatic Plants*)		Removed
State Street Pond	MA91014	4c	4c	(Fanwort*)		Added
State Street Pond	MA91014	4c	4c	(Non-Native Aquatic Plants*)		Removed

Baldpate Pond (MA91001)

Location:	Boxford.
AU Type:	FRESHWATER LAKE
AU Size:	60 ACRES
Classification/Qualifier:	B

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

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

DWM personnel performed a water quality survey of Baldpate Pond in August 2005 (W0608). Data at satisfactory ranges were temperature (5.3-27.9°C), pH (6.4 - 7.6 SU), depth-integrated Chlorophyll a (10.4 mg/m3) and surface dissolved oxygen (DO)(5.4-13.1 mg/L). DO depth-profile samples indicated that DO is lower than 5.0 mg/L below 5.7 meters (m) (minimum of <0.2 mg/L), consistent with conditions reported in the 2004-2008 Assessment Report. Oxygen supersaturation of 146% and 128% at depth (3.6 m and 4.4 m, respectively) was measured. Total phosphorus near bottom was 0.16 mg/L; likely attributed to the anoxic conditions at 9-12m. Also, as was documented in the 2004-2005 Assessment Report, DCR Lakes & Ponds staff reported infestations of the non-native aquatic macrophytes, *Cabomba caroliniana* and *Potamogeton crispus* in 2004. The prior non-native aquatic plants impairment is being delisted and replaced with the clarifying Fanwort and Curly-leaf Pondweed codes.

Overall, Baldpate Pond continues to be assessed as not supporting the Aquatic Life Use because of DO measurements below Class B DO criteria of 5.0 mg/L and the presence of two non-native aquatic macrophytes *Cabomba caroliniana* and *Potamogeton crispus*. A new alert is being identified due to some evidence of nutrient enrichment (supersaturation between 3.6 and 4.4 m in depth and slight phosphorus release from anoxic sediments).

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 macrophytes "Curly-leaf Pondweed" (Potamogeton crispus), and "Fanwort" (Cabomba caroliniana).

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

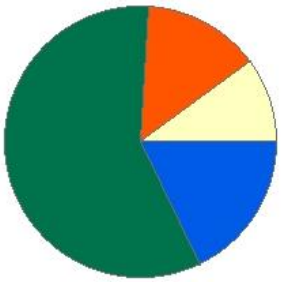
(MassDCR 2008) In 2004, DCR Lakes & Ponds staff reported infestations of the non-native aquatic macrophytes, *Cabomba caroliniana* and *Potamogeton crispus*, in Baldpate Pond. The impairment was changed from the generic "Non-Native Aquatic Plants" to the specific macrophytes "Curly-leaf Pondweed" (Potamogeton crispus), and "Fanwort" (Cabomba caroliniana).

Bull Brook (MA91-04)

Location:	Headwaters south of Linebrook Road, Ipswich to mouth at inlet Bull Brook Reservoir, Ipswich.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	A: PWS, ORW

Bull Brook - MA91-04

Watershed Area: 2.18 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.18	2.18	1.13	1.13
Agriculture	10.18%	10.18%	10.86%	10.86%
Developed	13.99%	13.99%	9.76%	9.76%
Natural	57.92%	57.92%	54.25%	54.25%
Wetland	17.92%	17.92%	25.11%	25.11%
Impervious Cover	4.42%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting
The low-gradient assessment unit, Bull Brook (MA91-04), was sampled by DFG biologists for fish twice in August, 2005 upstream of Line Brook Road in Ipswich (SampleIDs 1198 and 1199) and once in July, 2002 downstream from Line Brook Road in Ipswich (SampleID 735) using the backpack shocking method. According to MassGIS, samples 1198 and 1199 are approximately 350 feet upstream of 735. At all locations, the predominant species were moderately pollution tolerant macrohabitat generalists, and the 2002 downstream sample also included one intolerant species (the banded sunfish). The Aquatic Life Use of Bull Brook is assessed as Fully Supporting based on the fish community sample data documenting the presence of one intolerant and two moderately tolerant macrohabitat generalist species in this low gradient stream.

Bull Brook Reservoir (MA91002)

Location:	Ipswich.
AU Type:	FRESHWATER LAKE
AU Size:	7 ACRES
Classification/Qualifier:	A: PWS, ORW

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	4c	(Fish Passage Barrier*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

DMF biologists indicate that the Bull Brook Reservoir Dam used by the Municipal Light Plant in Ipswich (the "dam"), located at the outlet of Bull Brook Reservoir (AU MA91002), poses an impediment to fish passage and is in need of channel improvements. The target species to support is river herring, with the second species as rainbow smelt. The biologists gave the dam a Fish Passage score of 8 out of 10, meaning passage is almost completely restricted, and an Existing Population score of 2.

The Aquatic Life Use for Bull Brook Reservoir is assessed as Not Supporting because of the fish passage barrier which restricts passage for river herring and rainbow smelt.

Central Street Pond (MA91003)

Location:	Rowley.
AU Type:	FRESHWATER LAKE
AU Size:	3 ACRES
Classification/Qualifier:	B: ORW (tributary to SA SFO ORW)

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess Aquatic Life Use for Central Street Pond (MA91003) so it is Not Assessed.

Crane Pond (MA91004)

Location:	Groveland.
AU Type:	FRESHWATER LAKE
AU Size:	22 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use for Crane Pond (MA91004) so it is Not Assessed.

Dow Brook Reservoir (MA91005)

Location:	Ipswich.
AU Type:	FRESHWATER LAKE
AU Size:	16 ACRES
Classification/Qualifier:	A: PWS, ORW

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use for Dow Brook Reservoir (MA91005) so it is Not Assessed.

Eagle Hill River (MA91-06)

Location:	Headwaters north of Town Hill, east of Town Farm Road, Ipswich to the mouth at Plum Island Sound, Ipswich.
AU Type:	ESTUARY
AU Size:	0.35 SQUARE MILES
Classification/Qualifier:	SA: ORW

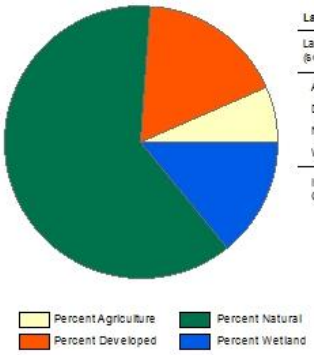
Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
As part of a larger study in the Parker River National Wildlife Refuge (Parker NWF) staff of the federal Fish and Wildlife Service (USFWS) conducted some limited mercury in sediment and wildlife sampling in this Eagle Hill River AU (MA91-06) in 2010 and 2011. The levels of mercury in sediment in the 2011 samples were 169 and 217 ug/g, which exceed the Canadian PEL by 241 to 310 times. These exploratory surveys were conducted without a QAPP. There is Insufficient Information to assess the Aquatic Life Use for this Eagle Hill River AU (MA91-06). An alert is being identified due to high levels of mercury in two sediment samples.

Egypt River (MA91-13)

Location:	Outlet Bull Brook Reservoir, Ipswich to tidally influenced area approximately 600 feet downstream from High Street (Route 1A), Ipswich.
AU Type:	RIVER
AU Size:	0.3 MILES
Classification/Qualifier:	B: ORW

Egypt River - MA91-13

Watershed Area: 3.62 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	3.62	3.62	1.93	1.93
Agriculture	6.63%	6.63%	7.18%	7.18%
Developed	17.35%	17.35%	14.68%	14.68%
Natural	61.94%	61.94%	58.02%	58.02%
Wetland	14.09%	14.09%	20.12%	20.12%
Impervious Cover	5.17%			

2016 AU Category	2018/20 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	4c	(Fish Passage Barrier*)		Added

Fish, other Aquatic Life and Wildlife Use: Not Supporting

DMF biologists indicate that the Bull Brook Reservoir Dam, located at the outlet of Bull Brook Reservoir and the beginning of this Egypt River AU (MA91-13), poses an impediment to fish passage and is in need of improvements. Further downstream in the middle of this AU DFG biologists conducted backpack electrofishing in the Egypt River in August 2005 downstream of Route 1A/133 in Ipswich (SampleID 1186). The sample was dominated by moderately pollution-tolerant macrohabitat generalist species.

While the fish community in this low gradient stream was indicative of generally good conditions (sample dominated by moderately tolerant macrohabitat generalist species, the Aquatic Life Use for this Egypt River AU (MA91-13) is assessed as Not Supporting based on the fish passage barrier (Bull Brook Reservoir Dam) that restricts passage of diadromous fish (target species river herring and rainbow smelt).

Egypt River (MA91-14)

Location:	From tidally influenced area approximately 600 feet downstream from High Street (Route 1A), Ipswich to mouth at confluence with Rowley River, Rowley/Ipswich.
AU Type:	ESTUARY
AU Size:	0.04 SQUARE MILES
Classification/Qualifier:	SA: ORW

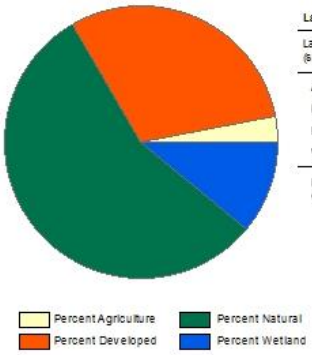
Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use for this Egypt River AU (MA91-14) so it is Not Assessed.

Jackman Brook (MA91-07)

Location:	Perennial portion northeast of intersection of Jewett and Tenney streets, Georgetown to mouth at confluence with Wheeler Brook, Georgetown.
AU Type:	RIVER
AU Size:	0.8 MILES
Classification/Qualifier:	B

Jackman Brook - MA91-07

Watershed Area: 2.34 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.34	2.34	1.05	1.05
Agriculture	3.1%	3.1%	2.38%	2.38%
Developed	30.32%	30.32%	20.63%	20.63%
Natural	55.67%	55.67%	59.07%	59.07%
Wetland	10.92%	10.92%	17.91%	17.91%
Impervious Cover	13.01%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting
DFG biologists conducted backpack electrofishing in Jackman Brook in July 2005 upstream of Jackman Street in Georgetown (Sample ID 1239). The sample contained relatively few fish but was dominated by a moderately pollution-tolerant macrohabitat generalist species and also contained a few sea lamprey. The Aquatic Life Use of Jackman Brook is assessed as Fully Supporting based on the fish sample data.

Little Crane Pond (MA91007)

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

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use for Little Crane Pond (MA91007) so it is Not Assessed.

Little River (MA91-11)

Location:	Scotland Road/Parker Street, Newbury/Newburyport to mouth at confluence with Parker River, Newbury.
AU Type:	ESTUARY
AU Size:	0.09 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO (tributary to SA SFO ORW)

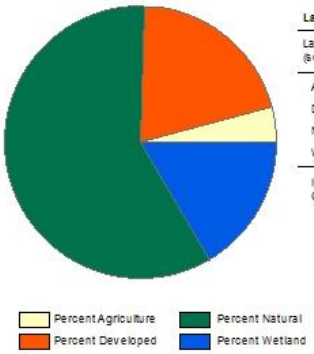
Fish, other Aquatic Life and Wildlife Use: Fully Supporting
DFG biologists conducted backpack electrofishing in the Little River downstream of the Scotland Road in Newburyport in August 2006 (Sample ID 1598). The sample was dominated by moderately tolerant macrohabitat generalists. One intolerant macrohabitat generalist species was also collected. The Aquatic Life Use of the Little River is assessed as Fully Supporting based on the fish sample data which documented the presence of intolerant and moderately tolerant fish in this low gradient stream.

Mill River (MA91-08)

Location:	Headwaters - Outlet of small unnamed pond between Route 95 and Rowley Road, Boxford to tidally influenced area approximately 1200 feet upstream from Route 1, Rowley/Newbury (through former 2008 segment: Upper Mill Pond MA91015 and through former 2010 segment: Lower Mill Pond MA91008).
AU Type:	RIVER
AU Size:	6.7 MILES
Classification/Qualifier:	B: ORW, WWF

Mill River - MA91-08

Watershed Area: 12.57 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	12.55	6.58	4.82	2.54
Agriculture	4.25%	6.41%	4.78%	7.31%
Developed	20.41%	20.34%	13.13%	13.46%
Natural	58.85%	57.83%	53.8%	51.8%
Wetland	16.49%	15.42%	28.29%	27.42%
Impervious Cover	9.03%			

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting

As was documented in the Parker River Watershed and Coastal Drainage Area 2004-2008 Assessment Report, the non-native aquatic macrophyte, water chestnut (*Trapa natans*), was identified during a 1994 synoptic survey of Lower Mill Pond, which is now part of this Mill River AU (MA91-08). DFG biologists conducted backpack electrofishing at two along this Mill River AU in Rowley in August 2005: the upstream sample was up and downstream of Mill Road (Sample ID 1190), and approximately one mile downstream the second sample was collected downstream from Dodge Road (Sample ID 1375). Moderately tolerant macrohabitat generalist species were collected at both sites although the downstream sample also included the fluvial dependent species white sucker.

Close to the most downstream end of this Mill River AU (MA91-08), DMF biologists indicate that the historic Jewel Mill Dam in Rowley (the "Dam") is an impediment to fish passage (passage score 10).

The Aquatic Life Use for this Mill River AU (MA91-08) is assessed as Not Supporting based on the infestation of Trapa natans (water chestnut) in the Lower Mill Pond impoundment, and the barrier to diadromous fish passage at the Jewell Mill Dam in Rowley. The generic non-native aquatic plants impairment is being delisted and the

specific water chestnut impairment is being added. The benthic macroinvertebrate bioassessment impairment is also being delisted since the original impairment was based on an RBPIII analysis indicating only slight impact in August 1999 (see justification in removal comment).

2018/20 Delisted Impairment	Delisting Reason	Delisting Comment
Benthic Macroinvertebrates	Applicable WQS attained; original basis for listing was incorrect	The benthic macroinvertebrate sampling in the Mill River was conducted in August 1999. The RBPIII analysis indicated slight impacts (total metric score of 28 representing 74% comparability to the Fish brook reference station). While there was some concern regarding nutrient enrichment and (numerous filter-feeding caddisflies) trophic structure of the benthic community did not grossly favor a FPOM-based assemblage as indicated by the high score for the scraper/filterer metric (elmid and psephenid beetles were well represented). Since the RBPIII analysis was clearly within the CALM guidance indicating supporting conditions for the Aquatic Life Use (near the upper end of the slightly impacted category), the benthic Macroinvertebrate Bioassessments impairment is being delisted.
Non-Native Aquatic Plants	Clarification of listing cause	Impairment changed from the generic “Non-Native Aquatic Plants” to the specific macrophyte “Water Chestnut” (Trapa natans)

Supporting Information for Delisted Impairments

Benthic Macroinvertebrates

The benthic macroinvertebrate sampling in the Mill River was conducted in August 1999. The RBPIII analysis indicated slight impacts (total metric score of 28 representing 74% comparability to the Fish brook reference station). While there was some concern regarding nutrient enrichment and (numerous filter-feeding caddisflies) trophic structure of the benthic community did not grossly favor a FPOM-based assemblage as indicated by the high score for the scraper/filterer metric (elmid and psephenid beetles were well represented).

Data Source (Weinstein and Connors 2001):

Table A2. Summary of RBP III data analysis for macroinvertebrate communities sampled during the Parker River watershed survey between 28 July and 5 August 1999. Shown are the calculated metric values, metric scores (in italics) based on comparability to the reference station (FB00), and the corresponding assessment designation for each biomonitoring station. Refer to Table 1 for a complete listing and description of sampling stations.

STATION #	FB00		JK01		MR03		OX03		PR01B		PR00	
STREAM	Fish Brook		Jackman Brook		Mill River		Ox Pasture Brook		Parker River		Parker River	
HABITAT SCORE	158		126		146		148		134		155	
TAXA RICHNESS	29	*6*	25	*6*	18	*4*	22	*4*	21	*4*	18	*4*
BIOTIC INDEX	4.81	*6*	3.70	*6*	4.66	*6*	3.94	*6*	5.70	*4*	4.90	*6*
EPT INDEX	8	*6*	11	*6*	6	*2*	6	*2*	6	*2*	7	*4*
EPT/CHIRONOMIDAE	0.70	*6*	2.39	*6*	14.75	*6*	7.50	*6*	0.57	*6*	3.50	*6*
SCRAPERS/FILTERERS	1.50	*6*	0.60	*4*	0.79	*6*	1.46	*6*	0.11	*0*	0.15	*0*
COMMUNITY SIMILARITY	100%	*6*	71%	*6*	31%	*0*	45%	*2*	62%	*4*	49%	*2*
% DOMINANT TAXON	34%	*2*	24%	*4*	20%	*4*	25%	*4*	19%	*6*	30%	*4*
TOTAL METRIC SCORE	*38*		*38*		*28*		*30*		*26*		*26*	
% COMPARABILITY TO REFERENCE STATION			100%		74%		79%		68%		68%	
BIOLOGICAL CONDITION-DEGREE IMPAIRMENT	**REFERENCE**		**NON-IMPACTED**		**SLIGHTLY IMPACTED**		**NON/ SLIGHTLY IMPACTED**		**SLIGHTLY IMPACTED**		**SLIGHTLY IMPACTED**	

A reevaluation of the original listing information was conducted. The RBPIII analysis of the August 1999 benthic sample indicated slight impacts (total metric score of 28 representing 74% comparability to the Fish brook reference station). While there was some concern regarding nutrient enrichment and (numerous filter-feeding caddisflies) trophic structure of the benthic community did not grossly favor a FPOM-based assemblage as indicated by the high score for the scraper/filterer metric (elmid and psephenid beetles were well represented). Since the RBPIII analysis was clearly within the CALM guidance indicating supporting conditions for the Aquatic Life Use (the RPBIII analysis is at the very high end of the slightly impaired category (54-79%) at 74%), the benthic Macroinvertebrate Bioassessments impairment is being delisted.

Non-Native Aquatic Plants

Data Source (MassDEP 1994): The non-native aquatic macrophyte, water chestnut (*Trapa natans)*, was identified during a 1994 synoptic survey of Lower Mill Pond, which is now part of Mill River (MA91-08). The impairment was changed from the generic “Non-Native Aquatic Plants” to the specific macrophyte “Water Chestnut” (Trapa natans).

Mill River (MA91-09)

Location:	From tidally influenced area approximately 1200 feet upstream from Route 1, Rowley/Newbury to mouth at confluence with Parker River, Newbury.
AU Type:	ESTUARY
AU Size:	0.09 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO

Fish, other Aquatic Life and Wildlife Use: Fully Supporting

The Governor's Academy Wastewater Treatment Plant discharges treated sanitary effluent to an unnamed intermittent freshwater tributary to the Mill River (permit #MA00030350). No acute or chronic toxicity was detected by the *C. dubia* test organisms during whole-effluent toxicity (WET) tests conducted between August 2009 and September 2018 (LC50s = >100% effluent n=19 tests and CNOECs = 100% effluent n=18 valid tests). DFG biologists conducted backpack electrofishing in this low gradient stream using two units in this Mill River AU (MA91-09) in August 2005 upstream of Route 1, on the Rowley/Newbury town line (sample ID 1178). The fluvial dependent species (white sucker) dominated the sample.

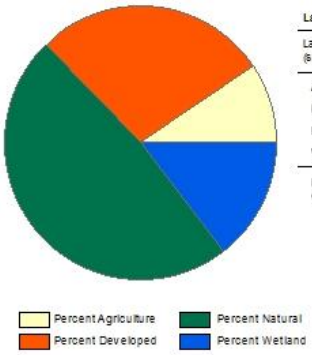
The Aquatic Life Use for this Mill River AU (MA91-09) is assessed as Fully Supporting based primarily on the fish sample data which was found to be dominated by a fluvial species although several moderately tolerant macrohabitat generalist species were also present in this low gradient stream.

Ox Pasture Brook (MA91-10)

Location:	Headwaters - Outlet of small unnamed impoundment east of Bradford Street, Rowley to west of Ox Pasture Hill near the Mill Creek Wildlife Management Area boundary, Rowley.
AU Type:	RIVER
AU Size:	2.3 MILES
Classification/Qualifier:	B: ORW (tributary to SA SFO ORW)

Ox Pasture Brook - MA91-10

Watershed Area: 1.85 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.85	1.85	0.82	0.82
Agriculture	9.65%	9.65%	11.67%	11.68%
Developed	27.69%	27.69%	20.56%	20.56%
Natural	48.04%	48.04%	44.4%	44.4%
Wetland	14.62%	14.62%	23.36%	23.36%
Impervious Cover	11.25%			

Fish, other Aquatic Life and Wildlife Use: Fully Supporting
DFG biologists conducted backpack electrofishing at two locations in Ox Pasture Brook in Rowley in August 2005 from upstream to downstream as follows: downstream of School Street (SampleID 1184) and downstream of Fenno Drive (SampleID 1188). Both locations were dominated by tolerant macrohabitat generalists although a few moderately tolerant macrohabitat generalists were also present (Sea lamprey at both sites and redfin pickerel at the downstream location). In December 2010, Ox Pasture Brook Lower Dam in Rowley that was serving as a "fish passage barrier" was removed. The Aquatic Life Use for Ox Pasture Brook is assessed as Fully Supporting based on the fish sample data documenting the presence of moderately tolerant macrohabitat generalist species in this low gradient stream as well as the removal of a fish passage barrier (the Lower Dam in Rowley).

Paine Creek (MA91-03)

Location:	Headwaters east of Town Farm Road, Ipswich to confluence with Eagle Hill River, Ipswich.
AU Type:	ESTUARY
AU Size:	0.06 SQUARE MILES
Classification/Qualifier:	SA: ORW

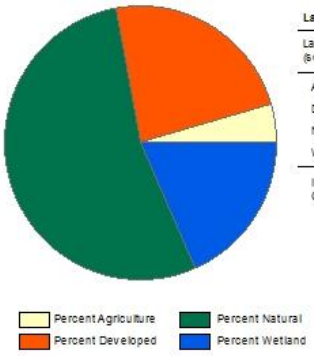
Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use for Paine Creek so it is Not Assessed.

Parker River (MA91-01)

Location:	Source north of Silver Mine Road, Boxford to Parker River Dam#1 (NATID# MA00241) just upstream of Central Street, Newbury (excluding Sperry Pond segment MA91013, Rock Pond segment MA91012, Pentucket Pond segment MA91010, and Crane Pond segment MA91004).
AU Type:	RIVER
AU Size:	12.3 MILES
Classification/Qualifier:	B: WWF, HQW

Parker River - MA91-01

Watershed Area: 24.85 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	24.79	9.16	8.25	3.54
Agriculture	4.6%	3.41%	2.85%	1.55%
Developed	23.43%	21.12%	17.94%	15.05%
Natural	53.44%	53.57%	47.17%	48.06%
Wetland	18.53%	21.89%	32.04%	35.35%
Impervious Cover	7.96%			

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting

DMF biologists indicate that the freshwater portion of the Parker River (MA91-01) once contained seven dams or culverts that once posed impediments to fish passage. Since the last assessment update, fish passage improvement projects were completed at four of these sites in Byfield. The statuses of three remaining barriers are as follows: Pentucket Outlet Dam in Georgetown has a passage score of 4 with improvements to passage needed, the Larkin Road Dam in Newbury has a passage score of 5 and removal of this dam has been proposed but not yet completed, and the Blacksmith Shop Dam in Byfield has passage score of 2. Survival of *C. dubia* exposed (~7 days) to water collected from the Parker River for use as dilution water in the Georgetown Water Treatment Facility's WET test in July 2019 was 100%. According to the MassGIS maps the Zone II Water Supply areas cover most of the length of this AU.

The Aquatic Life Use for this Parker River AU (MA91-01) is assessed as Not Supporting due to the presence of fish passage barriers as well as flow alterations due to dewatering. The dewatering impairment, originally identified as a Threat for the Aquatic Life Use in the 1996 reporting cycle, became listed as an impairment in the 1998 reporting cycle. Dewatering is considered to be associated in part with baseflow depletion from groundwater withdrawals.

Parker River (MA91-02)

Location:	From Parker River Dam#1 (NATID# MA00241) just upstream of Central Street, Newbury to mouth at Plum Island Sound, Newbury.
AU Type:	ESTUARY
AU Size:	0.6 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO

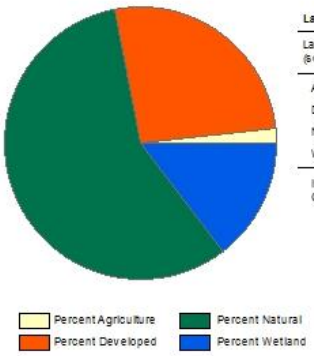
Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available to assess the Aquatic Life Use for this Parker River AU (MA91-02) so it is Not Assessed.

Penn Brook (MA91-16)

Location:	Headwaters, outlet Baldpate Pond, Boxford to mouth at confluence with Parker River, Georgetown.
AU Type:	RIVER
AU Size:	3 MILES
Classification/Qualifier:	B

Penn Brook - MA91-16

Watershed Area: 4.08 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.08	4.04	1.37	1.36
Agriculture	1.86%	1.87%	2.14%	2.14%
Developed	26.22%	26.14%	20.49%	20.49%
Natural	57.19%	57.18%	49.15%	49.06%
Wetland	14.73%	14.81%	28.22%	28.32%
Impervious Cover	9.69%			

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting

DMF biologists note that the Baldpate Pond culvert, forming the beginning of the Penn Brook AU (MA91-16), has restricted fish passage; however since no diadromous fish run is currently known to be present, no impairment decision will be made for this barrier. In July 2010 MassDEP biologists conducted benthic macroinvertebrate sampling in Penn Brook approximately 120 meters upstream of East Main Street (Route 133) in Georgetown (B0679). The RBPIII analysis indicated 52% comparable (slightly impaired/moderately impaired) to the Elizabeth Brook reference station (B0686) located in the Concord Basin. MassDEP staff also conducted water quality monitoring in Penn Brook as well during the summer of 2010 (approximately 390 feet upstream of East Main Street (Route 133), Georgetown (W2141). According to the Sonde readings, dissolved oxygen (DO) ranged from 0.2-4.9 mg/L, all below the Class B criterion of 5 mg/L. The maximum diel DO shift was 3.6 and the maximum DO saturation was only 54%. The maximum temperature was 25.4°C which meets warm water criteria. Attended probe data can be summarized as follows: All six DO readings were <4mg/L (1.0 to 3.7 mg/L), maximum temperature was 22.4°C (n=8), pH ranged from 6.1 to 6.9 SU (n=6) with two measurements slightly below 6.5SU. The average total phosphorus concentration was 0.052 mg/L (maximum 0.066 mg/L), below the 1986 EPA "Gold Book" phosphorus concentration of 0.1 mg/L for flowing rivers. No observations of dense or very dense filamentous algae were noted. Results of three clean metals sampling met all applicable criteria (no acute or chronic criteria exceedances). WPP staff considers the low DO and the slightly impaired benthic community to likely be the result of natural conditions (i.e., the low-gradient wetland upstream from the sampling location) however the natural land-use cover is only estimated to be ~72% in the Penn Brook

subwatershed and the impervious cover almost 10% which both fail the evaluation methods for natural condition. There was only one indicator of nutrient enrichment (maximum DO diel shift of 3.6).
The Aquatic Life Use for Penn Brook is assessed as Not Supporting based on the RBPIII analysis indicating a slightly/moderately impaired benthic community and the very low DO documented during the summer of 2010. It is noted however that these conditions may be natural and result from the expansive wetland system and influence of groundwater (DO essentially 0 for much of July and August deployments in 2010). A reevaluation of this impairment decision will be warranted once biocriteria thresholds are developed and the representativeness of the sampling station is considered.

Pentucket Pond (MA91010)

Location:	Georgetown.
AU Type:	FRESHWATER LAKE
AU Size:	92 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting
As was documented in the Parker River Watershed and Coastal Drainage Area 2004-2008 Water Quality Assessment Report, according to the MassDEP Herbicide Database, the Town of Georgetown treated an infestation of the non-native aquatic macrophyte, "Fanwort" (*Cabomba caroliniana*), in Pentucket Pond (MA91010) in the years 2005 and 2007. The Aquatic Life Use for Pentucket Pond is assessed as Not Supporting based on the presence of the non-native aquatic macrophyte species *Cabomba caroliniana* (Fanwort). The generic non-native aquatic plants impairment is being delisted and the specific Fanwort impairment is being added.

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 "Fanwort" (Cabomba caroliniana)

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

Data Source (MassDEP 2017): According to the MassDEP Herbicide Database, the Town of Georgetown treated an infestation of the non-native aquatic macrophyte, *Cabomba caroliniana*, in Pentucket Pond in the years 2005 and 2007. The impairment was changed from the generic "Non-Native Aquatic Plants" to the specific macrophyte "Fanwort" (Cabomba caroliniana).

Plum Island River (MA91-15)

Location:	From "high sandy" sandbar just north of the confluence with Pine Island Creek, Newbury to confluence with Plum Island Sound, Newbury (formerly part of 2000 segment: Plum Island River MA84A-23).
AU Type:	ESTUARY
AU Size:	0.39 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
Sediment mercury investigations by USFWS staff were performed within Plum Island River (MA91-15) in 2011. Mean total mercury concentrations in the five sediment samples from Plum Island River exceeded the Canadian PEL between 303 to 501 times. These exploratory surveys were conducted without a QAPP. An Alert Status is being identified for the Plum Island River segment (MA91-15) due to high levels of mercury in sediment; however, without any other confirmatory data there is Insufficient Information available to assess the Aquatic Life Use.

Plum Island Sound (MA91-12)

Location:	From the mouth of both the Parker River and Plum Island River, Newbury to the Atlantic Ocean, Ipswich (Includes Ipswich Bay) (formerly reported as 2000 segment: Plum Island Sound MA84A-24).
AU Type:	ESTUARY
AU Size:	4.48 SQUARE MILES
Classification/Qualifier:	SA: ORW, SFO

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
Sediment mercury samples were collected by US Fish and Wildlife Service (USFWS) staff within Plum Island Sound in 2011. Five sediment samples were collected. The mean total mercury in the five sediment samples exceeded the Canadian PEL between 79 to 203 times. These exploratory surveys were conducted without a QAPP. An Alert Status is being identified for Plum Island Sound due to high levels of mercury in sediment; however, without any other confirmatory data there is Insufficient Information available to assess the Aquatic Life Use.

Quills Pond (MA91011)

Location:	Newbury.
AU Type:	FRESHWATER LAKE
AU Size:	2 ACRES
Classification/Qualifier:	B: ORW (tributary to SA SFO ORW)

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
During the 1994 synoptic surveys, MassDEP staff observed a specimen of *Myriophyllum* sp. but indicated it was "not in good condition; very difficult to identify." The prior Alert Status for a potential infestation of a non-native aquatic macrophyte should be maintained. No additional data are available for Quills Pond (MA91011) in this reporting cycle, so the Aquatic Life Use is assessed as Insufficient Information.

Rock Pond (MA91012)

Location:	Georgetown.
AU Type:	FRESHWATER LAKE
AU Size:	49 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available so the Aquatic Life Use for Rock Pond is Not Assessed.

Rowley River (MA91-05)

Location:	Headwaters, confluence with Egypt River, Rowley/Ipswich to mouth at Plum Island Sound, Rowley/Ipswich.
AU Type:	ESTUARY
AU Size:	0.25 SQUARE MILES
Classification/Qualifier:	SA: ORW

Fish, other Aquatic Life and Wildlife Use: Insufficient Information (Alert)
In 2011, staff from the US Fish and Wildlife Service (USFWS) collected two sediment samples in the Rowley River AU (MA91-05) within the Parker River National Wildlife Refuge. The mean total mercury concentration in the two sediment samples exceeded the Canadian PEL by 187 and 263 times. These exploratory surveys were conducted without a QAPP. An Alert Status is being identified for the Rowley River due to high levels of mercury in sediment; however, without any other confirmatory data there is Insufficient Information available to assess the Aquatic Life Use.

Sperrys Pond (MA91013)

Location:	Boxford.
AU Type:	FRESHWATER LAKE
AU Size:	26 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available so the Aquatic Life Use for Sperrys Pond is Not Assessed.

State Street Pond (MA91014)

Location:	Newburyport.
AU Type:	FRESHWATER LAKE
AU Size:	4 ACRES
Classification/Qualifier:	B: ORW (tributary to SA SFO ORW)

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

Fish, other Aquatic Life and Wildlife Use: Not Supporting
The non-native aquatic macrophyte, *Cabomba caroliniana* (Fanwort), was identified by MassDEP biologists during a 1994 synoptic survey of State Street Pond. No other data are available. The Aquatic Life Use for State Street Pond is assessed as Not Supporting based on the presence of the non-native aquatic macrophyte species *Cabomba caroliniana* (Fanwort). The generic non-native aquatic plants impairment is being delisted and the specific Fanwort impairment is being added.

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 Fanwort (Cabomba caroliniana)

Supporting Information for Delisted Impairments

Non-Native Aquatic Plants

Data Source (MassDEP 1994)**:** The non-native aquatic macrophyte, *Cabomba caroliniana* (fanwort), was identified by MassDEP biologists during a 1994 synoptic survey of State Street Pond. The impairment was changed from the generic "Non-Native Aquatic Plants" to the specific macrophyte Fanwort (Cabomba caroliniana).

Wilson Pond (MA91017)

Location:	Rowley.
AU Type:	FRESHWATER LAKE
AU Size:	5 ACRES
Classification/Qualifier:	B: ORW, WWF (impoundment on river designated B/WWF/ORW)

Fish, other Aquatic Life and Wildlife Use: Not Assessed
No data are available so the Aquatic Life Use for Wilson Pond is Not Assessed.

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